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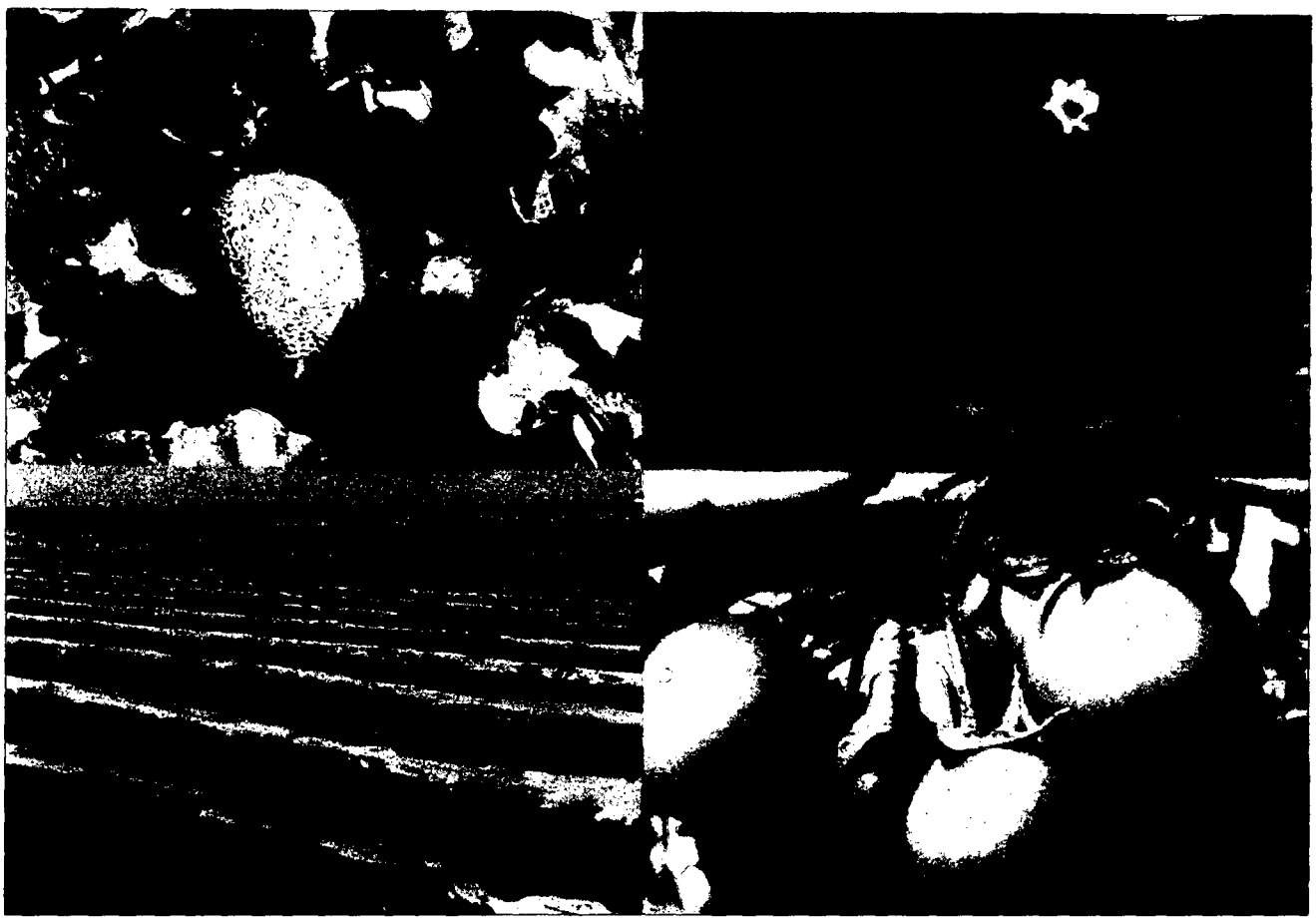
Universidad Autónoma de Sinaloa
Facultad de Agronomía



FINAL PROJECT REPORT

PROJECT: "Alternatives to the use of methyl bromide in tomato, strawberry, tobacco, melon and flowers crops"
Additonal services related to Contract No. 99/075

Culiacán, Sinaloa, México. March, 2004

Mounira Latrech
Contracts Office
General Services Section
Financial Performance Control Branch
UNIDO

March 15th, 2004.

Dear Ms. Latrech:

Regarding to the Amendment A to Contract UNIDO-UAS No. 99/075, "Demonstration Project of Alternatives to the use of Methyl Bromide in the cultivation of Tomatoes, Strawberries, Raspberries, Tobacco, Melons and cut Flowers in Mexico". In Terms of Reference, Annex E. We are enclosing our Final project report and the corresponding invoice for the final payment.

I hope this report cover the expectations approached in the contract. We keep in touch any comment.

Cordially yours,

MC. FRANCISCO JAVIER ESTRADA RAMÍREZ
DIRECTOR OF PROJECT

INDEX

FINAL REPORT

Pages

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

FINAL PROJECT REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP: Tomatoes (*Lycopersicon esculentun L.)* variety being used by the grower, and harvest will be fruits.

PROJECT AREAS: Experimental units will be located in "San Juanito" ranch, Valle de San Quintín, Baja California, México.

Executive Manager: Ing. Jaime González Sandoval.
Farmer: Ing. Conrado González Sandoval

Enterprise Address: Carretera Transpeninsular, Km 171.9, Colonia Vicente Guerrero, Valle de San Quintín, Baja California, México.

Tels: (01) (616) 6-24-94, 6-24-91

Culiacan, Sinaloa, March, 2004.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

FINAL PROJECT REPORT. Demonstration Project of Alternatives to the use of Methyl Bromide in the cultivation of **Tomatoes**, (*Lycopersicon esculentum* L.). The development in "Don Juanito" Ranch in Col. Vicente Guerrero, San Quintin, Baja California, Mexico. In this field have been working MC. Francisco Javier Estrada Ramirez, coordinator in this project. And MC. Sostenes Montoya Angulo, agronomist who is implementing the tests. QFB. María de la Luz Acosta Pineda y Carlos Morales Cazarez Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

INTRODUCTION

Last March, 2001, in Baja California, Mexico, we started taking some tests. We apply different treatments in soil, in order to analyze the control about soil microorganisms and in crops development also, comparing Methyl bromide. We apply this substance in muddy type soil.

Treatments: We started the experiment in agricultural season 2001. we applied 12 (twelve) treatments:

TREATMENTS OR ALTERNATIVES:

1.- Control (no treatment).
2.- 15 gr/m^2 of methyl bromide (75/25 or 80/20).
3.- 40 gr/m^2 of methyl bromide (75/25 or 80/20).
4.- Five kg of compost incorporated into the soil, plus four weeks of solarization
5.- Five kg of bovine cattle manure incorporated into soil, plus four weeks of solarization.
6.- Five kg of fresh broccoli residue (or other cruciferous plant) incorporated into soil, plus four weeks of solarization.
7.- 25 ml/m^2 of metam-sodium (N, methyl sodium ditiocarbamate) plus six weeks of solarization.
8.- 50 ml/m^2 of metam-sodium.
9.- 33 ml/m^2 of chloropicrin.
10- 40 gr/ m^2 of Dazomet (tetrahydro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona).

11.- 1,3-dichloropropene+chloropicrin,dose recommended by the manufacturer.
12.- 1,3-dichloropropene, dose recommended by the manufacturer (11.2 ml/m^2).

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last February, when "Don Juanito" enterprise heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they made the installment underground pipeline. Afterwards the beds were marked, raised and flattened. And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in March, 2001. In a piece of land with 48 beds, 50 m length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 12 experimental plots with 4 beds, which we applied next randomized treatments:

1). **Absolute control.** In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application.

2). **Methyl Bromide 80/20**. In the four rows, It was injected 15 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

3). **Methyl Bromide 80/20**. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

4). **Five kg of compost** incorporated into the soil, plus four weeks of solarization

5). **Five kg of bovine** cattle manure incorporated into soil, plus four weeks of solarization.

6). **Broccoli** incorporated on the soil and solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it were distributed 5 kg per M^2. It was incorporated by manual labor using hoes, after that, the rows were covered with transparent plastic.

7). **Metham-sodium.** In this four furrows it was applied 25 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

8). **Metham-sodium.** In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

9). **Chloropicrin.** On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 20 days.

10). **Dazomet** (tetrahidro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona). On this furrows soil we distributed by manual labor 40 gr/m^2 dazomet: it was incorporated using hoes, after that, we applied water by sprinkler irrigation during 3 hrs. Finally, it was covered in black/silver plastic.

11). **1,3-dichloropopren + chloropicrin.** These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

12). **1,3-dichloropropen.** These furrows soil were treated using 11.2 ml/m^2 1,2-dichloropropen. This application was carried out using the equipment tractor thereinafter. The furrows were covered in black/silver plastic during 20 days.

The treatments were applied on damp soil.

Evaluations are taking place in the two central furrows in each experimental unit. We attached a label in 10 plants (five each row or 10 cm central bed) which were randomized, in order to take size measure.

Planting.

Tomato plants used in this tests are "fat" tomato or "ball" type. This plants grew in polyethylene ashtrays in "Don Juanito" agricultural enterprise greenhouses. The plants were 50 days old. They were planting 45 cm between each plant, on furrows with damp soil, non covered with plastic.

Crop Management

Irrigation and fertilization took place using drip irrigation, and they are controlled directly by enterprise field manager. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

RESULTS

NEMATODES

FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA

SITE: RANCHO "DON JUANITO", COL. VICENTE GUERRERO (SANTA FE), B.C.

CROOP: Tomato "Tequila"

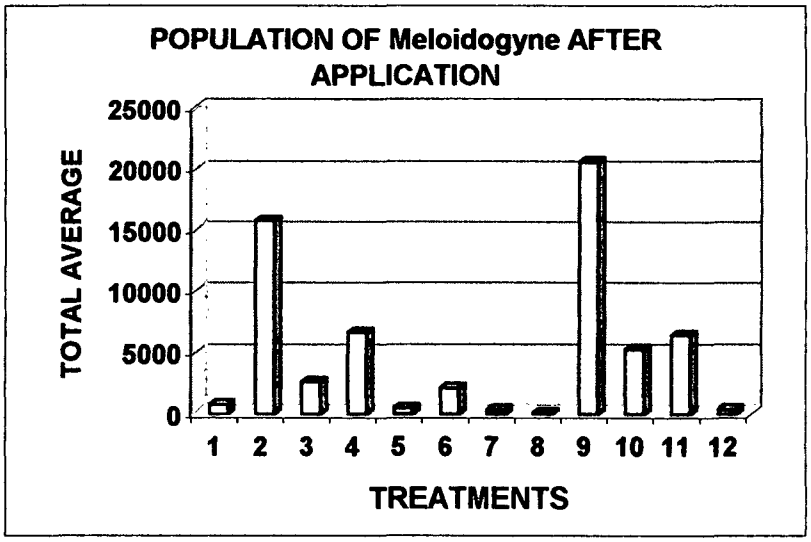
PLANTING DATE: April 25th, 2001

EVALUATION PARAMETER: Total Population of Meloydogine after application

SAMPLING DATE: August 24th, 2001

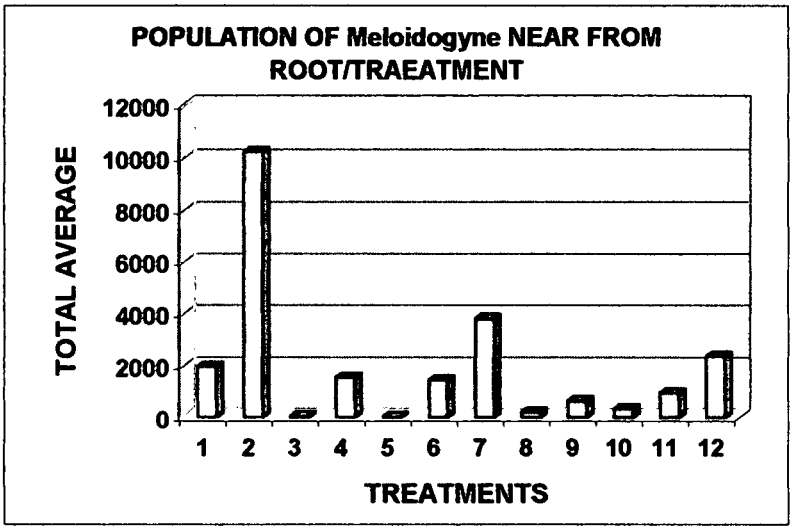
ACCOUNTING DATE: August 30th, 2001

Population of Meloydogine from 200 GR. Of soil/treatment				
TREATMENT	REPETITIONS			
	1	2	TOTAL	AVERAGE
1. Chloropicrin	820	680	1500.00	750
2. Dichloropropen+Chloropicrin	18280	13200	31480.00	15740
3. Broccoli	2720	2480	5200.00	2600
4. Metam sodium 50	7020	6160	13180.00	6590
5. Dichloropropene	420	480	900.00	450
6. Estiercol	2520	1700	4220.00	2110
7. Methyl Bromide 50	240	400	640.00	320
8. Methyl Bromide 40	60	120	180.00	90
9. Dazomet	17160	24000	41160.00	20580
10.Control	5940	4500	10440.00	5220
11.Tomato compost	6420	6340	12760.00	6380
12.Metam sodium 25	620	120	740.00	370



FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA
SITE: RANCHO "DON JUANITO", COL. VICENTE GUERRERO (SANTA FE), B.C.
CROOP: Tomato "Tequila"
PLANTING DATE: April 25th, 2001
EVALUATION PARAMETER:: Population of Meloydogine near root
SAMPLING DATE: October 30th, 2001
ACCOUNTING DATE: November 6th, 2001

Population of Meloydogine from 200 GR. Of soil/treatment				
TREATMENT	REPETITIONS			
	1	2	TOTAL	AVERAGE
1. Chloropicrin	2360	1540	3900.00	1950
2. Dichloropropen+Chloropicrin	10360	10100	20460.00	10230
3. Broccoli	40	20	60.00	30
4. Metam sodium 50	1740	1320	3060.00	1530
5. Dichloropropene	0	0	0.00	0
6. Estiercol	1400	1460	2860.00	1430
7. Methyl Bromide 50	3660	3920	7580.00	3790
8. Methyl Bromide 40	220	160	380.00	190
9. Dazomet	680	560	1240.00	620
10.Control	220	400	620.00	310
11.Tomato compost	1040	820	1860.00	930
12.Metam sodium 25	2620	2060	4680.00	2340



FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA

SITE: RANCHO "DON JUANITO", COL. VICENTE GUERRERO (SANTA FE), B.C.

CROP: Tomato "Tequila"

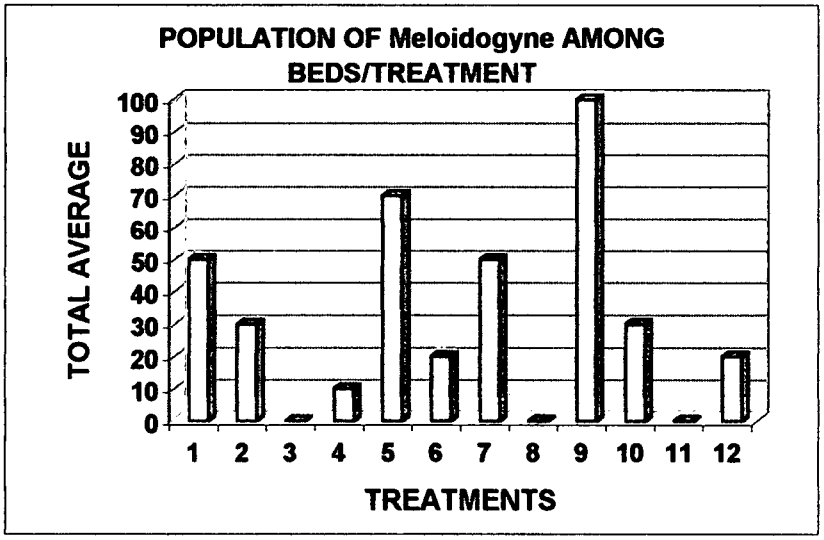
PLANTING DATE: April 25th, 2001

EVALUATION PARAMETER: Total Population of Meloydogine among beds

SAMPLING DATE: October 30th, 2001

ACCOUNTING DATE: November 6th, 2001

Population of Meloydogine from 200 GR. Of soil/treatment				
TREATMENT	REPETITIONS			
	1	2	TOTAL	AVERAGE
1. Chloropicrin	80	20	100.00	50
2. Dichloropropen+Chloropicrin	20	40	60.00	30
3. Broccoli	0	0	0.00	0
4. Metam sodium 50	20	0	20.00	10
5. Dichloropropene	40	100	140.00	70
6. Estiercol	20	20	40.00	20
7. Methyl Bromide 50	60	40	100.00	50
8. Methyl Bromide 40	0	0	0.00	0
9. Dazomet	60	140	200.00	100
10.Control	40	20	60.00	30
11.Tomato compost	0	0	0.00	0
12.Metam sodium 25	40	0	40.00	20



CULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINAL
SITE: "DON JUANITO" RANCH, COL. VICENTE GUERRERO (SA
CROP: TOMATOE, VAR. TEQUILA.
PLANTING DATE: April 25th, 2001 Cycle 2001
EVALUATION PARAMETER: % nodulation roots rate per Meloydo
EVALUATION DATE: 29/10/01 Scale 1-6 =

% NODULATION RATE OF ROOTS PER Meloydogine 10 PLANTS/REPETITION																						
TREATMENT	REPETITION I											REPETITION II										
	PLANTS											PLANTS										
	1	2	3	4	5	6	7	8	9	10	average	1	2	3	4	5	6	7	8	9	10	average
1. Chloropicrin	0	100	40	20	40	20	100	80	60	100	56.00	60	80	100	40	100	80	0	100	100	0	66.00
2. Dichloropropene+Chlorop	0	0	0	0	0	80	20	0	0	0	10.00	100	0	0	0	100	40	60	40	80	20	44.00
3. Brocoli	40	0	20	100	60	100	100	100	100	100	72.00	100	100	100	100	100	100	100	100	100	60	96.00
4. Metam sodium 50	100	100	0	0	100	100	100	100	100	100	80.00	100	100	80	100	100	100	100	100	80	100	96.00
5. Dichloropropene	0	0	0	0	60	0	0	0	80	60	20.00	60	80	20	40	0	20	0	100	20	20	36.00
6. Cow manure	100	100	100	60	80	100	100	100	100	100	94.00	100	0	100	100	100	80	100	100	100	100	88.00
7. Methyl Bromide 50	0	0	0	0	0	0	20	20	40	100	18.00	100	100	100	20	0	0	0	0	0	0	32.00
8. Methyl Bromide 40	20	0	0	0	0	40	40	60	20	40	22.00	0	0	0	0	0	0	0	0	0	0	0.00
9. Dazomet	100	100	100	100	100	100	100	100	100	100	100.00	100	100	100	100	80	80	100	100	100	60	92.00
10.Control	0	100	100	100	100	80	80	0	0	0	56.00	100	100	100	100	100	100	100	100	100	100	100.00
11.Tomatoe compost	100	100	100	100	100	100	80	80	100	100	96.00	100	100	100	100	100	100	100	100	80	60	94.00
12.Metam sodium 25	60	40	20	40	40	60	60	40	0	60	42.00	60	80	100	60	0	0	0	0	0	0	30.00

	REPETITION III											REPETITION IV										
TREATMENT	PLANTS											PLANTS										
	1	2	3	4	5	6	7	8	9	10	average	1	2	3	4	5	6	7	8	9	10	average
1. Chloropicrin	100	100	100	0	0	0	0	100	0	0	40.00	60	0	100	0	60	60	0	0	0	60	34.00
2. Dichloropropene+Chlorop	0	0	0	0	0	0	0	0	60	0	6.00	40	40	40	80	40	100	80	100	100	20	64.00
3. Brocoli	40	60	80	40	100	100	100	80	0	40	64.00	100	100	100	100	100	100	100	100	80	100	98.00
4. Metam sodium 50	100	100	100	100	100	100	100	100	100	100	100.00	100	100	100	100	100	100	100	100	100	100	100.00
5. Dichloropropene	60	100	100	100	60	80	100	100	100	100	90.00	60	100	100	80	80	100	80	80	80	60	82.00
6. Cow manure	60	100	100	100	20	0	100	100	100	80	76.00	80	100	100	100	20	80	100	100	100	100	88.00
7. Methyl Bromide 50	40	100	80	100	100	80	40	0	0	0	54.00	40	0	0	0	0	80	0	0	0	0	12.00
8. Methyl Bromide 40	0	20	0	0	0	0	0	0	0	0	2.00	0	0	0	0	0	0	0	0	0	0	0.00
9. Dazomet	100	100	100	100	100	100	100	100	100	100	100.00	100	100	100	0	100	100	100	100	100	100	90.00
10.Control	100	100	100	100	100	100	80	100	100	100	98.00	100	100	100	100	100	100	100	100	100	100	100.00
11.Tomatoe compost	80	100	100	100	100	100	100	100	80	100	96.00	100	100	100	100	100	100	100	100	100	100	100.00
12.Metam sodium 25	0	60	60	20	40	100	40	20	100	100	54.00	0	60	80	60	100	100	100	40	20	100	66.00

FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA

SITE: "DON JUANITO" RANCH, COL. VICENTE GUERRERO (SANTA FE), B.C.

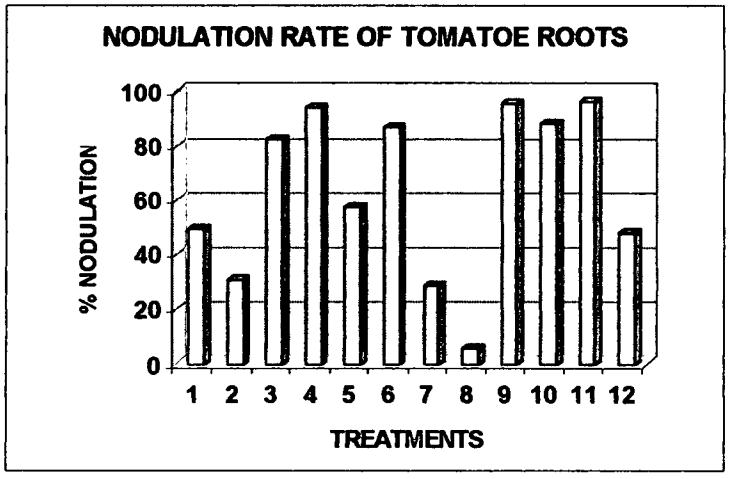
CROP: TOMATOE, VAR. TEQUILA.

PLANTING DATE: April 25th, 2001 **Cycle 2001**

EVALUATION PARAMETER: % nodulation roots rate per Meloydogine

EVALUATION DATE: 29/10/01 **Scale 1-6 = 0-100%**

TOTAL RATE OF ROOTS NODULATION/Meloydogine/TREATMENT						
TREATMENT	REPETITIONS					
	1	2	3	4	TOTAL	AVERAGE
1. Chloropicrin	56.00	66.00	40.00	34.00	196.00	49
2. Dichloropropene+Chlorop	10.00	44.00	6.00	64.00	31.00	31
3. Brocoli	72.00	96.00	64.00	98.00	82.50	83
4. Metam sodium 50	80.00	96.00	100.00	100.00	94.00	94
5. Dichloropropene	20.00	36.00	90.00	82.00	57.00	57
6. Cow manure	94.00	88.00	76.00	88.00	86.50	87
7. Methyl Bromide 50	18.00	32.00	54.00	12.00	29.00	29
8. Methyl Bromide 40	22.00	0.00	2.00	0.00	6.00	6
9. Dazomet	100.00	92.00	100.00	90.00	95.50	96
10.Control	56.00	100.00	98.00	100.00	88.50	89
11.Tomatoe compost	96.00	94.00	96.00	100.00	96.50	97
12.Metam sodium 25	42.00	30.00	54.00	66.00	192.00	48



HEIGHT OF PLANTS

FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA

SITE: RANCHO "DON JUANITO", COL. VICENTE GUERRERO (SANTA FE), B.C.

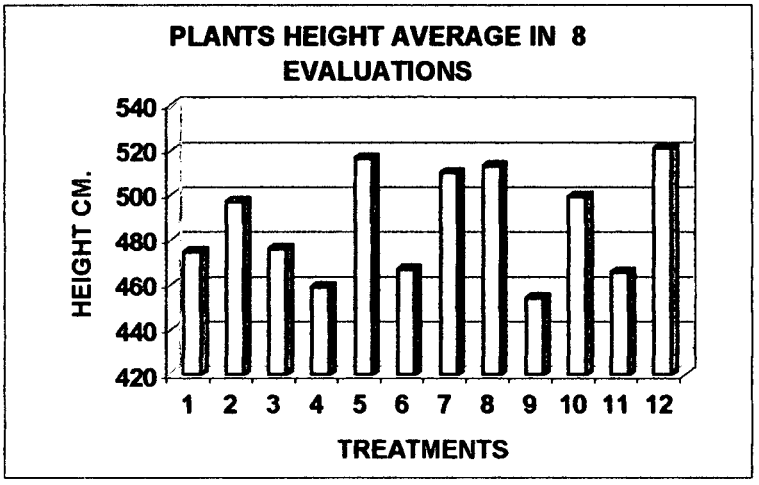
CROP: TOMATO, "TEQUILA"

PLANTING DATE: APRIL 25th, 2001

EVALUATION PARAMETER: HEIGHT OF 5 PLANTS (CM) PER REPETITION

TOTAL AVERAGE OF EIGHT HEIGHT EVALUATION DATES IN TOMATOE PLANTS

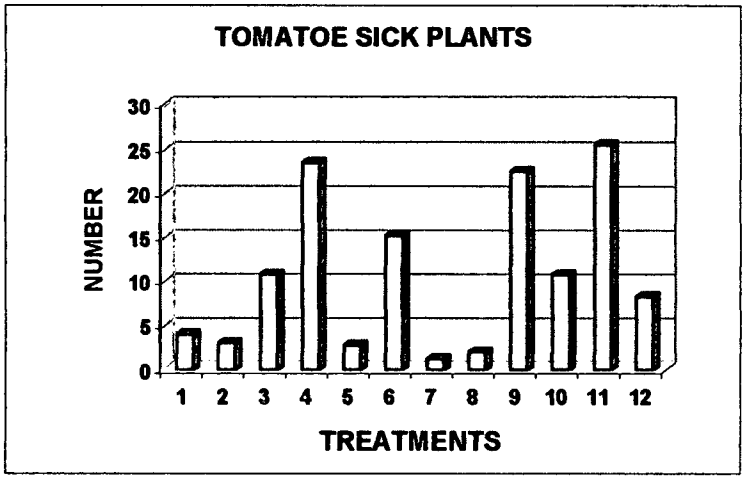
TREATMENTS	EVALUATION DATES								
	19/07/01	26/07/01	02/08/01	09/08/01	16/08/01	22/08/01	30/08/01	07/09/01	AVERAGE
1. Chloropicrin	3081	3226	3236	3373	3713	3976	3806	3796	**474.5**
2. Dichloroprop.+Chloro.	3187	3321	3326	3467	3740	4030	3888	3976	**497**
3. Broccoli	3133	3236	3336	3461	3684	3945	3810	3806	**475.75**
4. Metam-sodium 50	3066	3176	3235	3290	3562	3805	3640	3671	**458.875**
5. Dichloropropene	3194	3341	3315	3530	3872	4205	3976	4131	**516.375**
6. Cow manure	2980	3058	3092	3250	3458	3845	3725	3734	**466.75**
7. Methyl Bromide 50	3265	3410	3398	3523	3842	4270	3725	4078	**509.75**
8. Methyl Bromide 40	3113	3269	3315	3476	3802	4230	3725	4103	**512.875**
9. Dazomet	2974	3025	3043	3167	3366	3655	3725	3631	**453.875**
10.Control	3138	3288	3402	3484	3708	4065	3725	3994	**499.25**
11.Compost	3092	3145	3422	3438	3649	3935	3725	3723	**465.375**
12.Metam-sodium 25	3195	3268	3385	3507	3780	4165	3725	4167	**520.875**



DISEASED.

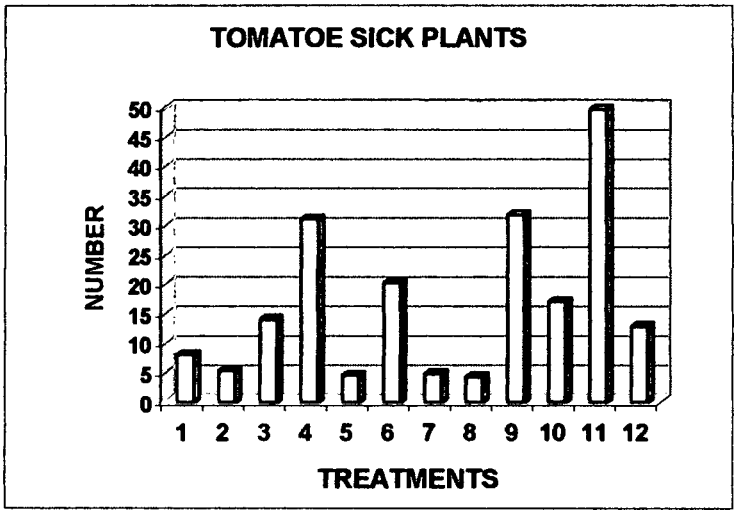
FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA
SITE: "DON JUANITO" RANCH, COL. VICENTE GUERRERO (SANTA FE), B.C.
CROP: TOMATO, TEQUILA.VAR.
PLANTING DATE: April 25th, 2001
EVALUATION PARAMETER: NUMBER OF DISEASED PLANTS/REPETITION
EVALUATION DATE: August 2nd, 2001
 # PLANTS PER REPETITION: 57 PLANTS

TREATMENT	REPETITION					
	1	2	3	4	TOTAL	AVERAGE
1. Chloropicrin	2	6	6	2	16	4.00
2. Dichloropropene+Chloropicrin	1	4	3	4	12	3.00
3. Brocoli	7	8	13	15	43	10.75
4. Metam-sodium 50	12	25	27	30	94	23.50
5. Dichloropropene	5	4	0	2	11	2.75
6. Cow manure	18	13	19	11	61	15.25
7. Methyl Bro 50	3	0	1	1	5	1.25
8. Methyl Bro 40	0	1	2	5	8	2.00
9. Dazomet	19	25	24	22	90	22.50
10. Control	8	13	12	10	43	10.75
11.Compost	20	24	30	28	102	25.50
12.Metam-sodium 25	6	8	10	9	33	8.25



EVALUATION PARAMETER: NUMBER OF DISEASED PLANTS/REPETITION
EVALUATION DATE: AUGUST 23th, 2001
 # PLANTS PER REPETITION: 57 PLANTS

TREATMENT	REPETITION				TOTAL	AVERAGE
	1	2	3	4		
1. Chloropicrin	7	12	10	3	32	8.00
2. Dichloropropene+Chloropicrin	4	6	6	5	21	5.25
3. Brocoli	9	10	18	19	56	14.00
4. Metam-sodium 50	15	35	32	42	124	31.00
5. Dichloropropene	7	5	2	4	18	4.50
6. Cow manure	22	19	26	14	81	20.25
7. Methyl Bro 50	9	3	4	3	19	4.75
8. Methyl Bro 40	2	3	4	8	17	4.25
9. Dazomet	30	32	33	32	127	31.75
10. Control	12	23	19	14	68	17.00
11.Compost	50	49	50	50	199	49.75
12.Metam-sodium 25	10	13	15	13	51	12.75



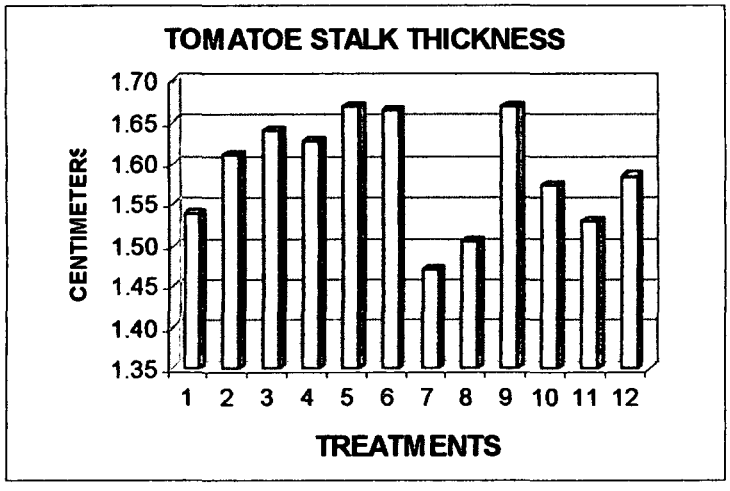
DIAMETER OF STALK.

FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA
SITE: "DON JUANITO" RANCH, COL. VICENTE GUERRERO (SANTA FE), B.C.
CULTIVO: TOMATOE, TEQUILA VAR.
PLANTING DATE: April 25th, 2001
EVALUATION PARAMETER: DIAMETER OF STALK 20 CM FROM SOIL
EVALUATION DATE: August 23th, 2001

TREATMENT	REPETITION I							REPETITION II						
	PLANTS							PLANTS						
	1	2	3	4	5	TOTAL	AVERAGE	1	2	3	4	5	TOTAL	AVERAGE
1. Chloropicrin	1.60	1.65	1.75	1.35	1.25	7.60	1.52	1.35	1.65	1.60	1.35	1.55	7.50	1.50
2. Dichloro+Chloropicrin	1.60	1.55	1.65	2.10	1.70	8.60	1.72	1.30	1.55	1.65	1.45	1.65	7.60	1.52
3. Brocoli	1.75	1.70	1.70	1.85	1.50	8.50	1.70	1.60	1.60	1.60	1.90	1.60	8.30	1.66
4. Metam-sodium 50	1.65	1.65	1.55	1.75	1.75	8.35	1.67	1.60	1.40	1.60	1.65	1.35	7.60	1.52
5. Dichloropropene	1.75	1.80	1.60	1.60	1.65	8.40	1.68	1.70	1.50	1.55	1.60	2.05	8.40	1.68
6. Cow manure	1.80	1.85	1.95	1.65	1.75	9.00	1.80	1.25	1.65	1.60	1.65	1.95	8.10	1.62
7. Methyl Bro 50	1.45	1.45	1.40	1.45	1.45	7.20	1.44	1.35	1.50	1.35	1.45	1.40	7.05	1.41
8. Methyl Bro 40l	1.55	1.45	1.65	1.35	1.55	7.55	1.51	1.70	1.40	1.50	1.40	1.50	7.50	1.50
9. Dazomet	1.70	1.75	1.55	2.10	1.90	9.00	1.80	1.70	1.85	1.55	1.55	1.85	8.50	1.70
10.Control	1.45	1.55	1.70	1.60	1.65	7.95	1.59	1.60	1.55	1.70	1.45	1.55	7.85	1.57
11.Compost	1.45	1.52	1.40	1.75	1.85	7.97	1.59	1.55	1.35	1.45	1.50	1.50	7.35	1.47
12.Metam-sodium 25	1.55	1.60	1.65	1.45	1.55	7.80	1.56	1.45	1.70	1.70	1.70	1.55	8.10	1.62

TREATMENT	REPETITION III							REPETITION IV						
	PLANTS							PLANTS						
	1	2	3	4	5	TOTAL	AVERAGE	1	2	3	4	5	TOTAL	AVERAGE
1. Chloropicrin	1.40	1.65	1.75	1.50	1.35	7.65	1.53	1.35	1.60	1.55	1.85	1.70	8.05	1.61
2. Dichloro+Chloropicrin	1.65	1.45	1.55	1.85	1.40	7.90	1.58	1.55	1.50	1.95	1.35	1.75	8.10	1.62
3. Brocoli	1.65	1.55	1.60	1.55	1.40	7.75	1.55	1.55	1.75	1.60	1.70	1.65	8.25	1.65
4. Metam-sodium 50	1.80	1.55	1.70	1.50	1.40	7.95	1.59	1.85	1.85	1.75	1.60	1.60	8.65	1.73
5. Dichloropropene	1.65	1.50	1.60	1.55	1.50	7.80	1.56	1.85	1.55	1.80	1.70	1.90	8.80	1.76
6. Cow manure	1.75	1.60	1.40	1.40	1.55	7.70	1.54	1.75	1.85	1.35	1.75	1.80	8.50	1.70
7. Methyl Bro 50	1.35	1.55	1.65	1.50	1.50	7.55	1.51	1.55	1.40	1.55	1.55	1.55	7.60	1.52
8. Methyl Bro 40l	1.45	1.50	1.40	1.55	1.40	7.30	1.46	1.50	1.55	1.55	1.70	1.45	7.75	1.55
9. Dazomet	1.55	1.55	1.65	1.30	1.60	7.65	1.53	1.80	1.70	1.55	1.55	1.65	8.25	1.65
10.Control	1.55	1.40	1.60	1.65	1.50	7.70	1.54	1.65	1.55	1.60	1.60	1.60	8.00	1.60
11.Compost	1.80	1.40	1.80	1.50	1.60	8.10	1.62	1.50	1.35	1.30	1.65	1.40	7.20	1.44
12.Metam-sodium 25	1.55	1.60	1.55	1.60	1.55	7.85	1.57	1.45	1.70	1.75	1.55	1.50	7.95	1.59

TREATMENT	REPETITIONS					
	I	II	III	IV	TOTAL	AVERAG
1. Chloropicrin	1.52	1.50	1.53	1.61	6.16	1.54
2. Dichloro+Chloropicrin	1.72	1.52	1.58	1.62	6.44	1.61
3. Brocoli	1.70	1.66	1.55	1.65	6.56	1.64
4. Metam-sodium 50	1.67	1.52	1.59	1.73	6.51	1.63
5. Dichloropropene	1.68	1.68	1.56	1.76	6.68	1.67
6. Cow manure	1.80	1.62	1.54	1.70	6.66	1.67
7. Methyl Bro 50	1.44	1.41	1.51	1.52	5.88	1.47
8. Methyl Bro 40l	1.51	1.50	1.46	1.55	6.02	1.51
9. Dazomet	1.80	1.70	1.53	1.65	6.68	1.67
10.Control	1.59	1.57	1.54	1.60	6.30	1.58
11.Compost	1.59	1.47	1.62	1.44	6.12	1.53
12.Metam-sodium 25	1.56	1.62	1.57	1.59	6.34	1.59



YIELD.

MEASUREMENT PARAMETER: Yield - Weight in pounds on 20 lineal meters/repetition
PLANTING DATE: April 25th, 2001
EVALUATION DATE: July 14th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	1.4	0.1	0.05	2.65	0	0	1.75	0	0.05	3.25	0	0.05
2. Dichloropropene+Chloropicrin	1.45	0	0	1.7	0.8	0.15	0.65	0	0.15	2.05	0	0
3. Broccoli	1.1	0.25	0.15	6.65	0.55	0.25	3.8	0.55	0.45	2.4	0	0.55
4. Metam-sodium 50	1.25	0.1	0	2.4	0.35	0.35	3.35	0.25	0.1	3.95	0.6	0.05
5. Dichloropropene	5.25	1.6	0.25	9.3	1.45	0.3	4.9	2	0.8	4.6	1.35	0.15
6. Cow manure	3.9	0.4	0.15	6.1	0.55	0.25	9.75	1.5	0.65	1.45	0	0.55
7. Methyl Bromide 50	2.05	0.25	0.2	4.65	0.75	0.45	3.6	0.2	0	9.9	0.9	0.85
8. Methyl Bromide 40	6.9	1.35	0	15.25	0.75	0.75	12.95	0.55	0.75	7.45	0.55	0.75
9. Dazomet	3.5	0.2	0.9	8.4	0.7	0	7	0.7	0.95	3.35	0.7	1
10.Control	9.25	0.4	0.25	6.55	0.55	0	11.95	0.55	0.35	11	0.85	0.9
11.Compost	5.5	0	1.3	7.35	0.15	1.3	10.85	0.85	1	3.45	0	0
12.Metam-sodium 25	3.7	0.25	0.35	7.15	0.45	0.55	3.65	0.45	0.35	9	0.45	0.35

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: July 19th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	7.25	0.65	0.55	6.6	0.45	0.25	3.1	0.65	0	9.25	1.15	0.25
2. Dichloropropene+Chloropicrin	7.35	1.1	0.25	6.7	0	0.1	5.55	0.55	0	6.95	0.4	0.13
3. Broccoli	4.7	0.2	0.15	6.65	1.85	0.2	10.15	2.75	0.2	8.15	2.15	0.1
4. Metam-sodium 50	5.9	1	0.4	7.95	0.4	0.5	7.5	0.75	0.5	8.6	0.6	0.5
5. Dichloropropene	7.9	1.45	0.3	9.95	0.95	0.2	9.15	0.7	0.35	6.55	0.75	0.1
6. Cow manure	6.05	2.3	0.6	6	1.35	0.55	6.2	3.15	0.2	3.25	1.05	0.45
7. Methyl Bromide 50	10.75	0.75	0.2	9.4	0.8	0.35	9.85	0.7	0.35	10.2	0.45	0.35
8. Methyl Bromide 40	7.4	0.35	0.15	9.5	0.1	0.15	7.65	0.3	0.35	8.4	0.7	0.35
9. Dazomet	5.8	0.15	0.85	8.25	1.1	0.3	8	0.35	0.25	6.3	1	0.4
10.Control	11	1.5	0.25	9.65	2.5	0	10.85	2.75	0	8.65	2.6	0.75
11.Compost	8.15	1.75	0.6	10.4	1.2	0.2	9.3	0.95	0.35	6.05	0.95	0.1
12.Metam-sodium 25	7	0.5	0.25	10	0.1	0.15	11.3	0.7	0.3	8.7	1.2	0.2

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: July 23th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	14	2.2	0.6	10	1.65	0.35	9.4	1.55	0	11.9	1.7	0.45
2. Dichloropropene+Chloropicrin	11.75	0.5	0.25	12.25	0.45	0.3	12.25	0.7	0.1	12.65	0.9	0.5
3. Broccoli	11.1	0.45	0.35	12.1	1.3	0.45	5.55	1.05	0.75	12.15	1.2	0
4. Metam-sodium 50	13.5	0.75	0.15	10.45	0.35	0.65	10.6	0.25	0.5	14	0.8	0.7
5. Dichloropropene	12.6	0.4	0.15	12.5	0.5	0.25	12.35	0.65	0.65	11.4	0.3	0.35
6. Cow manure	9	1.05	0.35	12.1	0.9	0.05	8.25	0.9	0.05	7.85	0.8	0.35
7. Methyl Bromide 50	10.2	0.85	0	8.8	0.7	0	9.25	0.9	0	12.9	0.8	0.05
8. Methyl Bromide 40	11.2	0.5	0.2	10.6	0.7	0.4	7.55	0.15	0.3	8.2	0.65	0.2
9. Dazomet	7.75	0.9	1.15	8.2	1.7	0.4	9.8	0.7	0.5	6.85	0.8	0.7
10.Control	15	0.5	0.25	11.4	0.4	0.05	10.3	1	0.2	15.5	0.8	0.4
11.Compost	13.3	0.5	0.2	15.3	1	0.35	14.8	0.2	0.2	12.6	0.35	0.4
12.Metam-sodium 25	11.3	0.7	0.4	15.65	0.4	0.1	16.3	1.1	0.6	14.9	0.55	0.4

PLANTING DATE: April 25th, 2001
EVALUATION DATE: July 26th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	9.2	0.4	0.05	8.55	1	0.1	9	0.2	0.05	10	0.3	0.1
2. Dichloropropene+Chloropicrin	10.4	0.75	0.4	8.55	1.5	0.35	9.55	0.9	0.15	8.7	1.65	0.4
3. Broccoli	12.2	0.8	0.55	8.7	1.5	0.35	11	2.2	1.1	10.65	1.3	0.15
4. Metam-sodium 50	9.5	1	0.5	10.4	0.45	0.7	9.4	0.5	0.3	10.7	0.5	0.7
5. Dichloropropene	9.85	1.4	0.25	6	2.05	0.2	8.05	1.75	0.75	7.1	1.35	0.3
6. Cow manure	4.5	0.3	0.3	9.55	0.55	0.4	8	0.7	0.4	5.6	0.45	0.65
7. Methyl Bromide 50	5.2	1.25	0.35	6.2	0.2	0.05	3.7	1.1	0.2	7.2	0.75	0.25
8. Methyl Bromide 40	10.75	0.45	0.05	9.7	0.2	0.15	9.45	0	0.2	5.8	0.1	0.2
9. Dazomet	6.7	0.75	0.55	5.5	1.3	0.75	5.2	1.15	0.7	5	0.8	1
10.Control	8	0.85	0.5	7.95	0.75	0.4	8.1	1.2	0.15	8.35	0.6	0.5
11.Compost	7.9	0.35	0.6	12.1	0.35	0.8	8.35	0.4	0.15	8.2	1	0.65
12.Metam-sodium 25	9.15	0.35	0.6	10.3	0.6	0.4	12.8	0.9	0.45	11.05	0.95	0.4

PLANTING DATE: April 25th, 2001
EVALUATIONDATE: JULY 30th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	11.9	1.1	0.3	10.9	1	0.25	11	0.2	0.05	11.3	0.5	0.4
2. Dichloropropene+Chloropicrin	10.5	0.85	0.4	8.1	2.25	0.3	7.55	1.1	0.25	10.75	0.7	0.35
3. Broccoli	11.6	0.9	0.6	12.2	0.85	0.7	12.5	0.7	1.15	11.4	1.5	0.75
4. Metam-sodium 50	11.2	1.15	0.5	9.2	0.7	1	8.15	0.9	0.65	12.5	0.45	0.5
5. Dichloropropene	12.5	1	0.35	11.9	0.7	0.4	10.85	1	0.35	11.5	1.1	0.7
6. Cow manure	8.5	0.7	0.75	9.2	0.8	0.4	7.85	0.45	0.4	9.3	0.45	0.9
7. Methyl Bromide 50	10.2	0.5	0.15	10.6	0.45	0.3	7.55	1	0.2	12.5	0.75	0.3
8. Methyl Bromide 40	13.4	1.1	0.6	12.25	0.65	0.5	13.95	1	0.3	10.65	0.35	0.8
9. Dazomet	8.9	1.15	2.15	10.35	0.4	1.8	7.7	1.2	1.2	10.1	0.5	0.7
10.Control	12.85	0.75	0.55	12.35	1.45	0.4	11	1.4	1.5	11.5	1.35	0.65
11.Compost	10.7	1.9	1.1	11.9	1.65	1.1	12	0.9	0.5	11.8	0.65	1.25
12.Metam-sodium 25	17.25	0.45	0.65	13.25	0.4	0.55	16.5	1.25	0.75	14.9	0.75	0.9

MEASUREMENT PARAMETER: Yield - Weight in pounds on 20 lineal meters/repetition
PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 2nd, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	12.35	0.5	0.75	9	0.25	0.1	6.8	0.6	0.3	12.4	0.7	1.05
2. Dichloropropene+Chloropicrin	9.7	2	0.55	11.5	1.5	0.9	8.7	2.3	0.8	11.6	2.7	0.7
3. Broccoli	13.5	0.4	0.8	12.2	0.1	0.6	13.15	1.5	1.5	12.7	0.05	0.2
4. Metam-sodium 50	9.45	1	0.9	12.6	0.45	1.9	9.55	0.9	1.5	9.95	1	1.2
5. Dichloropropene	10	1.35	1.05	13.5	0.3	0.5	11.15	1	0.4	12	0.9	0.65
6. Cow manure	9.1	1.55	1.85	9.7	2.65	0.25	9.6	2.1	0.75	10.2	1.8	1.7
7. Methyl Bromide 50	11.05	0.85	0.2	10.1	1.5	0.15	9.1	1	0.2	9.2	2.05	0.35
8. Methyl Bromide 40	9.1	0.8	1.25	12.5	1	0.6	14.35	0.3	0.35	11.75	0.5	0.65
9. Dazomet	8.3	0.35	1.8	12	0.7	1.1	9.55	0.12	1.65	6.65	0.6	0.9
10.Control	10.05	1.9	0.6	13.35	2.7	0.35	11	3.2	0.4	12.3	1.85	0.2
11.Compost	9.9	3.6	0.35	11.9	3.75	0.5	9.8	2.15	0.3	10.5	2	0.5
12.Metam-sodium 25	13.25	2.85	1.05	11.5	1	0.65	12.85	2.6	0.2	15.3	2	0.55

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 6th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	15	2.55	1.25	17.8	2	1.15	13.15	4.8	1.1	15.6	3	2.05
2. Dichloropropene+Chloropicrin	15.65	1.8	2	17.2	1.6	1.25	17.85	1.25	1.5	14.2	2.2	1.35
3. Broccoli	21.3	0.75	2.75	16.2	1	1.5	19.75	1.9	1.7	18.1	1.5	1
4. Metam-sodium 50	21.75	2	1.6	14.4	1.5	1.8	15.5	1.25	2.6	19	4.05	0.8
5. Dichloropropene	18.8	1.1	0.8	17.1	1.45	0.65	17.65	0.7	0.9	19.65	1.5	1
6. Cow manure	12.75	1.35	1.4	14.2	3.4	0.9	15.7	1	1.05	17.5	1.15	1.15
7. Methyl Bromide 50	21.25	1.35	1.25	18.3	2.45	0.5	17	1.6	0.7	19.3	0.85	0.75
8. Methyl Bromide 40	13.15	4.95	1.3	16	1.25	0.8	15.45	2.75	0.8	16.5	4	0.4
9. Dazomet	11.4	1.75	3.55	16.5	1.95	2.4	14.2	1.45	2.3	12.2	2.1	1.7
10.Control	15.1	0.9	1.2	19.9	1.4	0.95	17.6	1.35	1.45	18	1.4	1.25
11.Compost	17.1	1.6	0.7	15.4	3.6	0.4	17.85	2.5	1.15	17.5	2.85	0.65
12.Metam-sodium 25	20	1.5	1.15	16.65	1.2	1.2	18.1	2.6	1.1	18.5	1.05	1.37

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE : August 9th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	14.7	3.85	0.6	16.8	3.64	0.9	14	1.95	0.4	15.95	1.85	1.7
2. Dichloropropene+Chloropicrin	10.85	3.35	0.4	18.9	4.8	1.2	15.65	4.25	0.75	12.65	3.5	1
3. Broccoli	18.45	3.5	1.2	12.8	3.35	0.7	15.75	3.25	0.5	17.2	3.4	0.5
4. Metam-sodium 50	14.8	3.15	0.95	15.75	5	0.7	17.85	3.4	0.8	16.15	4.55	0.8
5. Dichloropropene	15.2	3.6	0.9	18.5	4.75	0.55	19	4.1	1	14.75	2.45	0.5
6. Cow manure	12.5	3	1.1	15.8	3.8	0.3	14.8	3.75	0.5	15.5	3.3	0.7
7. Methyl Bromide 50	18.4	5.65	0.6	15.65	2.85	0.3	12	5.4	1.1	17	4.6	0.6
8. Methyl Bromide 40	15.55	3.85	1.1	15.05	2.6	0.35	15.05	2.8	0.6	14.7	2.45	0.65
9. Dazomet	13	3.35	1.15	13.8	2.5	1.2	15.1	4.8	1.15	13.5	4.25	0.7
10.Control	17.4	3.75	1.1	19.35	2.65	0.6	15.65	3.5	0.9	16.3	2.6	0.65
11.Compost	13.85	3.1	0.4	15.4	4.1	0.4	12.5	2.8	0.3	17.5	3.85	0.2
12.Metam-sodium 25	17	3.7	1.2	16.35	1.65	1.25	20.5	3.5	0.4	17.15	3.95	0.5

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 13th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	28.8	5.9	1.3	22.8	5.6	1.4	20.13	6.3	0.5	24	6	0.9
2. Dichloropropene+Chloropicrin	23.7	7.7	1.3	28.1	6.45	1.05	23.3	8.2	0.7	23	5.1	1.1
3. Broccoli	23.7	6	1	24.4	7.6	1.85	16.4	5.1	0.6	23.05	5.6	0.3
4. Metam-sodium 50	19.3	5.2	1.1	15.1	4.7	0.9	18.75	5	1.15	17.15	6.1	0.9
5. Dichloropropene	23.5	7.5	0.85	24.5	5.3	0.7	20.6	5.9	0.6	25.4	8.35	0.85
6. Cow manure	19.7	4.2	0.8	21	4.65	0.45	20.1	5.3	0.75	17.5	5.3	0.8
7. Methyl Bromide 50	22.7	8.5	0.8	23.75	6.35	0.2	20.7	7.55	0.4	24.3	6.05	0.6
8. Methyl Bromide 40	23.8	7.2	1.75	20.9	9.3	1.4	23.3	7	1.2	23.5	6.5	0.65
9. Dazomet	18.25	6.3	0.8	15.15	3.5	0.7	15.7	6.35	1.35	16.1	4.4	1.3
10.Control	19.2	3.6	0.4	19.35	5.3	0.6	21.4	6.15	0.9	19.9	2.95	0.6
11.Compost	14.85	4	0.7	15.6	2.85	0.5	16.8	4.35	0.5	13.2	5.6	0.3
12.Metam-sodium 25	16	6	1.1	20.15	4	0.35	21.05	5.7	0.65	19.6	5.35	0.5

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 16th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	20.1	4.65	0.05	15.05	2	0.5	18.4	4	0.2	20.8	4.3	0.25
2. Dichloropropene+Chloropicrin	20.8	3.25	0.3	17.5	3.45	0.6	17.5	5.4	0.35	20.3	3.5	0.5
3. Broccoli	18	5.05	0.7	13.55	5	0.6	11.45	2.7	0.4	15.1	4.3	0.05
4. Metam-sodium 50	10.6	4.9	0	7.7	2.55	0.72	10.7	2.6	0.1	9.4	2.25	0.7
5. Dichloropropene	17.5	4.72	0.35	15.4	2.7	0.4	13.3	3	0.5	14.7	2.6	0.4
6. Cow manure	12.2	2.55	0.5	12.05	2.85	0.7	11.2	3	0.4	11	2.05	0.2
7. Methyl Bromide 50	17	3.65	0.9	25.9	3.5	0.45	17.8	3.6	0	21.15	3.5	0.5
8. Methyl Bromide 40	16.4	4.8	1.2	14.2	2.6	0.5	14.15	2.8	0.85	17.4	3.5	0.7
9. Dazomet	6.8	2.9	0.7	7.5	1.6	0.8	6.5	3.25	0.8	7.35	3.9	0.5
10.Control	12.3	1.9	0.25	19.75	1.85	0.3	11.7	2.05	0.15	7.7	2.4	0.35
11.Compost	10.1	1.15	0.6	7.6	1.2	0.4	9	3	0.3	13.6	2.55	1
12.Metam-sodium 25	10.5	1.65	0.55	12.4	1.8	0.8	12.8	2.3	0.45	10.9	2.6	0.8

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 18th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	13.1	2	0.6	8.55	2.5	0.8	11.7	1.95	0.3	12.8	3.4	1.75
2. Dichloropropene+Chloropicrin	11.15	3.1	0.65	10	3.05	0.85	9	2.7	0.7	13.35	4.1	0.4
3. Broccoli	7.35	2	0.35	7.4	2.35	0.4	4.85	1.65	0	6.8	2	0.55
4. Metam-sodium 50	8.5	2.3	0	3.75	2.1	0.75	5.95	1.55	0.15	4.8	2.6	0.05
5. Dichloropropene	7.9	3.6	0.65	10.65	2.35	0.2	9.1	3.1	0.6	9.2	1.65	0.35
6. Cow manure	7.1	1.7	0.4	5.85	1.2	0.25	7	2.2	0.1	6.3	2.3	0
7. Methyl Bromide 50	8.75	2.35	0.05	6.7	0.9	0.35	6.6	1	0.2	9.3	1.6	0.35
8. Methyl Bromide 40	7.9	1.55	0.3	7	1.6	0.3	6.3	1	0.5	6.85	1.55	0.5
9. Dazomet	5.3	1.2	0.25	4.7	1.5	0.8	3.7	1.8	0.65	4.75	2.3	0.1
10.Control	4.2	1.75	0.2	5	1.95	0.05	6	2.9	0.2	5.9	1.5	0.1
11.Compost	3.5	1.05	0.2	2.4	1.3	0.1	1.2	0.5	0	3.2	1.25	0.2
12.Metam-sodium 25	3.4	1.3	0.2	5	1.05	0	5.05	0.85	0.1	3.1	1.4	0.05

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 21st, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	11.7	3.1	1.35	6.4	3	0.55	8.7	3.6	0.3	10.75	3.8	1.4
2. Dichloropropene+Chloropicrin	12.35	4.45	1	9.95	2.7	0.85	9	3.1	1.3	11	5.9	1.2
3. Broccoli	11.75	2	0.35	7.4	2.35	0.4	4.85	1.65	0	6.8	2	0.55
4. Metam-sodium 50	9.5	3.8	1.5	4.2	2.5	1.4	6.8	3.55	0.8	6	3.1	1.2
5. Dichloropropene	11.2	4.2	0.8	9.45	3.55	0.7	6.9	4	0.5	12.7	3.6	0.7
6. Cow manure	9.15	3.35	1.2	5.25	2.05	0.4	7.1	3.6	0.55	7.4	3.7	0.45
7. Methyl Bromide 50	12.1	4.8	0.6	14.1	4.55	0.45	12.7	4.5	0.2	12.95	5.1	0.45
8. Methyl Bromide 40	10.4	4	1.8	10	4.5	0.6	10.9	4.45	0.65	11.7	4.55	0.65
9. Dazomet	6.4	1.8	0.9	4.9	2.3	1.7	5.65	3	1.6	6.65	3.2	0.8
10.Control	8.15	1.75	0.5	6.4	2.15	1	6.25	3.6	0.85	6.4	2.35	0.55
11.Compost	5.05	2	0.4	5.15	2.4	0.8	6.5	1.7	0.4	5.3	1.8	0.75
12.Metam-sodium 25	6.9	2.5	0.7	10.4	3.6	0.35	7.05	2.5	0.8	5.8	2.5	0.8

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 23th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	5.85	2.1	0.55	4.1	0.75	0.35	6.1	1.4	0.3	3.8	1.3	0.3
2. Dichloropropene+Chloropicrin	4.45	2.5	0.6	4.7	1.15	0.25	4.4	1.65	0.1	4.5	1.95	0.15
3. Broccoli	6.6	1.5	0	5.65	1.6	0.4	4.15	0.8	0.5	6.6	1.5	0.2
4. Metam-sodium 50	5.6	2	0.1	2.25	1.75	0.55	6.1	3.05	0.5	2.6	1.45	0.6
5. Dichloropropene	6.35	1.9	0.4	6.3	2.5	0.15	5.7	1.5	0	7.1	1	0.1
6. Cow manure	3.95	2	0.7	4.25	0.5	0.25	4.2	1.7	0.1	3.4	2.2	0.2
7. Methyl Bromide 50	6.7	1.6	0.2	6.6	1.5	0.15	8.1	0.7	0.2	7	0.8	0.15
8. Methyl Bromide 40	5.85	2	0.6	5.1	1.4	0.3	3.95	2	0.4	5.35	2.05	0.45
9. Dazomet	3	1.75	0.4	3.6	1.05	0.6	3.3	1.35	0.45	3.6	1.25	0.5
10.Control	6.55	0.5	0.05	4.7	1.4	0.35	5.2	0.7	0.1	5.4	1	0.2
11.Compost	2.5	0.45	0.45	2.3	0.6	0.1	3.6	0.6	0.05	3.35	0.6	0.15
12.Metam-sodium 25	3.6	1	0.35	3.7	0.25	0.2	3.4	0.25	0.15	4	0.5	0.2

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 25th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	4.55	2.6	0.85	3.15	1.35	0.5	5.5	3.2	0.65	4.2	2.6	0.6
2. Dichloropropene+Chloropicrin	4.7	2.8	0.7	4.5	2.5	0.8	4.4	2.5	0.85	5	2.25	0.6
3. Broccoli	5.8	2.6	0.2	3.95	2.7	0.8	2.5	2.1	0.25	5.8	2.7	0.4
4. Metam-sodium 50	3.9	3.25	0.3	1.4	1.6	0.6	2	1.8	0.2	1.9	2.45	1
5. Dichloropropene	5.5	2.5	0.4	4.6	2.55	0.3	3.35	2.1	0.45	4.8	3.05	0.2
6. Cow manure	3.5	1.25	0.2	2.4	1.4	0.05	3.2	1.55	0.05	2.1	1.8	0.35
7. Methyl Bromide 50	4.85	2.45	0.15	5.9	2.8	0.5	6.7	3.7	0.45	7	3.05	0.2
8. Methyl Bromide 40	5.75	2.05	0.6	3.05	2	0.1	5.05	2.4	0.3	4.8	4.15	0.2
9. Dazomet	1.75	2.1	0.35	0.9	1.6	0.3	2	1.85	0.55	1.4	2	0.3
10.Control	2.3	1.9	0.5	3.2	1.15	0.15	3.2	1.95	0.4	2.5	0.9	0.15
11.Compost	2.7	1.3	0.25	1.9	1.2	0.15	2.85	1.3	0.25	2.25	1.6	0.6
12.Metam-sodium 25	3.45	1.6	0.25	3.95	1.85	0.4	3.25	1.7	0	2.15	1.55	0.35

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 28th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	6.65	3.4	0.7	5.5	2.4	0.75	6.9	3.1	0.35	5.7	2.9	0.8
2. Dichloropropene+Chloropicrin	8.2	3.9	0.5	6.8	2.8	0.75	7.65	3	0.5	6.65	2.55	0.2
3. Broccoli	7.3	3.8	0.15	4.3	2	0.45	3.9	1.8	0.05	6.9	4	0.3
4. Metam-sodium 50	3.9	3	0.3	3.55	2.05	0.45	3.85	2.4	0.35	1.5	2.2	0.85
5. Dichloropropene	5.65	3.2	0.7	5.05	3	0.2	3.15	1.65	0.3	7.5	2.7	0.4
6. Cow manure	3.95	2.8	0.15	4.1	1.65	0.4	4.9	2.2	0.5	5.6	1.85	0.4
7. Methyl Bromide 50	6	4.35	0.25	6.6	3.4	0.3	7	3.65	0.3	11.25	4.9	0.35
8. Methyl Bromide 40	6.8	3.1	0.4	6.9	2.45	0.05	7.6	2.4	0.2	7.2	3.8	0.2
9. Dazomet	2.7	2.9	0.3	2	1.8	0.15	4.1	2.7	0.35	2.3	2.05	0.5
10.Control	5.5	2.2	0.1	4	2	0.25	3.9	2.15	0.3	3.25	1.9	0.5
11.Compost	3.35	1.3	0.3	2.5	2.4	0.15	3.2	1.2	0.2	2.6	1.8	0.2
12.Metam-sodium 25	2.6	1.4	0.3	3.5	1.85	0.3	3.4	1.6	0.2	2.65	1.65	0.2

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: AUGUST 30th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	7	1.8	0.45	5.8	1	0.1	7.9	3.2	0.15	3.5	1.6	0.4
2. Dichloropropene+Chloropicrin	6	1.35	0.65	7.2	1.05	0.5	5.8	1.9	0.2	5.1	1.15	0.55
3. Broccoli	6.55	1.9	0.4	4.4	1.7	0.6	3.2	1.1	0.4	6.7	1.7	0.4
4. Metam-sodium 50	3.1	1.8	0.1	2.6	1.4	0.55	4.4	1.5	0.6	2.2	1.2	0.85
5. Dichloropropene	4.2	1.3	0.5	3.9	1.05	0.1	4.4	1.2	0.2	4	1.1	0.45
6. Cow manure	3.65	1.2	0.35	3.8	0.65	0.3	4.3	1.4	0.5	4.5	1.2	0.3
7. Methyl Bromide 50	6	2	0.2	7.9	1.75	0.3	4.9	1.15	0.1	7.5	2	0.2
8. Methyl Bromide 40	4.6	2.1	0.35	4.8	0.55	0.3	5.6	1.1	0.15	4.55	2.05	0.3
9. Dazomet	3.6	2.1	0.1	2.7	0.4	0.3	3.3	0.6	0.3	3.35	0.15	0.35
10.Control	3.75	0.4	0.3	3.8	1	0.3	3.05	0.45	0.35	5.6	0.8	0.1
11.Compost	4.7	1.15	0.4	4.5	0.7	0.2	4.55	1.4	0.5	4.75	0.8	0.55
12.Metam-sodium 25	3.8	0.75	0.2	3.85	1.1	0.25	2.2	1	0.05	4.25	0.5	0.1

MEASUREMENT PARAMETER: Yield - Weight in pounds on 20 lineal meters/repetition
PLANTING DATE: April 25th, 2001
EVALUATIOND DATE: September 1st, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	7.6	3.1	0.7	4.5	3	0.2	6.7	2.1	0.35	7.15	2.55	0.8
2. Dichloropropene+Chloropicrin	8.1	2.25	0.7	6	1.5	0.05	5.9	3	0.25	5.4	2	0.05
3. Broccoli	6.1	1.2	0.2	4.9	1.05	0.2	3	1.5	0.2	5.6	1.35	0.5
4. Metam-sodium 50	3.75	0.75	0.45	1.85	0.7	0.2	3.1	1	0.5	1.8	1.15	0.6
5. Dichloropropene	5	2.05	0.25	3.45	1.45	0.25	4.3	1.05	0.45	6.5	1.4	0.35
6. Cow manure	4.3	1.05	0.15	4.5	1.5	0.15	3.5	1	0.35	4.15	1	0.2
7. Methyl Bromide 50	5.15	2.1	0.85	5.75	1.4	0.25	4.6	1.8	0.75	6	0.9	0.4
8. Methyl Bromide 40	5.2	2.45	0.5	5.35	0.9	0.4	4.65	1.4	0.3	4.25	2.1	0.45
9. Dazomet	3	1.8	0.5	2	1.2	0.4	3	1.65	0.2	2.95	0.95	0.4
10.Control	4.3	1.1	0.5	3.9	1.3	0.95	2.8	1.6	0.55	4.05	1	0.25
11.Compost	3.65	1.3	0	3.5	1.2	0	3.3	1	0	4.2	0.9	0
12.Metam-sodium 25	4.4	0.85	0.6	4.7	1.25	0.35	3.9	1.1	0.3	5.8	1.2	0.6

PLANTING DATE: APRIL 25th, 2001
EVALUATION DATE: SEPTEMBER 5th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	17.3	3.6	1.05	13.45	3	1.7	13.4	6.1	0.6	13.3	4.8	1.4
2. Dichloropropene+Chloropicrin	16.6	5	1.5	16.85	4.4	0.6	15.5	5.6	1.15	16.1	4.2	1
3. Broccoli	12.4	4	1.05	9.45	3.8	1.65	9.2	3	1.3	13.6	4	1.15
4. Metam-sodium 50	9.1	3.5	1.1	3.1	3.2	1.7	7.4	2.1	0.9	1.6	3.1	2.4
5. Dichloropropene	12.55	3.7	0.65	10.5	4.2	1.1	8.3	3.5	1.1	13.1	3.9	0.6
6. Cow manure	8.4	4	0.7	8.1	2.5	0.6	8.2	2.4	1.5	7.7	3.1	0.95
7. Methyl Bromide 50	13.2	3.35	0.75	16.2	4.1	0.8	13.5	2.3	0.5	22.25	5.1	0.1
8. Methyl Bromide 40	10.6	5.4	1.8	17.6	3.85	0.35	13.6	3.2	0.4	15.4	5.7	0.3
9. Dazomet	7.1	3.85	1.4	6.2	3	2.1	6.9	3.75	1.15	5	2.35	1.2
10.Control	8.65	2.8	0.8	6.5	2.7	1.7	8	3.5	1.2	7.5	1.95	1.2
11.Compost	6.1	3.85	3.85	5.35	4.7	4.7	6.6	4.5	4.5	6.1	3.1	3.1
12.Metam-sodium 25	7.2	2.1	1.2	8.6	2.4	0.95	9.9	2.9	0.8	9.5	3.05	1.2

PLANTING DATE: April 25th, 2001
EVALUATION DATE: SEPTEMBER 8th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	15	5.9	1.1	10.8	3	0.65	14.25	3.1	0.8	12	5	1.85
2. Dichloropropene+Chloropicrin	13.1	2.9	0	12.2	6	0	15.8	2.5	0	14.1	4	0
3. Broccoli	9	5.3	0.85	6.5	3.3	2	10	3.7	0.7	10.9	5	0.4
4. Metam-sodium 50	8.7	2.75	1.2	3.5	2.2	1.3	4.1	1.8	1.5	1.6	3.1	2.4
5. Dichloropropene	13	5.3	1.2	9.3	4.1	1.85	9.55	4.8	1.15	9.5	4.4	1.7
6. Cow manure	7.7	2.9	1	8.5	4	1.7	6.2	3	1.3	7.9	3.45	1.7
7. Methyl Bromide 50	9.1	2.55	0.5	18.4	5.8	0.7	14.3	3.8	0.3	17.2	3.25	1
8. Methyl Bromide 40	11.2	3.2	1.3	15.5	4.4	0.65	15.6	4.1	0.9	12.4	3.6	0.7
9. Dazomet	5.5	5.5	3	3.2	2.3	1.2	6	3.5	1.4	5.8	1.7	2.5
10.Control	8.35	5.25	0.7	5.4	3.3	0.9	7.7	3.3	1.7	9.5	2.9	1
11.Compost	6.6	3.9	2.3	5.1	3.4	2.2	6.5	3	1.8	6.6	2.3	0.8
12.Metam-sodium 25	6.5	3.5	1.1	11.1	3	1.2	10.6	4.2	1	1.09	3.4	1.2

PLANTING DATE: April 25th, 2001
EVALUATION DATE: SEPTEMBER 12th, 2001

TREATMENTS	PRODUCTION OF EXPORT TOMATOES, DOMESTIC AND REMAIN ON KG.											
	REPETITION I			REPETITION II			REPETITION III			REPETITION IV		
	EXP.	DOM	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.	EXP.	DOM.	REM.
1. Chloropicrin	5.6	0.8	0.2	3.4	1.1	0.55	4.9	1.6	0.2	4.6	1.4	0.5
2. Dichloropropene+Chloropicrin	3.25	1.45	0.45	3.9	0.9	0.2	5.3	1.2	0.45	4.9	1.4	0.4
3. Broccoli	3.6	1.15	0.6	2.3	0.5	0.5	2.8	1	0.4	3.7	0.9	0.4
4. Metam-sodium 50	2.4	1.05	0.7	0.9	0.55	0.4	2.3	0.95	0.7	0.1	0.1	0.8
5. Dichloropropene	5.1	0.65	0.6	2.9	0.8	0.25	5.4	1.4	0.6	2.6	1	0.3
6. Cow manure	2.55	0.4	0.45	3.1	1.1	0.5	1.75	0.9	0.55	2.8	0.9	0.4
7. Methyl Bromide 50	3.8	1.2	0.45	4.6	1	0.5	3.5	1.5	0.7	4.5	1.2	0.9
8. Methyl Bromide 40	2.7	0.6	0.8	6.65	1.7	0.75	4.4	1.8	0.4	2.6	1.1	0.65
9. Dazomet	1.75	0.85	0.45	0.9	0.3	0.35	1.35	0.7	0.4	1.5	0.7	0.35
10.Control	3.9	0.8	0.45	2.1	1.6	0.6	2	0.8	0.7	3	1.35	0.5
11.Compost	1.5	0.3	0.85	1.9	1	0.5	1.35	0.4	0.6	3.1	0.9	0.85
12.Metam-sodium 25	3.3	1	0.75	3.8	1.35	0.35	4.2	1	0.9	2.8	0.8	0.6

STATISTIC ANALYSIS OF RESULTS OBTAINED IN TOMATOES CROP IN RANCHO "DON JUANITO" SAN QUINTÍN, B.C. PLANTED on April 25th., AND HARVESTED from July 14th, to September 12th, 2001.

Table 1. Kilograms of tomato per treatments, categories and repetitions

TREATMENTS	CATEGORIES	Rep 1	Rep 2	Rep 3	Rep 4
1.Chloropicrin	Export	229.05	185.80	192.78	212.25
	Domestic	50.30	38.69	49.60	48.85
	Remain	13.05	11.15	6.65	17.00
2. Dichloropropen + Chloropicrin	Export	210.05	212.60	201.30	227.40
	Domestic	51.00	48.85	51.80	50.15
	Remain	12.60	11.05	10.25	10.58
3. Broccoli	Export	212.10	181.50	167.95	204.30
	Domestic	45.40	45.35	40.00	45.95
	Remain	12.40	14.60	12.15	8.45
4. Metan-Sodium 50	Export	175.70	133.05	157.35	145.50
	Domestic	44.45	34.50	35.50	41.35
	Remain	11.85	17.12	14.40	14.40
5. Dichloropropen	Export	209.55	204.75	187.15	204.65
	Domestic	52.55	45.70	45.10	44.45
	Remain	11.40	9.25	11.65	10.15
6. Cow manure	Export	152.45	165.55	161.80	151.00
	Domestic	38.05	38.05	41.70	37.85
	Remain	13.10	8.85	10.90	12.40
7. Methyl Bromide 50	Export	204.45	226.10	192.45	248.60
	Domestic	50.35	46.75	46.90	48.60
	Remain	8.65	7.05	6.85	8.70
8. Methyl Bromide 40	Export	198.65	217.90	201.90	199.45
	Domestic	51.80	42.50	41.50	49.95
	Remain	16.05	9.40	9.90	9.75
9. Dazomet	Export	130.50	136.75	138.05	124.70
	Domestic	41.65	30.90	40.97	35.70
	Remain	20.63	17.35	17.90	15.90
10. Control	Export	185.80	184.60	177.65	182.30
	Domestic	34.50	38.10	44.10	33.05
	Remain	9.45	9.90	12.09	10.80
11. Compost	Export	151.00	157.55	160.90	155.85
	Domestic	34.55	38.75	33.70	34.85
	Remain	15.55	14.85	13.05	12.25
12. Metan-Sodium 25	Export	170.30	192.00	198.80	181.14
	Domestic	33.95	29.30	38.20	35.40
	Remain	12.95	10.35	9.35	11.27

Table 2. A N A L Y S I S O F V A R I A N C E OF TOMATOES' WEIGHT, FOR TREATMENTS AND CATEGORIES.

FV	GL	SC	CM	F	P>F
REPETITIONS	3	312.000000	104.000000	1.491 NS	0.220
TREATMENTS	11	13304.312500	1209.482910	17.336 **	0.000
CATEGORIES	2	803994.687500	401997.343750	5762.026 **	0.000
TREAT - CATEG	22	21478.437500	976.292603	13.994 **	0.000
ERROR	105	7325.500000	69.766670		
TOTAL	143	846414.937500			

C.V. = 10.55%

TEST OF TUKEY

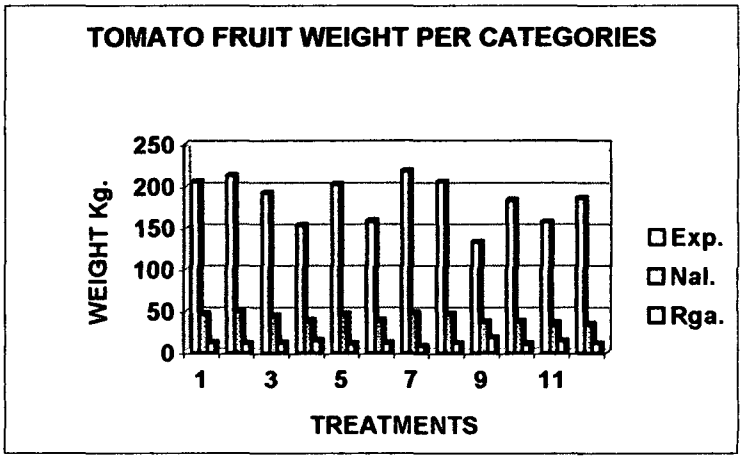
Table 3. COMPARISON OF AVERAGE'S TREATMENTS (Three categories' average)

TREATMENTS	
2	91.4691 A
7	91.2875 A
1	87.9308 AB
8	87.3958 AB
5	86.3600 AB
3	82.5125 AB
12	76.9425 BC
10	76.8617 BC
6	69.3083 CD
4	68.7642 CD
11	68.5708 CD
9	62.5833 D

LEVEL OF SIGNIFICANCE = 0.05
TUKEY = 11.4351
VALUES OF TABLES:
q(0.05) = 4.74 q(0.01) = 5.48

Table 4. AVERAGE OF TREATMENTS PER CATEGORÍES

TREATMENTS	CATEGORIES Exp.	Dom.	Rem.	AVERAGE
1. Chloropicrin	204.9700 AB	46.8600 A	11.9625 A	87.9308
2. Dichlorop+Chlorop	212.8375 A	50.4500 A	11.1200 A	91.4692
3. Broccoli	191.4625 BC	44.1750 A	11.9000 A	82.5125
4. Metan–Sodium 50	152.9000 D	38.9500 A	14.4425 A	68.7642
5. Dichloropropene	201.5250 ABC	46.9425 A	10.6125 A	86.3600
6. Cow manure	157.7000 D	38.9125 A	11.3125 A	69.3083
7. Methyl Bro 50	217.9000	48.1500 A	7.8125 A	91.2875
8. Methyl Bro 40	204.4750 AB	46.4375 A	11.2750 A	87.3958
9. Dazomet	132.5000 E	37.3050 A	17.9450 A	62.5833
10. Control	182.5875 C	37.4375 A	10.5600 A	76.8617
11. Compost	156.3250 D	35.4625 A	13.9250 A	68.5708
12. Metan–Sodium 25	185.5850 BC	34.2125 A	11.0300 A	76.9425
AVERAGE	183.3973	42.1079	11.9915	79.1655



INTERPRETATION OF RESULTS:

Analysis of tomatoes weight variance show highly significant effects for treatments and categories (Table 1)

Export Tomato: The highest yield were observed in treatments: 7; Methyl Bromide 50 and 2; Dichloropropene + Chloropicrin), with averages of 217.90 and 212.838 kg respectively. In descendent order, next group of significance was occupied for treatments: 1; Chloropicrin, 8; Methyl Bromide

40 and 5; Dichloropropene, with averages of 204.970, 204.470 and 201.525 kg respectively. Third place of significance was for treatments: 3; Broccoli, 12; Metan-Sodium 25 and 10; Control, with averages of 191.463, 185.585 and 182.587 kg respectively. Lowest than Control, the fourth place of significance was occupied for treatments: 6; Cow manure, 11; Compost and 4; Metan-Sodium 50, with averages of 157.700, 156.325 and 152.900 kg of tomato, respectively. Last and fifth place of significance was occupied for treatment 9; Dazomet, with average of 132.500 kg tomato (Table 4).

Domestic Tomato : It wasn't significant differences among treatments. In treatment 2; Dichloropropene + Chloropicrin it got the best average, 50.450 kg of tomato. In treatment 12; Metan-Sodio 25, it was found the lowest, 34.213 kg (Table 4).

Remain tomato. Result was similar to previous category. It wasn't observed significant differences among treatments. Treatment 9; Dazomet it was got the highest average, 17.945 kg; The lowest was treatment 7; Methyl Bromide 50. Its average was 7.813 kg of tomato (Table 4).

YIELD OF TREATMENTS (average of Exp., Dom., and Rem): First place of significance was occupied for treatments: 2; Dichloropropene + Chloropicrin and 7; Methyl Bromide 50, with averages of 91.469 and 91.288 kg of tomato. Second place of significance was for treatments: 1, 8, 5 and 3 1; Chloropicrin, 8; Methyl Bromide 40, 5; Dichloropropene and 3; Broccoli, which averages were 87.931, 87.396, 86.360 and 82.513 kg. Third place of significance were treatments: 12; Metan-Sodium 25 and 10; Control, with averages 76.943 and 76.862 kg. Fourth significance group was for treatments: 6; Cow manure, 4; Metan-Sodium 50 and 11; Compost, with averages of 69.308, 68.764 and 68.571 kg. Treatment 9; Dazomet, was in last place of significance, with average of 62.583 kg tomato (Table 3).

CONCLUSIONS.

1. The Best treatments were: 2; Dichloropropene + Chloropicrin and 7; Methyl Bromide 50.

2. Next best treatments: 1; Chloropicrin, 8; Methyl Bromide 40 and 5; Dichloropropene.

3. Treatments 3 Broccoli and Metam Sodium 25 got same results than Control.

4. The others treatments got low results than Control.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTION

During February 2002, it was established the second test of project "Alternatives to the use of Methyl Bromide in the cultivation of Tomatoes, (*Lycopersicon esculentum* L.), we started some tests in "Don Juanito" Ranch, San Quintin, Baja California, Mexico, which consisted in the aplication of different treatments on soil, in order to analyze the control about soil microorganisms and in crops development, comparing Methyl bromide. We apply this substance in alluvial arenaceous land, with region characteristics (flora and fauna) half-dessert. Agricultural activities are based in the drip irrigation, using groundwater table.

Treatments: Based on before results treatments during last agricultural season 2001, we selected 8 (eight) treatments.

TREATMENTS OR ALTERNATIVES:

1.- Control (no treatment).
2.- 40 gr/m^2 of methyl bromide (75/25 or 80/20).
3.- Five kg of fresh broccoli residue (or other cruciferous plant) incorporated into soil, plus four weeks of solarization.
4.- 50 ml/m^2 of metam-sodium.
5.- 33 ml/m^2 of chloropicrin.
6.- 1,3-dichloropropene+chloropicrin, dose recommended by the manufacturer.
7.- 1,3-dichloropropene, dose recommended by the manufacturer (11.2 ml/m^2).
8.- Commercial control

BODY OF THE REPORT

Land preparation

Activities in cooperative farmer land started in last February, when "Don Juanito" enterprise heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they made the installment underground pipeline. Afterwards the beds were marked, raised and

flattened. And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in February, 2002. In a piece of land with 32 beds, 50 m length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 8 experimental plots with 4 beds, which we applied next randomized treatments:

1). **Absolute control.** In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application.

2). **Methyl Bromide 80/20**. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

3). **Broccoli** incorporated on the soil and solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it were distributed 5 kg per M^2. It was incorporated by manual labor using hoes, after that, the rows were covered with transparent plastic.

4). **Metham-sodium.** In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

5). **Chloropicrin.** On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 20 days.

6). **1,3-dichloropopren + chloropicrin.** These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

7). **1,3-dichloropropen.** These furrows soil were treated using 11.2 ml/m^2 1,2-dichloropropen. This application was carried out using the equipment tractor thereinafter. The furrows were covered in black/silver plastic during 20 days.

8) **Commercial control** 1,3-dichloropropeno (75%) chloropicrin (25%). Tratamiento utilizado por el productor en el lote comercial.

The treatments were applied on damp soil.

Evaluations are taking place in the two central furrows in each experimental unit. We attached a label in 10 plants (five each row or 10 cm central bed) which were randomized, in order to take size measure.

Planting.

Tomato plants used in this tests are "fat" tomato or "ball" type. This plants grew in polyethylene ashtrays in "Don Juanito" agricultural enterprise greenhouses. The plants were 50 days old. They were planting 45 cm between each plant, on furrows with damp soil, non covered with plastic.

Crop Management

Irrigation and fertilization took place using drip irrigation, and they are controlled directly by enterprise field manager. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

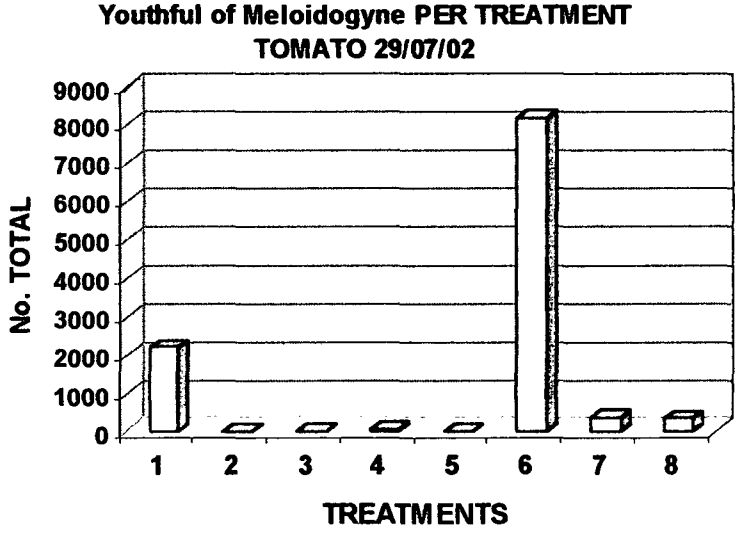
RESULTS:

Nematodes population:

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA
SITE: Rancho "Don Juanito" Col. Vicente Guerrero (Santa Fe)B.C.
PLANTING DATE: February 21st., 2002 **CROP:** Tomato Var. Tequila
EVALUATION PARAMETER: Population of nematodes on 200 gr. soil/treatment
EVALUATION DATE: 29/JULY/02

NEMATODES	TREATMENTS							
	1	2	3	4	5	6	7	8
Free life	2580	980	220	1360	360	660	2260	800
Meloidogyne	**2200**	**20**	**0**	**80**	**0**	**8200**	**380**	**360**
Pratylenchus	1660	20	0	100	0	200	120	180
Aphelenchus	60	0	0	40	0	20	20	20
Trichodorus	20	0	0	0	140	0	180	0
Aphelenchoides	80	40	0	100	0	20	0	0
Tylenchus	0	20	0	0	0	0	0	0

1. CONTROL
2. DICHLOROPROPENE
3. METHYL BROMIDE 40
4. CHLOROPICRYN
5. DICHLOROPROPENE+CHLOROPICRYN
6. METAM SODIUM 50
7. BROCCOLI
8. COMMERCIAL CONTRO



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

SITE: Rancho "Don Juanito" Col. Vicente Guerrero (Santa Fe)B.C.

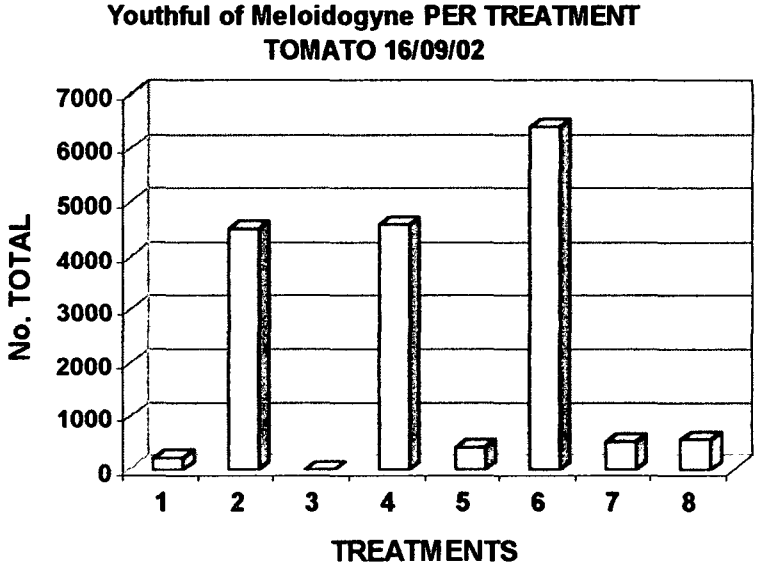
PLANTING DATE: February 21 st., 2002 CROP: Tomato Var. Tequila

EVALUATION PARAMETER: Population of nematodes on 200 gr. soil/treatment

EVALUATION DATE: 16/09/02

NEMATODES	TREATMENTS							
	1	2	3	4	5	6	7	8
Free life	1960	3760	860	860	2340	2120	740	960
Meloidogyne	**240**	**4520**	**0**	**4600**	**420**	**6380**	**540**	**580**
Pratylenchus	100	180	0	2020	180	300	20	160
Aphelenchus	0	0	0	0	40	20	0	80
Trichodorus	100	220	0	0	0	240	20	80
Longidorus	0	0	0	0	0	40	0	0
Tylenchus	0	0	0	60	0	0	0	0

1. CONTROL
2. DICHLOROPROPENE
3. METHYL BROMIDE 40
4. CHLORPICRYN
5. DICHLOROPROPENE + CHLORPICRYN
6. METAM SODIUM 50
7. BROCCOLI
8. COMMERCIAL CONTROL



FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA

SITE: Rancho "Don Juanito" Col. Vicente Guerrero (Santa Fe)B.C.

PLANTING DATE: February 21st., 2002 **CROP**: Tomato, Var. Tequila.

EVALUATION PARAMETER: % nodulation of roots per Meloidogyne

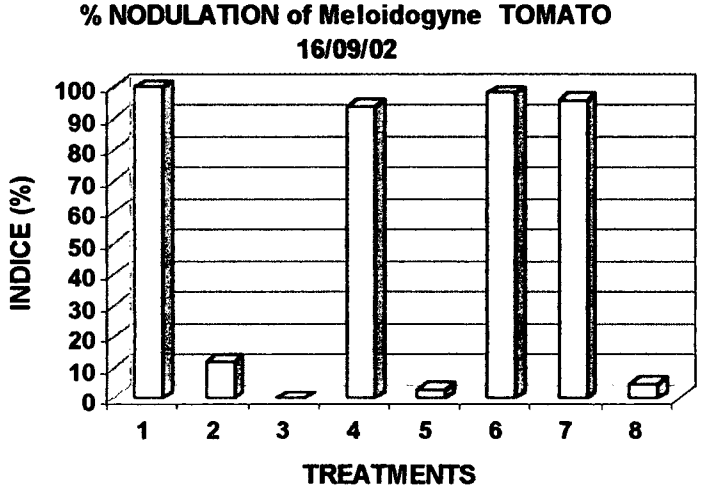
EVALUATION DATE: 16/09/02 **Escala de 1-6 = 0-100%**

% NODULATION OF ROOTS PER Meloydogine ON 5 PLANTS/REPETITION												
TREATMENTS	REPETITION I						REPETITION II					
	PLANTS						PLANTS					
	1	2	3	4	5	Average	1	2	3	4	5	Average
1. Control	100	100	100	100	100	100	100	100	100	100	100	100
2. Dichloropropene	0	0	60	0	0	12	0	0	0	40	0	8
3. Methyl Bromide 40	0	0	0	0	0	0	0	0	0	0	0	0
4. Chloropicryn	100	100	100	100	100	100	100	100	80	100	100	96
5. Dichloropropene+Chloropicryn	0	0	0	0	0	0	0	0	40	0	0	8
6. Metam sodium 50	100	100	100	100	80	96	100	100	100	100	100	100
7. Brócoli	100	100	100	100	100	100	100	80	100	100	100	96
8. Comercial Control	0	0	0	40	0	8	0	0	0	0	0	0

% NODULATION OF ROOTS PER Meloydogine ON 5 PLANTS/REPETITION												
TREATMENTS	REPETITION Lii						REPETITION IV					
	PLANTS						PLANTS					
	1	2	3	4	5	Average	1	2	3	4	5	Average
1. Control	100	100	100	100	100	100	100	100	100	100	100	100
2. Dichloropropene	0	0	60	0	0	12	0	0	20	0	60	16
3. Methyl Bromide 40	0	0	0	0	0	0	0	0	0	0	0	0
4. Chloropicryn	100	100	100	60	100	92	100	60	100	100	80	88
5. Dichloropropene+Chloropicryn	0	0	0	0	20	4	0	0	0	0	0	0
6. Metam sodium 50	100	100	100	100	100	100	100	100	80	100	100	96
7. Broccoli	100	100	80	100	100	96	60	100	100	100	100	92
8. Commercial Control	0	60	0	0	0	12	0	0	0	0	0	0

FACULTAD DE AGRONOMIA -UNIVERSIDAD AUTONOMA DE SINALOA
SITE: Rancho "Don Juanito" Col. Vicente Guerrero (Santa Fe)B.C.
PLANTING DATE: February 21st., 2002 **CROP:** Tomato Var. Tequila
EVALUATION PARAMETER: % nodulation of roots per Meloidogyne
EVALUATION DATE: 16/09/02

TOTAL AVERAGE OF ROOTS NODULATION PER Meloydogine						
TREATMENTS	AVERAGES/REPETITION					
	1	2	3	4	Total	Average
1. Control	100	100	100	100	400	100
2. Dichloropropene	12	8	12	16	48	12
3. Methyl Bromide 40	0	0	0	0	0	0
4. Chloropicryn	100	96	92	88	376	94
5. Dichloropropene+Chloropicryn	0	8	4	0	12	3
6. Metam sodium 50	96	100	100	96	392	98
7. Brócoli	100	96	96	92	384	96
8. Comercial Control	8	0	12	0	20	5



YIELD RESULTS:

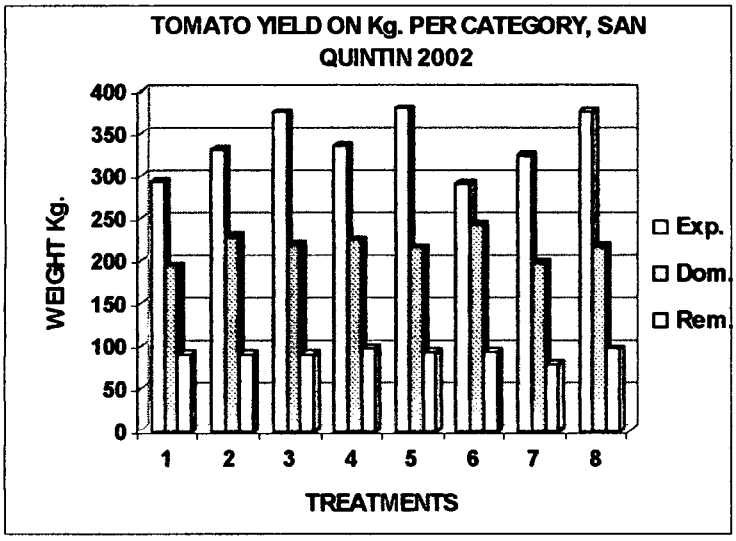
FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINA.LOA

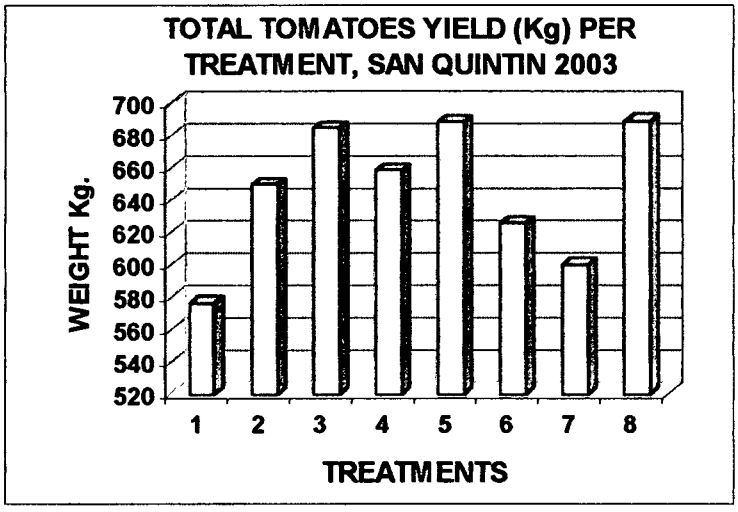
SITE: "Don Juanito" Ranch, Col. Vicente Guerrero (Santa Fe), B.C.
CROP: Tomato Var. Tequila
EVALUATION PARAMETER: Total yield on Kg. 12 m. lineal/repetition/treatment
PLANTING DATE: April 8th, 2002
EVALUATION DATE: July 3th, to August 27th, 2002

TREATMENTS	EXPORT, DOMESTIC AND REMAIN TOMATOES YIELD ON KG.														
	REPETITION I			REPETITION II			REPETICION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM	EXP.	DOM	REM	EXP.	DOM	REM	EXP.	DOM	REM	EXP.	DOM	REM
1. Control	76.85	50.45	22.4	72.75	48.65	26.2	73.15	48.1	18.3	69.55	46.6	23.25	**292.3**	**193.8**	**63.95**
2. Dichloropropen	79.75	54.2	23.35	75.1	49.7	22.15	81.8	64.1	23.15	93.55	61.1	21.55	**330.2**	**229.1**	**68.05**
3. Methyl Bromide 40	74.3	54.05	25.8	90.85	53.65	22.2	103.1	55.8	22.3	106.1	55.2	20.85	**374.3**	**218.7**	**68.95**
4. Chloropicrin	76.45	58.6	29.55	82.3	54.85	27.1	92.35	54.7	20.2	83.8	56.5	21.9	**334.9**	**224.65**	**71.65**
5. Dichloropropen+Chloropicrin	101.2	58.4	23.3	92.15	51.85	25.7	100	54.45	20.8	85.95	50.85	23.45	**379.25**	**215.55**	**67.55**
6. Metam-sodium 50	68.3	51.55	24	75.3	55.6	21.3	85.75	71.4	22.6	61.2	64.05	24.55	**290.55**	**242.6**	**71.15**
7. Broccoli	73.1	46.1	17.9	82.75	50.55	19.9	89.8	48.65	20.6	77.2	51.95	21.5	**322.85**	**197.25**	**60**
8. Commercial Control (Piclor 15)	96.7	53	22.5	96.3	62.05	26.15	89.35	51.35	21.1	93.95	49.4	26.8	**376.3**	**215.8**	**70.4**

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINA.LOA
SITE: "Don Juanito" Ranch, Col. Vicente Guerrero (Santa Fe), B.C.
CROP: Tomato Var. Tequila
EVALUATION PARAMETER: Total yield Kg. on 48 m. lineal/treatment
PLANTING DATE: April 8th, 2002
EVALUATION DATE: July 3th, to August 27th, 2002

TREATMENTS	TOTAL TOMATOES YIELD ON Kg.			
	Export	Domestic	Remain	Total
1. Control	292.3	193.8	90.15	**576.25**
2. Dichloropropen	330.2	229.1	90.2	**649.5**
3. Methyl Bromide 40	374.3	218.7	91.15	**684.15**
4. Chloropicrin	334.9	224.65	98.75	**658.3**
5. Dichloropropen+Chloropicrin	379.25	215.55	93.25	**688.05**
6. Metam-sodium 50	290.55	242.6	92.45	**625.6**
7. Brócoli	322.85	197.25	79.9	**600**
8. Commercial Control (Piclor 15)	376.3	215.8	96.55	**688.65**





Final conclusion. The treatments with greater production (export and national) were: dichloropropeno + Chloropicrin, and metam sodium + solarization. These are alternatives to the use of methyl bromide for the control of pathogens of the ground in tomato, nevertheless biofumigation could be a good treatment of control that could be adopted by lower producers

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

THIRD ANNUAL REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP, VARIETY AND PRODUCT TO BE HARVESTED: Tomato (*Lycopersicon esculentum* L.), variety being used by the grower, and harvest will be fruits.

PROJECT AREAS: Experimental units be located in "El Porvenir" farming, Culiacan, Sinaloa, Mexico.

Owner: Ing. Daniel Cárdenas
Executive Manager: Ing. Gerardo Duarte
Applications Technician: Ing. Joel Bojórquez Beltrán (Cel: 650956)

Enterprise Address: Carretera "La Veinte", Villa Juárez, Navolato, Sinaloa, México.

Tels: (67) 13-02-33, 15-74-71 (Culiacan)
(672) 8-51-59, 8-51-58, 8-51-54 and 8-53-94 (in the field and packing house).
Fax: (01 672) 13-12-57

Culiacan, Sinaloa, March, 2004.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

FINAL PROJECT REPORT. Demonstration Project of Alternatives to the use of Methyl Bromide in the cultivation of Tomatoes, (*Lycopersicon esculentum* L.). The development in empresa Agrícola El Porvenir fields in Bachigualatillo, Culiacan, Sinaloa, Mexico. In this field have been working MC. Francisco Javier Estrada Ramirez, coordinator in this project. And MC. Sostenes Montoya Angulo, agronomist who is implementing the tests. QFB. María de la Luz Acosta Pineda y MC: Carlos Morales Cazarez, Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

Introduction

Last September, 1999, in Culiacan, Valley, Sinaloa, Mexico, we started taking some tests. We apply different treatments in soil, in order to analyze the control about soil microorganisms and in crops development also, comparing Methyl bromide. We apply this substance in muddy type soil.

Treatments: We started the experiment in agricultural season 1999. we applied 13(fourteen) treatments:

treatments or alternatives:

1.- Control (no treatment).
2.- 15 gr/m^2 of methyl bromide (75/25 or 80/20).
3.- 40 gr/m^2 of methyl bromide (75/25 or 80/20).
4.- Five kg of bovine cattle manure incorporated into soil, plus four weeks of solarization.
5.- .- Five kg of chicken manure incorporated into soil, plus four weeks of solarization.
6- Five kg of fresh broccoli residue (or other cruciferous plant) incorporated into soil, plus four weeks of solarization.
7.- 25 ml/m^2 of metam-sodium (N, methyl sodium ditiocarbamate) plus six weeks of solarization.
8.- 50 ml/m^2 of metam-sodium.
9.- 33 ml/m^2 of chloropicrin.
10.- 40 gr/ m^2 of Dazomet (tetrahydro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona).

11.- 1,3-dichloropropene+chloropicrin,dose recommended by the manufacturer.
12- 1,3-dichloropropene, dose recommended by the manufacturer (11.2 ml/m^2).
13.- Four weeks of solarization.

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last August, when "El Porvenir" enterprise heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they made the instalment underground pipeline. Afterwards the beds were marked, arised and flattened. And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in September 13rd , 1999. In a piece of land with 56 beds, 50 m lenght, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 13 experimental plots with 4 beds, which we applied next randomized treatments:

1). Absolute control. In this experimental unit consist on 4 rows, 10 M. lenght, and we didn't realized any fungicide or organic matter application.

2). Methyl Bromide 80/20 (15 gr/m^2). In soil in the 4 rows in this experimental unit it was injected 15 gr M^2 (80% methil bromide and 20% chloropicrin). The application was aproximattely 25-30 cm depth.

3). Methyl Bromide 80/20. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% cholopicrin).The application was aproximattely 25-30 cm depth.

4). Solarization. The four rows were padded or was covered with transparent plastic from September 14th to October 15th, 1999.

5). Hen manure was incorporated to the soil with the solarization. It was distributed on the soil, in that 10 mts., four rows, 200 kgs hens manure, aproximattely 5 kgs per M^2. It was incorpored by manual labour using hoes and the rows were covered with transparent plastic from September 16th to Ocrubre 15th, 1999.

6). Cow Manure was incorporated to the soil with the solarization. It was distributed 200 kg. Cow manure, aproximattely 5 kg. Per M^2. It was incorpored by manual labour using hoes, and the rows were covered with transparent plastic from September 16th to October 15th, 1999. The cow manure was still damp.

7). Green cabbage incorporated on the soil with the solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it were distributed 5 kg per M^2. It was incorporated by manual labour using hoes, after that the rows were covered with transparent plastic from September 16th
to October 15th, 1999.

8). Metham-sodium (N, methyl ditiocarbamato sodium) with solarization. Using drip irrigation it was applied aproximattely 25 ml/m^2 metham sodium. Before the application the rows were covered with transparent plastic from September 14th to October 15th, 1999.

9). Metham-sodium. In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 22 days.

10). Chloropicrin. On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 22 days.

11). Dazomet(tetrahidro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona). On this furrows soil we distributed by manual labour 40 gr/m^2 dazomet: it was incorporated using hoes, after that, we applied water by sprinkler irrigation during 3 hrs.

12). 1,3-dichloropopreno + chloropicrin. These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 22 days.

13). 1,3-dichloropropen. These furrows soil were treated using 11.2 ml/m^2 1,2-dichloropropen. This application was carried out using the equipment tractor thereinafter. The furrows were covered in black/silver plastic during 22 days.

The treatments were applied in damp soil.

Evaluations are taking place in the two central furrows in each experimental unit. We attached a label in 10 plants (five each row or 10 cm central bed) which were randomized, in order to take size measure.

Planting.

Tomatoe plants used in this tests are "fat" tomatoe or "ball" type. This plants growed in polyethylene ashtrays in "El Porvenir" agricultural enterprise greenhouses. The plants were 50 days old. They were planting 45 cm between each plant, on furrows with damp soil, non covered with plastic.

Crop Management

Irrigation and fertilization took place using drip irrigation, and they are controlled directly by enterprise field manager. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and follage pests, etc.

RESULTS

Root knotting diseases incidence. We are checking the plants each two weeks, carrying out observations in plants, in order to detect syntoms, like yellow leaves, no development, withering or dead plants. However, we haven't detected any abnormality.

Nematodes Population. Seven weeks after central furrows transplanting, in each experimental unit, near plant roots, 0-30 cm depth. We'll take five soil subsampling, in order to obtain one kg. Sampling. Immediatly after that, the soil samplers will be taken to the Phytopatology lab in Agronomy Faculty to carry out nematodes extraction.

We put into a 1,000 ml graduate test tube 400 ml of water, we stirred each soil sample perfectly homogenized. We stirred hard and we put out in a small cask containing 4 liters of water. Afterwards the soil was disolved in water, allowed to stand for 20 seconds and this water with the soil was passed through a 60 mesh sieves and this soil with water was put into a second small cask. Subsequently it was stirred again allowing to stand for 20 seconds, then it was passed through a 325 sieve mesh. The soil retained in this sieve mesh was taken using a teaspoon and it was passed into a 100 ml flask and it was taken to the Faculty of Agronomy Pthytopatology lab in order to carry out nematodes extraction. In lab the soil from the flasks was put on a piece of toilet paper which was on a wire mesh, which was on a plastic funnel. In the funnel extreme it was put a flexible plastic hose which was stopped up using a pincer; the funnel was filled up of water until this touch the sieved soil. After 24 hours, from the bottom extreme hose, we pick up a 10 ml. Sample; it was gauged again using clean water, and after 24 hours again it was taken another water sample with nematodes. This activity was repeated in all 52 samples.

Using a biological microscope we observed the nematodes and we counted which we found in 1 ml. Aliquots. Afterwards we calculed the founded populations in 20 ml of water which we obtained using the sieve funnel method. This correspond to the soil 200 ml populations.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTION

Last September, 2000, it was established the second test of project "Alternatives to the use of Methyl Bromide in the cultivation of Tomatoes, ***(Lycopersicon esculentum* L.),** we started taking some tests in Agrícola El Porvenir, Culiacan Valley, Sinaloa, Mexico,. We apply different treatments in soil, in order to analyze the control about soil microorganisms and in crops development also, comparing Methyl bromide. We apply this substance in muddy type soil.

Treatments: Based on before results treatments during last agricultural season 1999-2000, we selected 6 (six) treatments.

1. Dichloropropen + chloropicrin 16 ml/m2.
2. Control
3. Methyl bromide 75/25, 40 gr/m2
4. Metam-sodium 50 ml/m2
5. Chloropicrin 33ml/m2
6. Dichloropropen 12 gr/m2

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last August, when "El Porvenir" enterprise heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they made the instalment underground pipeline. Afterwards the beds were marked, arised and flattened. And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in October 1st, 2000. In a piece of land with 24 beds, 100 m lenght, inside the enterprise commercial land. It was traced four blocks 25 m each; we selected 7 experimental plots with 4 beds, which we applied next randomized treatments:

1). 1,3-dichloropopren + chloropicrin. These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

2). Absolute control. In this experimental unit consist on 4 rows, 10 M. lenght, and we didn't realized any fungicide or organic matter application.

3). Methyl Bromide 80/20. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% cholopicrin).The application was aproximattely 25-30 cm depth.

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6). 1,3-dichloropropen. These furrows soil were treated using 11.2 ml/m^2 1,2-dichloropropen. This application was carried out using the equipment tractor thereinafter. The furrows were covered in black/silver plastic during 20 days.

The treatments were applied on damp soil.

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Using a biological microscope we observed the nematodes and we counted which we found in 1 ml. Aliquots. Afterwards we calculed the founded populations in 20 ml of water which we obtained using the sieve funnel method. This correspond to the soil 200 ml populations.

RESULTS

YIELD.

WEIGHT OF HARVESTED FRUITS (Kg)											
DIC+CLOR		TEXT		METHYL BRO		MET SOD		CHLOROP		DICHLOR	
EXP	DOM	EXP	DOM	EXP	DOM	EXP	DOM	EXP	DOM	EXP	DOM
39.000	45.875	26.925	29.200	27.725	21.275	26.125	25.875	10.950	11.525	17.225	15.275
160.981	134.171	188.798	137.297	204.526	132.053	215.439	136.877	161.744	201.791	149.710	168.204
318.466	190.863	185.734	132.501	254.810	161.675	186.853	123.337	254.182	226.050	328.223	199.543
49.333	56.080	43.962	59.869	74.115	56.676	92.961	58.251	72.261	66.063	69.187	77.117
137.604	121.707	122.590	108.762	115.027	104.207	132.876	106.565	140.153	116.063	131.304	108.485
705.38	548.70	568.01	467.63	676.20	475.89	654.25	450.91	639.29	621.49	695.65	568.62
1254.080		1035.638		1152.089		1105.159		1260.782		1264.273	

STATISTIC ANALYSIS OF EXPORT TOMATOES NUMBER ACHIEVED IN EXPERIMENT CARRIED OUT IN "EL PORVENIR" CAMP, CULIACAN, SINALOA, MEXICO, SEASON 2000-2001

VARIABLE: **Export tomatoes number**

TREATMENTS	REPETITIONS			
	1	2	3	4
1.- Dichloropropen	850.0000	825.0000	878.0000	847.0000
2.- Control	830.0000	755.0000	725.0000	722.0000
3.- Metyl Bromide	944.0000	860.0000	794.0000	802.0000
4.- Metam Sodium	826.0000	800.0000	708.0000	768.0000
5.- Chloropicrin	865.0000	789.0000	775.0000	793.0000
6.- Dichloropropen	862.0000	853.0000	867.0000	874.0000

ANALYSIS

FV	GL	SC	CM	F	P>F
TREATMENTS	5	38889.000000	7777.799805	6.4607**	0.002
REPETITIONS	3	18210.000000	6070.000000	5.0421	0.013
ERROR	15	18058.000000	1203.866699		
TOTAL	23	75157.000000			

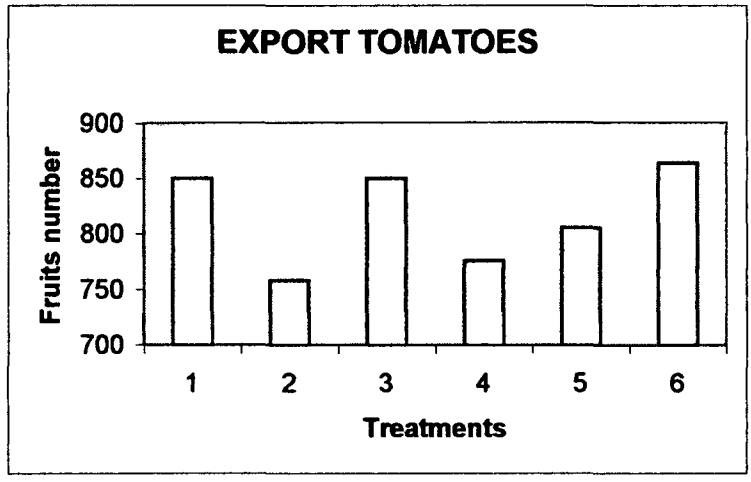
C.V. = 4.25%

COMPARISON OF AVERAGE STATISTIC ANALYSIS IN ORDER TO ACHIEVE SIGNIFICANCE LEVEL AMONG TREATMENTS, USING TUKEY TEST 0.05

COMPARISON OF AVERAGE TABLE
TUKEY TEST

TREATMENTS	AVERAGES
6	864.0000 A
3	850.0000 AB
1	850.0000 AB
5	805.5000 ABC
4	775.5000 BC
2	758.0000 C

SIGNIFICANCE LEVEL = 0.05
TUKEY = 79.8026
TABLE'S VALUE (0.05), (0.01) = 4.60, 5.80



INTERPRETATION OF RESULTS:

Based on achieved results in statistic analysis about harvested export tomatoes each treatment we could observed that there are high significant differences among them. Treatment 6; dichloropropen, was the best, next treatments 3; methyl bromide and 1; dichloropropen + chloropicrin, on third place we got treatment 5; chloropicrin. The worst treatments were: 4; metam sodium and 2; control.

STATISTIC ANALYSIS OF TOMATOES NUMBER FOR DOMESTIC MARKET ACHIEVED IN "EL PORVENIR, CULIACÁN, SINALOA, MÉXICO. SEASON 2000-2001

VARIABLE: **Number of Tomatoes Domestic Market**

TREATMENTS	REPETITIONS			
	1	2	3	4
1.- Dichloroprop+chlorop	762.0000	740.0000	661.0000	697.0000
2.- Control	622.0000	620.0000	598.0000	635.0000
3.- Methyl bromide	724.0000	670.0000	597.0000	613.0000
4.- Metam sodium	618.0000	626.0000	523.0000	560.0000
5.- Chloropicrin	892.0000	768.0000	696.0000	798.0000
6.- Dichloropropen	713.0000	667.0000	606.0000	732.0000

A N A L Y S I S O F V A R I A N C E

FV	GL	SC	CM	F	P>F
TREATMENTS	5	107592.000000	21518.400391	18.7312**	0.000
REPETITION	3	36012.000000	12004.000000	10.4492	0.001
ERROR	15	17232.000000	1148.800049		
TOTAL	23	160836.000000			

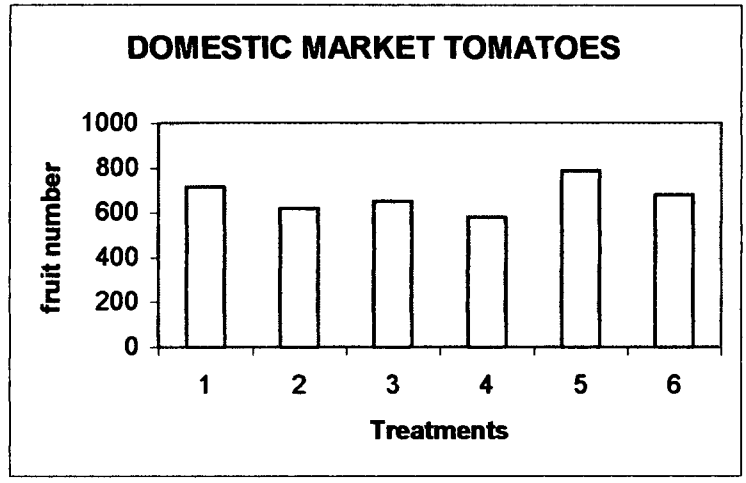
C.V. = 5.04%

AVERAGES COMPARISON OF STATISTIC ANALYSIS IN ORDER TO ACHIEVE SIGNIFICANCE AMONG TREATMENTS, USING TUKEY TEST 0.05

C O M P A R I S O N O F A V E R A G E T A B L E
TUKEY TEST

TREATMENTS	AVERAGE
5	788.5000 A
1	715.0000 AB
6	679.5000 BC
3	651.0000 BCD
2	618.750 CD
4	581.7500 D

SIGNIFICANCE LEVEL = **0.05**
TUKEY = 77.9561



INTERPRETATION OF RESULTS :

Based on achieved results in statistic analysis about number of tomatoes for domestic market harvested per treatments we could observed that there are high significant differences among them. Treatment 5; chloropicrin, was the best, then treatment 1; dichloropropen + chloropicrin, third place 6; dichloropropen, fourth place 4; methyl bromide, fifth place 2; control. The worst treatment was 4; metam sodium.

STATISTIC ANALYSIS OF TOTAL NUMBER TOMATOES (EXPORT + DOMESTIC) ACHIEVED IN "EL PORVENIR", CULIACAN, SINALOA, MEXICO. SEASON 2000-2001

VARIABLE: **Total of Tomatoes (Export + Domestic market)**

	REPETITIONS			
TREATMENTS	1	2	3	4
1. Dichloro + Chloro	1612.0000	1565.0000	1539.0000	1544.0000
2. Control	1452.0000	1375.0000	1323.0000	1357.0000
3. Methyl Bromide	1668.0000	1530.0000	1391.0000	1415.0000
4. Metan Sodium	1444.0000	1426.0000	1231.0000	1328.0000
5. Chloropicrin	1757.0000	1557.0000	1471.0000	1591.0000
6. Dichloropropen	1575.0000	1520.0000	1473.0000	1606.0000

ANALYSIS OF VARIANCE

FV	GL	SC	CM	F	P>F
TREATMENTS	5	199484.000000	39896.800781	13.6758 **	0.000
REPETITIONS	3	99272.000000	33090.667969	11.3428	0.001
ERROR	15	43760.000000	2917.333252		
TOTAL	23	342516.000000			

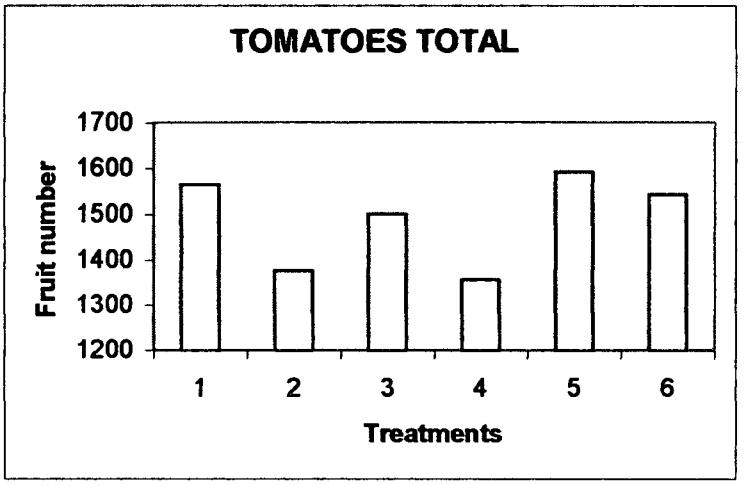
C.V. = 3.63%

AVERAGES COMPARISON OF STATISTIC ANALYSIS IN ORDER TO ACHIEVE SIGNIFICANCE AMONG TREATMENTS, USING TUKEY TEST 0.05

COMPARISON OF AVERAGE TABLE
TUKEY TEST

TREATMENTS	AVERAGE
5	1594.0000 A
1	1565.0000 A
6	1543.5000 A
3	1501.0000 A
2	1376.7500 B
4	1357.2500 B

SIGNIFICANCE LEVEL = 0.05
TUKEY = 124.2284



INTERPRETATION OF RESULTS:

Based on achieved results in statistic analysis about total number of tomatoes for export and domestic markets harvested each treatment, we could observed that there are high significant differences among them. The best treatments were: 5; chloropicrin, 1; dichloropropen+chloropicrin, 6; dichloropropen and 3; methyl bromide. There weren't significant differences among them, with a significant level 0.05%. The worst treatments were 2; control and 4; metam sodium.

STATISTIC ANALYSIS OF TOMATOES WEIGHT FOR EXPORT ACHIEVED IN "EL PORVENIR", CULIACÁN, SINALOA, MÉXICO, SEASON 2000-2001

VARIABLE: **Export Tomatoes weight (kg)**

	REPETITIONS			
TREATMENTS	1	2	3	4
1. Dichlorop + Chlorop	181.7340	175.3950	186.8530	180.7250
2. Control	173.8340	157.0190	153.6700	150.2270
3. Methyl Bromide	198.8690	182.0240	167.8590	168.5580
4. Metan Sodium	175.6210	169.3690	149.9260	160.8330
5. Chloropicrin	178.5700	164.5220	161.9660	165.8330
6. Dihcloropropen	178.6910	178.5200	149.3460	183.2640

ANALYSIS OF VARIANCE

FV	GL	SC	CM	F	P>F
TREATMENTS	5	1544.125000	308.825012	4.2206 *	0.014
REPETITIONS	3	1197.375000	399.125000	5.4547	0.010
ERROR	15	1097.562500	73.170830		
TOTAL	23	3839.062500			

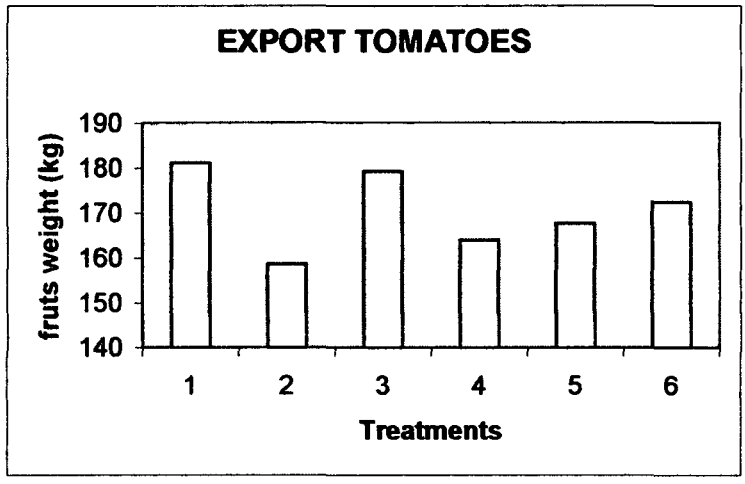
C.V. = 5.02%

AVERAGES COMPARISON OF STATISTIC ANALYSIS IN ORDER TO ACHIEVE SIGNIFICANCE AMONG TREATMENTS, USING TUKEY TEST 0.05.

COMPARISON OF AVERAGE TABLE
P R U E B A D E T U K E Y

TREATMENTS	AVERAGE
1	181.1768 A
3	179.3275 A
6	172.4553 AB
5	167.7227 AB
4	163.9372 AB
2	158.6875 B

SIGNIFICANCE LEVEL = **0.05**
TUKEY = 19.6742



INTERPRETATION OF RESULTS:
Based on achieved results in statistic analysis about tomatoes' weight for export market harvested each treatment. We could observed that there are high significant differences among them. The best treatments were: 1; dichloropropen + chloropicrin and 3; methyl bromide. There aren't significant differences among them with a significance level 0.05%, then treatments 6; dichloropropen, 5; chloropicrin; 4; metam sodium. The worst treatment was 2; control.

STATISTIC ANALYSIS OF TOMATOES WEIGHT FOR DOMESTIC MARKET

VARIABLE: **Tomatoes weight for Domestic Market (kg)**

TREATMENTS	REPETITIONS 1	2	3	4
1. Dichlorop + Chlorop	147.3700	146.1540	132.6230	136.9080
2. Control	125.4940	122.3290	118.5660	126.7350
3. Methyl Bromide	145.0610	130.5820	115.6230	118.7940
4. Metan Sodium	123.1770	129.8420	106.5790	112.0800
5. Chloropicrin	184.8110	154.3720	141.9350	163.1150
6. Dichloropropen	143.3940	135.5480	124.2530	152.1400

ANALYSIS OF VARIANCE

FV	GL	SC	CM	F	P>F
TREATMENTS	5	4847.906250	969.581238	14.0438 **	0.000
REPETITIONS	3	1425.500000	475.166656	6.8825	0.004
ERROR	15	1035.593750	69.039581		
TOTAL	23	7309.000000			

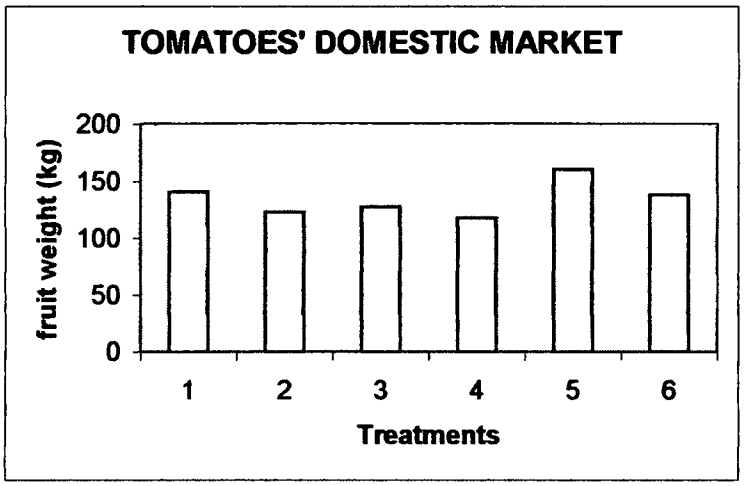
C.V. = 6.16%

AVERAGES COMPARISON OF STATISTIC ANALYSIS IN ORDER TO ACHIEVE SIGNIFICANCE AMONG TREATMENTS, USING TUKEY TEST 0.05

COMPARISON OF AVERAGE TABLE TEST OF TUKEY

TREATMENTS	AVERAGE
5	161.0582 A
1	140.7637 B
6	138.8338 B
3	127.5150 BC
2	123.2810 BC
4	117.9195 C

SIGNIFICANCE LEVEL = **0.05**
TUKEY = 19.1107



INTERPRETATION OF RESULTS:

Based on achieved results in statistic analysis about tomatoes' weight for domestic market harvested each treatment, we could observed that there are high significant differences among them. The best treatment was 5; chloropicrin, then 1; dichloropropen + chloropicrin and 6; dichloropropen, third place treatments 3; methyl bromide and 2; control. The worst treatment was 4; metam sodium.

STATISTIC ANALYSIS OF TOTAL WEIGHT TOMATO (EXPORT + DOMESTIC)

VARIABLE: **Total weight of Tomatoes, in kg (Export + Domestic)**

TREATMENTS	REPETITIONS 1	2	3	4
1. Dichlorop + Chlorop	329.1040	321.5490	319.4760	317.6330
2. Control	299.3280	279.3480	272.2360	276.9620
3. Methyl Bromide	343.9300	312.6060	283.4820	287.3520
4. Metam Sodium	298.7980	299.2110	256.5050	272.9130
5. Chloropicrin	363.3810	318.8940	303.9010	328.9480
6. Dichloropropen	322.0850	314.0680	273.5990	335.4040

ANALISIS OF VARIANCE

FV	GL	SC	CM	F	P>F
TREATMENTS	5	7841.750000	1568.349976	7.7660 **	0.001
REPETITIONS	3	5160.500000	1720.166626	8.5178	0.002
ERROR	15	3029.250000	201.949997		
TOTAL	23	16031.500000			

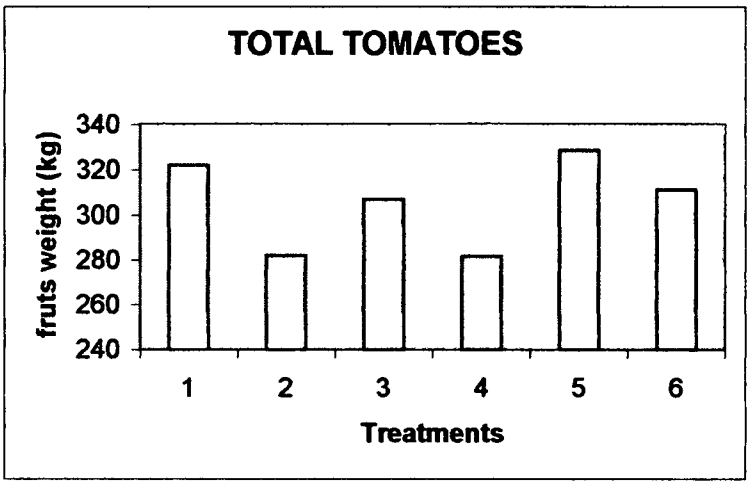
C.V. = 4.65%

AVERAGES COMPARISON OF STATISTIC ANALYSIS IN ORDER TO ACHIEVE SIGNIFICANCE AMONG TREATMENTS, USING TUKEY TEST 0.05

AVERAGE COMPARISON TABLE
TUKEY TEST

TREATMENTS	AVERAGE
5	328.7810 A
1	321.9405 A
6	311.2890 AB
3	306.8425 AB
2	281.9685 B
4	281.8568 B

SIGNIFICANCE LEVEL = 0.05
TUKEY = 32.6851



INTERPRETATION OF RESULTS:

Based on achieved results in statistic analysis about harvested export tomatoes each treatment we could observed that there are high significant differences among them. Treatment 6; dichloropropen, was the best, next treatments 3; methyl bromide and 1; dichloropropen + chloropicrin, on third place we got treatment 5; chloropicrin. The worst treatments were: 4; metam sodium and 2; control.

GENERAL CONCLUSION

a) **Export** The best treatment were: 6; dichloropropen, 1; dichloropropen+chloropicrin and 3; Methyl Bromide

b) **Domestic market** The best treatment was number 5; chloropicrin, then 1; dichloropropen+chloropicrin and 6; dichloropropen.

c) **Export and Domestic market** The best treatments were: 5; chloropicrin, 1; dichloropropen+chloropicrin, 6; dichloropropen and 3; methyl bromide

d) **Export harvest**, Metam sodium was better than control; in domestic market metam sodium was lower than control, and total harvest (export + domestic market) metam sodium was the same than control.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTION.

Last June, 2001, it was established the third test of project "Alternatives to the use of Methyl Bromide in the cultivation of Tomatoes, (***Lycopersicon esculentum*** **L.)**, we started taking some tests in Agrícola El Porvenir, Culiacan Valley, Sinaloa, Mexico,. We apply different treatments in soil, in order to analyze the control about soil microorganisms and in crops development also, comparing Methyl bromide. We apply this substance in muddy type soil.

Treatments: Based on before results treatments during last agricultural season 2000-2001, we selected 7 (seven) treatments:

1. Dichloropropen + chloropicrin 16 ml/m2.
2. Control
3. Methyl bromide 75/25, 40 gr/m2
4. Metam-sodium 25 ml/m2 + solarization
5. Chloropicrin 33ml/m2
6. Dichloropropen 12 gr/m2
7. Cabbage + solarization

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last June, when "El Porvenir" enterprise heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they made the installment underground pipeline. Afterwards the beds were marked, raised and flattened. And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in June, 2001. In a piece of land with 28 beds, 100 m length, inside the enterprise commercial land. It was traced four blocks 25 m each; we selected 7 experimental plots with 4 beds, which we applied next randomized treatments:

1). 1,3-dichloropopren + chloropicrin. These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

2). Absolute control. In this experimental unit consist on 4 rows, 10 M. lenght, and we didn't realized any fungicide or organic matter application.

3). Methyl Bromide 80/20. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

4). Metham-sodium. In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

5). Chloropicrin. On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 20 days.

6). 1,3-dichloropropen. These furrows soil were treated using 11.2 ml/m^2 1,2-dichloropropen. This application was carried out using the equipment tractor thereinafter. The furrows were covered in black/silver plastic during 20 days.

The treatments were applied on damp soil.

Evaluations are going to take place in the two central furrows in each experimental unit.

Planting.

Tomato plants will be used in this tests are "fat" tomato or "ball" type. This plants grew in polyethylene ashtrays in "El Porvenir" agricultural enterprise greenhouses. The plants will be 50 days old. They will be planted 45 cm between each plant, on furrows with damp soil, on soil covered with plastic.

Crop Management

Irrigation and fertilization will take place using drip irrigation, and they will be controlled directly by enterprise field manager. Same people will take the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

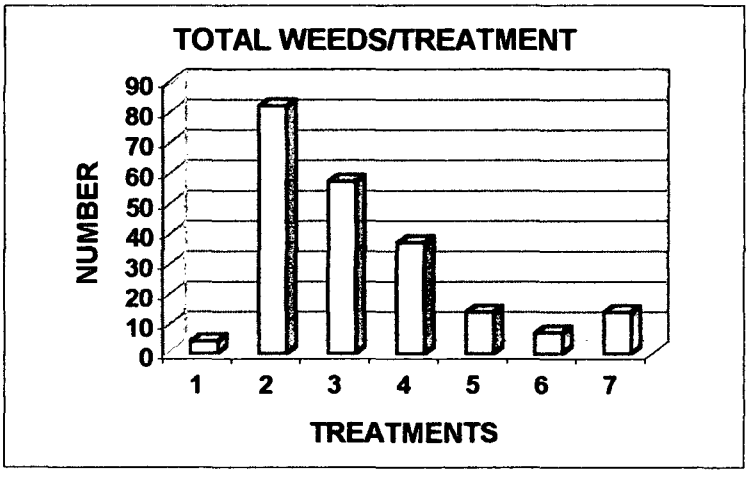
RESULTS

WEEDDS.

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA
CROP: Tomato "ball"
SITE: Agrícola El Porvenir, Culiacán, Sin.
Evaluation Parameter: Weeds Population on 1meter cuadrado
Fecha de transplante: 8/11/01
Fecha de evaluación: 15/01/02

	REPETITION					
TREATMENT	1	2	3	4	TOTAL	AVERAGE
1.Dichloropropene+chloropícrin	0	4	0	0	4.00	1.00
2.Cabbage+solarization	37	28	6	11	82.00	20.50
3.Control	14	9	25	9	57.00	14.25
4.Methyl Bromide 40	7	29	1	0	37.00	9.25
5.Metam sodium+solarization	9	0	1	4	14.00	3.50
6.Chloropicrin	0	4	2	1	7.00	1.75
7.Dichloropropene	0	12	2	0	14.00	3.50

Weeds found: Chiquelite, Cardo, Chual y Zacates



NEMATODES.

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

CROP: Tomato

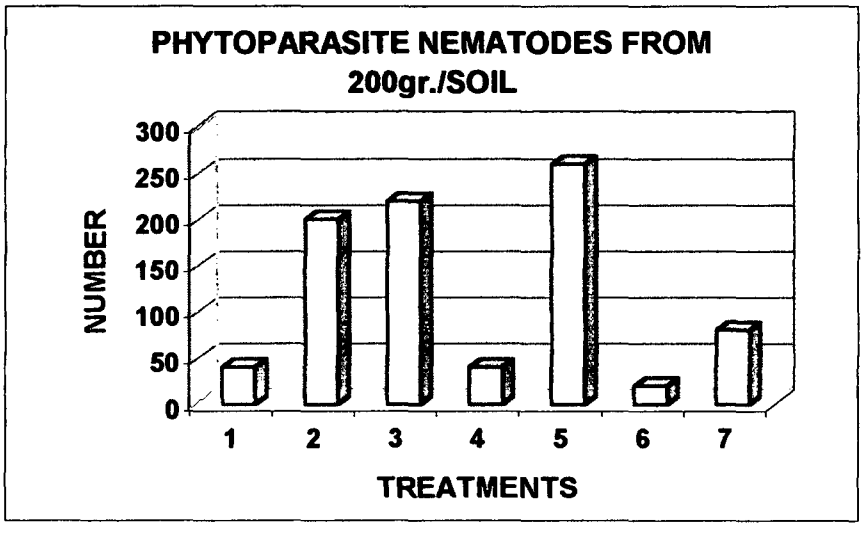
SITE: Agrícola El Porvenir, Culiacán, Si

Evaluation Parameter: Number of nematodes extracted from 200 gr. soil

Planting date: Nov/8/2001

Sampling date: February 6th, 2002

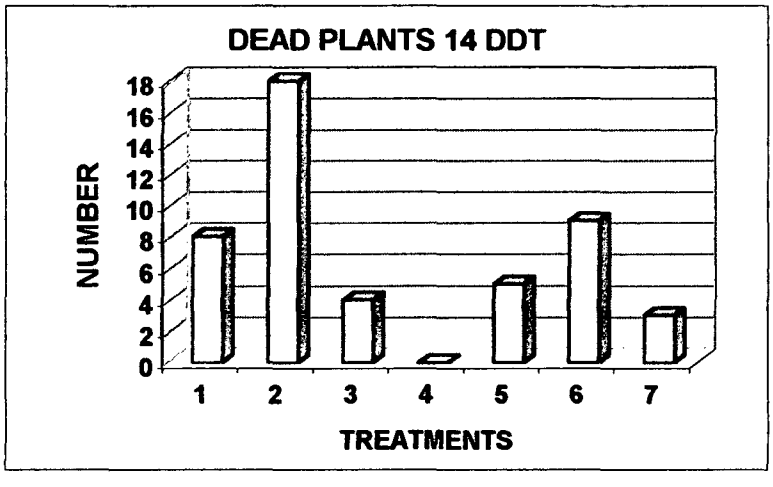
GENUS	NUMBER OF NEMATODES FROM 200 GR SOIL						
	1Dichlor+chlor	2Cabbage	3Control	4Methyl40	5M-S+sol.	6Chlor.	7Dichlor.
Vida Libre	2380	2020	720	900	1120	420	2120
Aphelenchus	0	0	20	20	0	20	40
Longidorus	40	200	180	20	240	0	40
Dorylaimus	0	0	20	0	0	0	0
Tylenchus	0	0	0	0	20	0	0
Phytoparasite Nematod	40	200	220	40	260	20	80



DISEASED PLANTS.

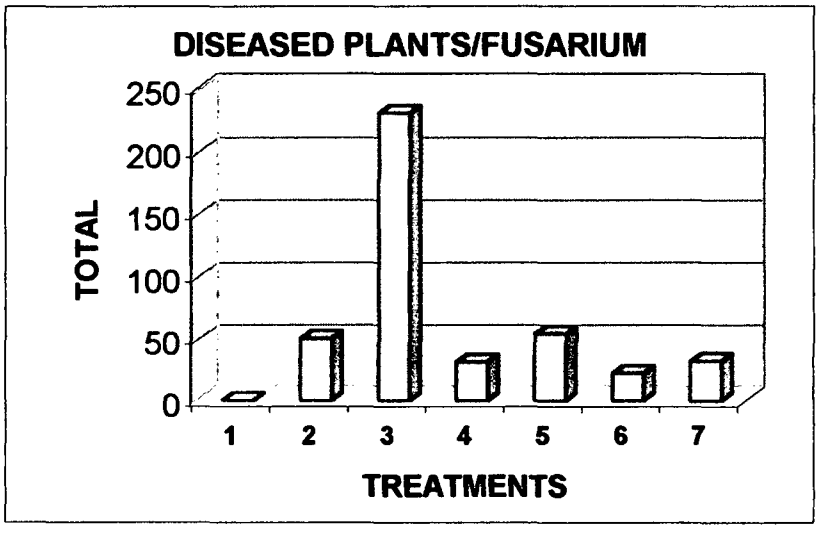
INIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA
CROP: TOMATOE
SITE: El Porvenir, Culiacán
Evaluated parameter: Dead plantas after 14 days transplanting (DDT)
Transplanting date: 11/8/01
Evaluation date: 11/22/01

	REPETITION					
TREATMENT	1	2	3	4	TOTAL	AVERAGE
1. Dichloropropene+Chlorop	0	1	5	2	8.00	2.00
2. Cabbage + solarization	3	4	8	3	18.00	4.50
3. Control	1	0	2	1	4.00	1.00
4. Methyl Bromide 40	0	0	0	0	0.00	0.00
5. Metam-sodium+ solarizati	1	2	2	0	5.00	1.25
6. Chloropicrin	2	2	4	1	9.00	2.25
7. Dichloropropen	0	3	0	0	3.00	0.75



FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA
SITE: El Porvenir, Culiacán, Sin.
CROP: Tomato
Planting date: Nov/8/2001
EVALUATION PARAMETER: Number of diseased plants/Fusarium/repetition
Evaluation date: April 16th, 2002
Number of plants / REPETITION: 120 plants

TREATMENT	REPETITION					
	I	II	III	IV	TOTAL	AVERAGE
1. Dichloropropene+Chloropicrin	0	0	0	0	**0**	**0.00**
2. Cabbage + solarization	23	16	6	5	**50**	**12.50**
3. Control	95	50	45	40	**230**	**57.50**
4. Methyl Bromide 40	3	1	1	26	**31**	**7.75**
5. Metam-sodium+ solarization	8	14	13	19	**54**	**13.50**
6. Chloropicrin	7	5	4	6	**22**	**5.50**
7. Dichloropropen	3	14	10	5	**32**	**8.00**



YIELD.

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

Crop: Tomato
Site: El Porvenir
evaluation parameter: Total yield Kg. from 20 lineal meters/repetition
PLANTING DATE: November 8th, 2001
EVALUATION date: February 19th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	17.15	11.1	4	12.3	8.6	1.6	7.3	9.7	2.1	15.5	19.7	4.9	**52.25**	**49.1**	**12.6**
2. Cabbage + solarization	17.6	9.7	0.7	8.7	14	1.9	9.7	18.2	2.3	12.8	16.6	1.5	**48.8**	**58.5**	**6.4**
3. Control	12.15	10.2	2.9	12.5	11.2	1.9	7.1	7.3	1.1	8.8	10.2	0.3	**40.55**	**38.9**	**6.2**
4. Methyl Bromide 40	8.3	17.6	1.6	8.9	16	0.8	9.6	16	2	7.4	14.3	1.8	**34.2**	**63.9**	**6.2**
5. Metam-sodium+ solarization	26.25	22.1	1.2	19	18.1	2.8	13.7	16.4	2	7.4	9.3	1.4	**66.35**	**65.9**	**7.4**
6. Chloropicrin	3.6	16.6	1	9.2	14.4	2	10.8	10.9	0.6	7.23	11.1	0.9	**30.83**	**53**	**4.5**
7. Dichloropropen	10.4	19.8	2.2	8.7	17.4	1.7	6.8	12.3	1.7	11.2	15.2	2.4	**37.1**	**64.7**	**8**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: February 22nd, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	1.05	3	1.2	2.85	3.65	1.25	2.15	3.25	0.2	1.3	3.35	1.3	**7.35**	**13.25**	**3.95**
2. Cabbage + solarization	1.95	1.65	1.3	1.8	3.5	1.2	2.3	4.5	2.3	4.15	8.2	2.5	**10.2**	**17.85**	**7.3**
3. Control	1.15	2.95	2.7	1.95	3.175	1.9	1.8	2.15	0.95	0.75	4.95	1.35	**5.65**	**13.23**	**6.9**
4. Methyl Bromide 40	3.3	3.95	1.5	3.15	4.9	2.1	1.75	3.05	1.3	1.225	4.35	1.5	**9.425**	**16.25**	**6.4**
5. Metam-sodium+ solarization	1.625	5.5	1.7	1.5	4.2	2.3	1.3	2.4	1.6	0.425	1.65	0.55	**4.85**	**13.75**	**6.15**
6. Chloropicrin	1.075	2.95	1.25	0.925	5	1.75	1.425	6.7	2	2.425	5.75	1.2	**5.85**	**20.4**	**6.2**
7. Dichloropropen	0.775	3.15	0.9	1.25	2.95	1.3	1.05	1.25	1.4	0.825	4.125	1.55	**3.9**	**11.48**	**5.15**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 1st, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	3.5	2.9	0.975	1.2	2.8	1.2	4.375	4.65	1.5	2.725	3.2	1.9	**11.8**	**13.55**	**5.575**
2. Cabbage + solarization	5.425	1.5	1	0.6	1.4	0.45	0.925	1.325	0.325	1.575	1.125	0.625	**8.525**	**5.35**	**2.4**
3. Control	1.3	1.55	1.1	0.9	0.325	1.5	0.85	0.725	0.975	0.9	2.125	0.675	**3.95**	**4.725**	**4.25**
4. Methyl Bromide 40	0.725	1.75	1	0.9	2.575	1.3	0.925	4.9	1.95	1.75	5.6	1.325	**4.3**	**14.83**	**5.575**
5. Metam-sodium+ solarization	0.375	0.675	0	0.4	0.525	0.75	0	0.6	0	0.225	1	0.425	**1**	**2.8**	**1.175**
6. Chloropicrin	0.8	4.725	1.45	0.25	3.275	1.8	0.45	2.475	1.35	1.46	2.675	0.8	**2.96**	**13.15**	**5.4**
7. Dichloropropen	0.55	2.675	1.575	0.525	3.925	0.675	0.625	2.4	1.45	0.55	3	1.225	**2.25**	**12**	**4.925**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 4th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	1.7	3.625	3.325	2.575	2.625	1.6	1.625	2.075	1.55	1.575	1.55	1.1	**7.475**	**9.875**	**7.575**
2. Cabbage + solarization	1.6	1.825	1.225	0.75	1.15	0.175	0.55	0.45	0.5	0.425	0.675	0	**3.325**	**4.1**	**1.9**
3. Control	2.6	2.875	2.2	1.7	2.3	3.35	1.6	1	0.55	1.125	1.025	1	**7.025**	**7.2**	**7.1**
4. Methyl Bromide 40	1.9	3.275	3.925	1.175	2.725	2.35	2.575	2.55	1.85	1.75	4.35	2.1	**7.4**	**12.9**	**10.23**
5. Metam-sodium+ solarization	1.45	3.325	4.325	1.775	4.1	2.1	1.05	2.45	1.25	0.65	1.825	1.35	**4.925**	**11.7**	**9.025**
6. Chloropicrin	1.35	6.325	2.2	0.6	1.675	1.2	0.3	2.55	0.25	1.05	1.35	0.8	**3.3**	**11.9**	**4.45**
7. Dichloropropen	0.5	1.625	2.425	1.625	2.875	1.85	1.025	2.9	1.475	1.275	1.875	1.65	**4.425**	**9.275**	**7.4**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 8th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	1.8	3.9	1.35	1.325	3.275	1.85	1.325	2.275	2.2	1.6	3.875	1	**6.05**	**13.33**	**6.4**
2. Cabbage + solarization	3.15	3.7	1.4	1.3	1.7	1.7	1.15	3.3	3.1	1.85	4.05	2.325	**7.45**	**12.75**	**8.525**
3. Control	0.95	1.8	0.9	0.825	2	0.875	0.3	2.9	1.35	1.075	1.475	1.1	**3.15**	**8.175**	**4.225**
4. Methyl Bromide 40	0.8	2.9	0.725	0.625	2.675	1.4	0.8	3.55	1.55	0.725	4.65	1	**2.95**	**13.78**	**4.675**
5. Metam-sodium+ solarization	1.3	1.8	0.825	1.15	4.15	0.3	1.225	1.5	0.8	0.525	1.2	1.15	**4.2**	**8.65**	**3.075**
6. Chloropicrin	0.825	2.7	1.1	0.975	2.95	0.65	1.175	2.2	1	0.85	1.65	1.1	**3.825**	**9.5**	**3.85**
7. Dichloropropen	1.925	1.45	1.5	0.95	3.525	2.9	0.575	2.4	1.425	1.55	2.525	1.3	**5**	**9.9**	**7.125**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 11th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	4.75	6.75	3.25	4.8	5.05	3.2	4.1	4.8	0.35	3.55	5.325	2.3	**17.2**	**21.93**	**9.1**
2. Cabbage + solarization	2.825	5.675	2	2.375	3.175	1.65	1.85	4.55	1.7	0.375	2.65	0.8	**7.425**	**16.05**	**6.15**
3. Control	1.6	7.725	1.35	2.275	4.75	2.2	4.225	5.8	1.8	0.825	1.825	1.25	**8.925**	**20.1**	**6.6**
4. Methyl Bromide 40	2.25	7	3	1.65	4.225	1.75	3.325	6.4	2.65	1.925	6.075	1.8	**9.15**	**23.7**	**9.2**
5. Metam-sodium+ solarization	3.55	7.95	1.35	2.9	7.125	2.7	2.6	6.3	2	1.05	4.625	3.4	**10.1**	**26**	**9.45**
6. Chloropicrin	2.45	5.9	2.7	0.925	7.925	2.325	2.075	2.25	0.55	1.175	4.2	1.95	**6.625**	**20.28**	**7.525**
7. Dichloropropen	2.925	5.925	2.1	2.5	5.2	1.5	1.65	2.775	1.2	2.15	8.25	0.7	**9.225**	**22.15**	**5.5**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 15th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	1.375	3.6	0.6	1.325	2.525	0.3	2.1	1.825	1.375	2.2	1.775	0.95	**7**	**9.725**	**3.225**
2. Cabbage + solarization	2.175	8.95	1.1	5.2	9	3.6	1.5	2.925	0.7	1.075	2.25	1.525	**9.95**	**23.13**	**6.925**
3. Control	5.675	10.25	2.45	1.85	7.25	1.3	2.375	1.3	0.25	0.6	1.25	0.6	**10.5**	**20.05**	**4.6**
4. Methyl Bromide 40	7.8	13.55	4.8	7.95	13.28	2.3	3.95	3.525	1.3	3.85	2.9	0.8	**23.55**	**33.25**	**9.2**
5. Metam-sodium+ solarization	8.8	13.63	3.95	8.95	8.95	3.1	1.825	1.7	0.9	0.975	2.475	0.5	**20.55**	**26.75**	**8.45**
6. Chloropicrin	7.375	14.23	3	4.025	6.075	3.8	0.475	4.3	1.2	0.825	1.325	0.45	**12.7**	**25.93**	**8.45**
7. Dichloropropen	4.15	13.93	3.3	4.575	9.625	2.9	2	4.675	0.7	0.85	1.125	0.7	**11.58**	**29.35**	**7.6**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 18th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	3.7	10.8	1.875	4.425	10.03	2.35	2	10.38	1.9	3.725	8.35	2.9	**13.85**	**39.55**	**9.025**
2. Cabbage + solarization	3.875	11.75	1	7.775	10.25	2.45	6.525	13.6	2.45	6.9	9.25	1.05	**25.08**	**44.85**	**6.95**
3. Control	5.55	11.68	2.8	7.1	11.85	1.6	6.675	13.85	1.75	6.2	9.35	1.4	**25.53**	**46.73**	**7.55**
4. Methyl Bromide 40	8.95	12.15	2.7	5.925	17.9	2	7.95	15.6	2.4	5.45	12.45	2.3	**28.28**	**58.1**	**9.4**
5. Metam-sodium+ solarization	6.65	19.1	2.5	4.425	12.8	3.8	5.425	12.6	4.2	7.3	12.25	3	**23.8**	**56.75**	**13.5**
6. Chloropicrin	6.425	18.65	3.1	5.5	19.58	3.5	7.125	16.3	2.7	5.8	12	3.1	**24.85**	**66.53**	**12.4**
7. Dichloropropen	4.025	12.2	1.7	8.9	17.55	2.75	5.975	10.58	1.95	5.375	7.2	1.75	**24.28**	**47.53**	**8.15**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 22th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	3.875	7.025	0.85	1.55	10.1	2.4	1.3	2.625	0.675	1.375	6.45	2.1	8.1	26.2	6.025
2. Cabbage + solarization	3.725	7.7	1.25	1.5	3.3	1.325	0.8	1.075	0.55	2.175	2.5	0.75	8.2	14.58	3.875
3. Control	1.4	4.35	1.5	1.825	4.3	1.4	0.725	1.775	1	5.675	1.35	0.8	9.625	11.78	4.7
4. Methyl Bromide 40	2.125	3.95	1.5	1.1	6.65	2.3	1.2	3.8	0.95	7.8	1.775	0.4	12.23	16.18	5.15
5. Metam-sodium+ solarization	1.65	6.325	1.25	1.875	6.7	1.75	0.5	1.35	0.7	8.8	0.925	0.55	12.83	15.3	4.25
6. Chloropicrin	1.575	4.1	0.95	1.725	6.475	1.7	0.925	1.4	0.5	7.375	3.2	0.85	11.6	15.18	4
7. Dichloropropen	1.275	6.6	2.35	1.075	1.95	0.95	1.7	8.9	2.15	4.15	2.025	1.2	8.2	19.48	6.65

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 25th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	3.05	9.9	1.7	1.95	9.225	3.15	2.25	5.875	1.05	1.75	3.95	1.725	9	28.95	7.625
2. Cabbage + solarization	1.8	5.05	1.6	1.6	1.55	0.6	0.625	2.475	1.35	1.125	1.65	1.2	5.15	10.73	4.75
3. Control	1.95	5.475	1.6	2.25	5.4	2.4	2.675	3.75	1.2	1.975	3.1	1.4	8.85	17.73	6.6
4. Methyl Bromide 40	2.325	8.3	1.8	5.4	7.575	2.4	2.175	8.45	2.1	6.675	5.425	2.35	16.58	29.75	8.65
5. Metam-sodium+ solarization	1.725	8.35	2.45	2.95	5.25	1.8	1.975	8.45	0.9	2.025	6.225	1.6	8.675	28.28	6.75
6. Chloropicrin	3.7	12.98	2.775	2.825	6.65	2.9	2.45	4.3	2.775	3.975	8.425	3.2	12.95	32.35	11.65
7. Dichloropropen	2.975	11.88	4.3	1.3	7.55	3.35	1.1	5	2.25	0.625	5.3	1.65	6	29.73	11.55

PLANTING DATE: November 8th, 2001
EVALUATION DATE: March 30th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	4.2	15.23	3.45	1.625	11.65	3.5	4.25	10.88	3.95	3.125	10.18	3.7	13.2	47.93	14.6
2. Cabbage + solarization	1.825	9.675	4.2	3.5	7.35	3.1	0.75	4.35	2.35	1.475	4.8	2.15	7.55	26.18	11.8
3. Control	0.45	4.2	2.25	1.125	3.6	1.5	1.225	8.7	2.6	1.975	9.15	2.4	4.775	25.65	8.75
4. Methyl Bromide 40	2.175	9.75	2.9	2.825	10.43	2.4	1.675	7.85	2	1.425	6.55	2.775	8.1	34.58	10.08
5. Metam-sodium+ solarization	3.2	13.57	4.6	3.35	14.8	4.8	3.3	7.5	2.3	2.25	7.925	2.4	12.1	43.79	14.1
6. Chloropicrin	2.1	7.35	2.4	1.7	6.35	2.1	2.3	8.875	3.2	1.2	10	5	7.3	32.58	12.7
7. Dichloropropen	1.275	8.45	3.3	2.05	6.8	3.2	1.55	4.7	2.2	1.625	14.48	5	6.5	34.43	13.7

PLANTING DATE: November 8th, 2001
EVALUATION DATE: April 3rd, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	3.5	7.075	2	2.075	5.3	1.7	2.5	6.075	1.95	2.675	8.575	2.6	10.75	27.03	8.25
2. Cabbage + solarization	1.225	4.5	1.6	2.075	3	1.65	2.4	2.4	1.5	1	5.075	1.6	6.7	14.98	6.35
3. Control	0.875	2.225	1.9	1.275	4.05	2.5	2.55	6.45	2.8	1.7	5.45	1.4	6.4	18.18	8.6
4. Methyl Bromide 40	1.425	3.2	2.1	0.775	8.075	2.3	0.55	2.05	1.95	0.975	2.6	2.9	3.725	15.93	9.25
5. Metam-sodium+ solarization	1.6	2.575	1.6	0.225	3.05	2	1.025	3.9	1.6	1.6	4.075	2.2	4.45	13.6	7.4
6. Chloropicrin	2.25	4.05	1.45	1.075	5.175	0.95	0.675	1.925	1	2.475	3.5	0.825	6.475	14.65	4.225
7. Dichloropropen	2.675	4.9	1.5	0.875	1.925	1.5	0.475	2.425	0.825	2.775	5.175	2.3	6.8	14.43	6.125

PLANTING DATE: November 8th, 2001
EVALUATION DATE: April 5th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	3.7	13.53	1.8	4.25	7.4	0.8	4.4	8.6	2.5	0.775	5.425	0.45	**13.13**	**34.95**	**5.55**
2. Cabbage + solarization	1.8	8.05	1.7	1.175	3.75	0.95	2.95	5.25	1.9	1.925	6.7	1.5	**7.85**	**23.75**	**6.05**
3. Control	1.175	6.6	3	3.3	10.33	3.25	1.45	3.6	1.35	1.05	8	2.5	**6.975**	**28.53**	**10.1**
4. Methyl Bromide 40	1.6	5.55	2.2	2.65	8.95	2.5	2.525	8.45	1.9	1.675	3.8	0.9	**8.45**	**26.75**	**7.5**
5. Metam-sodium+ solarization	1.725	8.05	3.45	2.95	12.05	2.2	1.6	8.05	1.6	0.875	5.15	1.2	**7.15**	**33.3**	**8.45**
6. Chloropicrin	2.65	9.75	2.3	1.75	6.625	2.2	1.25	3.35	0.55	2.6	7.05	1.6	**8.25**	**26.78**	**6.65**
7. Dichloropropen	3.175	15.5	3.7	2.3	10.93	2.45	0.625	5.65	1.1	1.6	11.6	2.9	**7.7**	**43.68**	**10.15**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: April 9th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	4.85	16.9	3.325	4.05	15.05	6	3.1	14.4	6.5	4.875	15.93	3.8	**16.88**	**62.28**	**19.63**
2. Cabbage + solarization	5.85	16	3.6	3.35	12.2	3.8	3.05	12	2.9	4.3	13.7	4.5	**16.55**	**53.9**	**14.8**
3. Control	3.2	15.35	5.3	1.65	12.5	3	1.9	8.75	2.9	1.85	13.9	5.5	**8.6**	**50.5**	**16.7**
4. Methyl Bromide 40	2.475	15.18	5.8	3.6	14.75	2.9	2.2	14.5	2.75	2.825	13.95	5.3	**11.1**	**58.38**	**16.75**
5. Metam-sodium+ solarization	6.55	21.1	4.5	4.35	15.8	4	4.25	17.75	4.3	5	15.15	4.8	**20.15**	**69.8**	**17.6**
6. Chloropicrin	3.6	14.25	3.8	1.825	14.65	2.5	1.7	9.8	1.8	3.25	15.05	2.85	**10.38**	**53.75**	**10.95**
7. Dichloropropen	3.725	24.25	4.9	3.2	14.58	2.5	2.325	13.55	3.15	2.675	20.9	4	**11.93**	**73.28**	**14.55**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: April 11th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	2.575	6.85	0.75	1.675	4.8	2	1.15	3.1	2.75	1.525	2.375	1.5	**6.925**	**17.13**	**7**
2. Cabbage + solarization	2.575	6	2.25	1.35	4.425	1.75	0.75	2.175	1.275	2.175	4.8	1.85	**6.85**	**17.4**	**7.125**
3. Control	1.55	4.25	1.75	2.6	5	2.4	1.7	5.45	1	1.575	4.5	1.65	**7.425**	**19.2**	**6.8**
4. Methyl Bromide 40	1.225	10.8	1.85	1.325	9.225	1.45	2.1	8.2	1.3	1.025	4.375	0.65	**5.675**	**32.6**	**5.25**
5. Metam-sodium+ solarization	3.675	9.25	1.45	2.75	11.75	1.5	1.425	4.275	1.4	1.45	4.15	0.7	**9.3**	**29.43**	**5.05**
6. Chloropicrin	1.675	10.68	2.525	3.925	12.65	1.55	2.175	6.2	0.9	2.35	5.775	1.7	**10.13**	**35.3**	**6.675**
7. Dichloropropen	2.9	9.75	2.45	1.9	7.95	1.55	1.1	5.25	1.5	0.875	3.45	1.35	**6.775**	**26.4**	**6.85**

PLANTING DATE: November 8th, 2001
EVALUATION DATE: April 15th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	1.45	4.175	0.6	1.175	5.175	1.4	3.75	8.15	2.7	1.675	3.45	2.35	**8.05**	**20.95**	**7.05**
2. Cabbage + solarization	1.325	3.05	2.2	1.15	3.175	1.25	0.15	2.1	1.8	1.375	3.9	1.05	**4**	**12.23**	**6.3**
3. Control	1.5	2.15	1.1	0.85	1.325	2.7	1	4.275	1.95	0.475	4.45	1.125	**3.825**	**12.2**	**6.875**
4. Methyl Bromide 40	0.3	3.575	2.3	1.85	4.05	2.4	0.775	6.825	2.4	1.825	3.725	0.95	**4.75**	**18.18**	**8.05**
5. Metam-sodium+ solarization	1.45	4.65	2.2	2.075	6.8	3.1	2.475	10.08	2.8	0.875	7.575	3.3	**6.875**	**29.1**	**11.4**
6. Chloropicrin	1.325	7.525	0.7	1.225	6.15	0.6	2.225	4.775	1.5	3.475	6.4	1.5	**8.25**	**24.85**	**4.3**
7. Dichloropropen	2.225	5.95	2.25	2.125	5.85	1.4	1.075	2.85	1.65	1.725	5.4	2.5	**7.15**	**20.05**	**7.8**

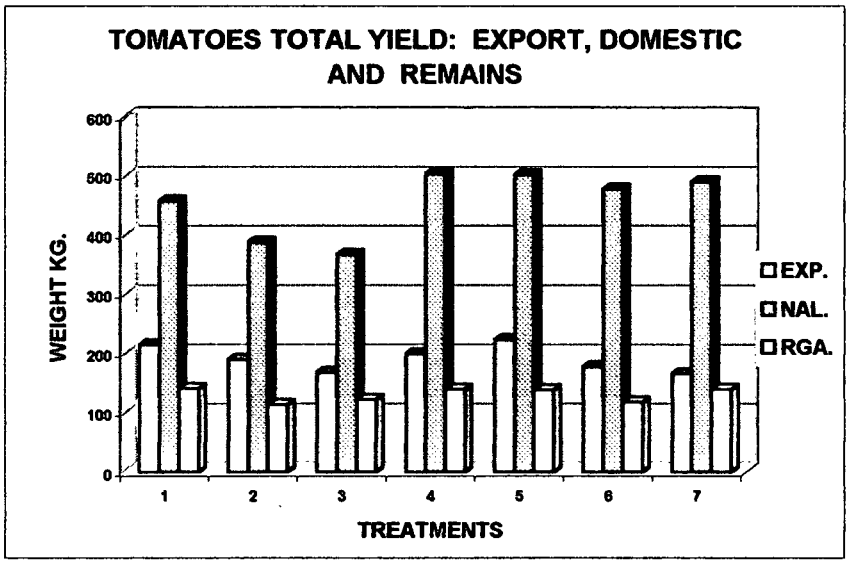
PLANTING DATE: November 8th, 2001
EVALUATION DATE: April 17th, 2002

TREATMENTS	TOMATOES YIELD: EXPORT, DOMESTIC AND REMAIN														
	REPETITION I			REPETIION II			REPETITION III			REPETITION IV			TOTAL		
	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.	EXP.	DOM	REM.
1. Dichloropropene+Chloropicrin	0.925	2.2	1.2	0.875	3.95	1.75	2.575	7.075	2.3	0.95	7.1	2.15	5.325	20.33	7.4
2. Cabbage + solarization	1.65	8.95	1.85	1.425	8.05	0.8	1.05	5.6	2	1.4	8.15	1.2	5.525	30.75	5.85
3. Control	1.325	5.075	1.5	2.125	6.225	1.25	1.475	4.55	0.9	1.125	7.5	1.9	6.05	23.35	5.55
4. Methyl Bromide 40	2.725	9.85	2.4	3.1	8.85	1.75	2.15	10.7	1.85	0.725	4.925	1.2	8.7	34.33	7.2
5. Metam-sodium+ solarization	1.275	7.75	0.7	1.8	6.3	1.5	1.225	6.2	1.3	1.3	6.3	1.4	5.6	26.55	4.9
6. Chloropicrin	2.55	6.3	0.3	3.55	6.025	1.35	1.7	4.775	0.825	2.925	4.225	1.25	10.73	21.33	3.725
7. Dichloropropen	2.425	7.05	1.4	0.775	6.9	1.75	2.025	4.2	2.225	1.475	3.375	2.15	6.7	21.53	7.525

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

Crop: Tomato
Site: El Porvenir
Evaluation parameter: Total Yield Kg. From 80 lineal meters/treatment
PLANTING DATE: November 8th, 2001
EVALUATION DATE: From February 19th, to April 16th, 2002

TREATMENTS	TOTAL TOMATOES YIELD KG.		
	EXPORT	DOMESTIC	REMAIN
1. Dichloropropene+Chloropicrin	214.325	456.025	140.575
2. Cabbage + solarization	189.125	387.05	113.45
3. Control	167.8	366.2	122.1
4. Methyl Bromide 40	198.55	503.35	138.75
5. Metam-sodium+ solarization	222.895	501.44	138.125
6. Chloropicrin	176.99	477.425	117.65
7. Dichloropropen	165.5	489.35	138.75



STATISTIC ANALYSIS ABOUT OBTAINED RESULTS IN TOMATO EXPERIMENT IN CAMPO EL PORVENIR, CULIACÁN, SINALOA.

The seven initial treatments were analyzed for yield variables in tomato. Three qualities: export, domestic and remain. We used a blocks randomized design (DBCA) with divided plots and factor incomplete analysis, which constitute blocks repetitions. On Main plot took place the samplings. Four strips of land were the minor plots. We carried out comparison of averages using Tukey test, with significance ($P<0.05$).

TABLE 1. ANÁLYSIS OF VARIANCE FOR EXPORT TOMATO PRODUCTION (kg) SEVEN DIFFERENT TREATMENTS.

F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	6	0.41638995	3.22	0.0250
REPETITION (BLOCKS)	3	1.15901926		
TREAT*REP E(a)	18	0.12926277		
MINOR PLOT (STRIP OF LAND)	3	1.15901926		
MAIN PLOT	16	7.60889419		
REPETITION*PARCELA MAYOR	48	0.15565884		
MINOR PLOT*MAIN PLOT	48	0.15565884		
TREAT*MINOR PLOT	18	0.12926277		
TREAT*MAIN PLOT	96	0.21018639		
ERROR E(b)	219	0.4657666		
TOTAL	475			

C.V.=12.77728%, R2 =94.3698%

TABLE 2. ANÁLYSIS OF VARIANCE FOR TOMATO PRODUCTIÓN (kg). DOMESTIC QUALITY. SEVEN DIFFERENT TREATMENTS.

F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	6	45.61920508	4.78	0.0044
REPETITION (BLOCKS)	3	106.93754263		
TREAT*REP E(a)	18	9.54234357		
MINOR PLOT (STRIP OF LAND)	3	106.93754263		
MAIN PLOT	16	432.66306986		
REPETITION*MAIN PLOT	48	12.29273188		
TREAT*MINOR PLOT	18	9.54234357		
TREAT*MAIN PLOT	96	8.41876940		
ERROR E(b)	267	2.38249191		
TOTAL	475			

C.V.=23.10267%, R2 =93.7732%

TABLE 3. ANÁLYSIS OF VARIANCE FOR TOMATO PRODUCTIÓN (kg.). REMAIN QUALITY SEVEN DIFFERENTS TREATMENTS.

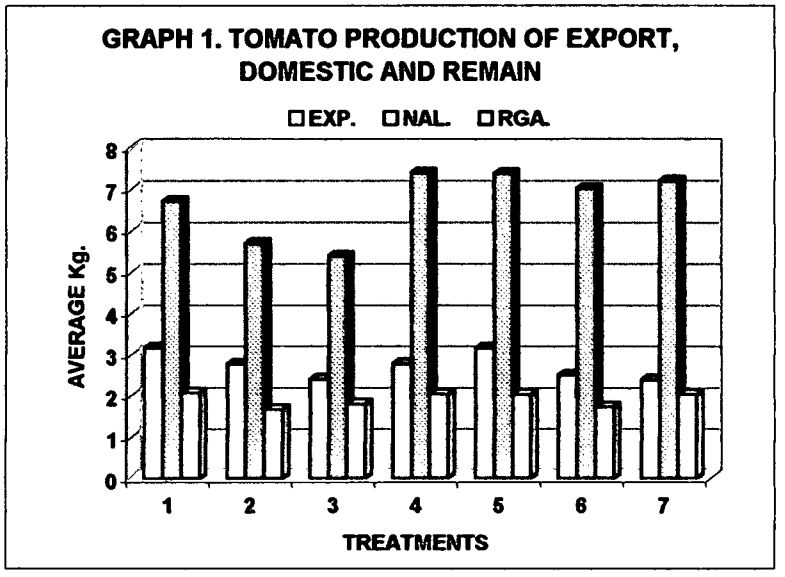
F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	6	2.00920299	2.85	0.0394
REPETITION (BLOCKS)	3	4.90339636		
TREAT*REP E(a)	18	0.70475972		
MINOR PLOT (STRIP OF LAND)	3	4.90339636		
MAIN PLOT	16	13.70678440		
REPETITION*MAIN PLOT	48	0.99290529		
TREAT*MINOR PLOT	18	0.70475972		
TREAT*MAIN PLOT	96	0.97444620		
ERROR E(b)	267	0.42025541		
TOTAL	475			

C.V.=33.93194%, R2 =79.2041%

TABLE 4. TOMATO YIELD (kg) EXPORT, DOMESTIC AND REMAIN QUALITY SEVEN DIFFERENT TREATMENTS.

TREATMENTS	AVERAGE		
	EXPORT	DOMESTIC	REMAIN
1. Dichloropropen-Chloropicrin	3.1566[a]	6.7068[ab]	2.0673[b]
2. Cabbage-Solarization	2.7651[ab]	5.6919[ab]	1.6684[a]
3. Control	2.4004[b]	5.3854[b]	1.7956[ab]
4. Methyl Bromide 40	2.7728[ab]	7.3918[a]	2.0404[b]
5. Metam-Sodium+Solarization	3.1555[ab]	7.3743[a]	2.0313[b]
6. Chloropicrin	2.5002[ab]	7.0213[ab]	1.7301[ab]
7. Dichloropropene	2.3842[b]	7.1968[a]	2.0404[b]
CV=	12.77	23.10	33.93
R2=	94.36%	93.77	79.20

Values with different literal aren't statistically equal (P<0.05)
E.E.E. = standar Error Valued. DBCA with divided plots



STATISTIC INTERPRETATION

EXPORT QUALITY.
You can observe on Table 4, Graph 1. that Treatment 1; Dichloropropene+Chloropicrin is higher ($P<0.01$) this variable with production about (3.1566), even that there isn't any statistic difference with treatments 2; Cabbage+Solarization, 4; Methyl Bromide 40, 5; Metam-sodium+Solarization and 6; Chloropicrin in averages (2.7651, 2.7728, 3.1555, and 2.5002 respectively), in the meantime treatments 3; Control and 7; Chloropicrin were lower than the others with averages (2.4004 y 2.3842).

DOMESTIC QUALITY.
On table 4, Graph 1. You can observe that treatments 4; Methyl Bromide 40, 5; Metam-sodium+Solarization and 7; Dichloropropene which got yields (7.3918, 7.3743 and 7.1968) and they were statistically better than 1; Dichloropropene+Chloropicrin with (6.7068), 2; Cabbage+Solarization (5.6919) and 6; Chloropicrin with (7.0213), were intermediate, and 3; Control took last place. It was the worst treatment with (5.3854) yield average.

REMAIN QUALITY.
On table 4, Graph 1. treatment 2; Cabbage+Solarization it was which less remain had (1.6684), while treatments 3; Control and 6; Chloropicrin (1.7956 and 1.7301) were classified like regulars, in order to consider 1; Dichloropropene+Chloropicrin, 4; Methyl Bromide 40, 5; Metam-sodium+Soalrization and 7; Dichloropropene. Treatments which recorded more remain quantity with averages (2.0673, 2.0404, 2.0313 y 2.0404 respectively).

FINAL CONCLUSION. The treatments with greater production (export and national) were: dichloropropeno + Chloropicrin, and metam sodium + solarization. These are alternatives to the use of methyl bromide for the control of pathogens of the ground in tomato, nevertheless biofumigation could be a good treatment of control that could be adopted by lower producers.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

FINAL PROJECT REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP, VARIETY AND PRODUCT TO BE HARVESTED: Tomato (*Lycopersicon esculentum* L.), variety being used by the grower, and harvest will be fruits.

PROJECT AREAS: Experimental units be located in Agronomy Faculty of Universidad Autonoma de Sinaloa, Culiacan, Sinaloa, Mexico.

Owner: Universidad Autonoma de Sinaloa
Executive Manager:. MC. Guadalupe Alfonso Lopez Urquidez

Enterprise Address: Carretera ElDorado, km. 17.5, Culiacán, Sinaloa, México.

Tels: 01667 8461084 (Culiacan)

Culiacan, Sinaloa, March, 2004.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

FINAL PROJECT REPORT. Demonstration Project of Alternatives to the use of Methyl Bromide in the cultivation of **Tomatoes**, (*Lycopersicon esculentum* L.). The development in Agronomy Faculty, Universidad Autonoma de Sinaloa, Culiacán, Sinaloa, Mexico. In this field have been working MC. Francisco Javier Estrada Ramirez, coordinator in this project. And MC. Sostenes Montoya Angulo, agronomist who is implementing the tests. QFB. María de la Luz Acosta Pineda y Carlos Morales Cazarez, Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

Introduction

Last June, 2001, in Culiacán, Sinaloa, Mexico, we started taking some tests, including solarization o soil. We apply different treatments in soil, on October 25, 2001, in order to analyze the control about soil microorganisms and in crops development also, comparing Methyl bromide. We apply this substance in muddy type soil.

Treatments: We started the experiment in agricultural season 2001. we applied 14 (fourteen) treatments:

TREATMENTS OR ALTERNATIVES:

1.- Control (no treatment).
2.- 15 gr/m^2 of methyl bromide (75/25 or 80/20).
3.- 40 gr/m^2 of methyl bromide (75/25 or 80/20).
4.- Five kg of sorghum compost, incorporated into the soil, plus four weeks of solarization
5.- Five kg of bovine cattle manure incorporated into soil, plus four weeks of solarization.
6.- .- Five kg of chicken manure incorporated into soil, plus four weeks of solarization.
7- Five kg of fresh broccoli residue (or other cruciferous plant) incorporated into soil, plus four weeks of solarization.
8.- 25 ml/m^2 of metam-sodium (N, methyl sodium ditiocarbamate) plus six weeks of solarization.
9.- 50 ml/m^2 of metam-sodium.
10.- 33 ml/m^2 of chloropicrin.
11.- 40 gr/m^2 of Dazomet (tetrahydro3-5 dimethyl 2H-135-tiadizin-2 tiona).

12.- 1,3-dichloropropene+chloropicrin,dose recommended by the manufacturer.
13.- 1,3-dichloropropene, dose recommended by the manufacturer (11.2 ml/m^2).
14.- Solarization

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last June, in Agronomy Faculty heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in four rows, after that, they made the installment underground pipeline. Afterwards the beds were marked, raised and flattened. And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in June, 2001. In a piece of land with 56 beds, 50 m length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 14 experimental plots with 4 beds, which we applied next randomized treatments:

1). **Absolute control.** In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application.

2). **Methyl Bromide 80/20**. In the four rows, It was injected 15 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

3). **Methyl Bromide 80/20**. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

4). **Five kg of sorghum compost** incorporated into the soil, plus four weeks of solarization

5). **Five kg of bovine** cattle manure incorporated into soil, plus four weeks of solarization.

6). **Five kg of chicken** cattle manure incorporated into soil, plus four weeks of solarization.

7). **Broccoli** incorporated on the soil and solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it were distributed 5 kg per M^2. It was incorporated by manual labor using hoes, after that, the rows were covered with transparent plastic.

8). **Metham-sodium.** In this four furrows it was applied 25 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

9). **Metham-sodium.** In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

10). **Chloropicrin.** On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 20 days.

11). **Dazomet** (tetrahidro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona). On this furrows soil we distributed by manual labor 40 gr/m^2 dazomet: it was incorporated using hoes, after that, we applied water by sprinkler irrigation during 3 hrs. Finally, it was covered in black/silver plastic.

12). **1,3-dichloropopren + chloropicrin.** These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

13). **1,3-dichloropropen.** These furrows soil were treated using 11.2 ml/m^2 1,2-dichloropropen. This application was carried out using the equipment tractor thereinafter. The furrows were covered in black/silver plastic during 20 days.

14). **Solarization.**

The treatments were applied on damp soil.

Evaluations will be taking place in the two central furrows in each experimental unit. We attached a label in 10 plants (five each row or 10 cm central bed) which were randomized, in order to take size measure.

Planting.

Tomato plants used in this tests are "fat" tomato or "ball" type. This plants grew in polyethylene ashtrays in "Agronomy Faculty" in greenhouses. The plants were 50 days old. They were planting 45 cm between each plant, on furrows with damp soil, covered with plastic.

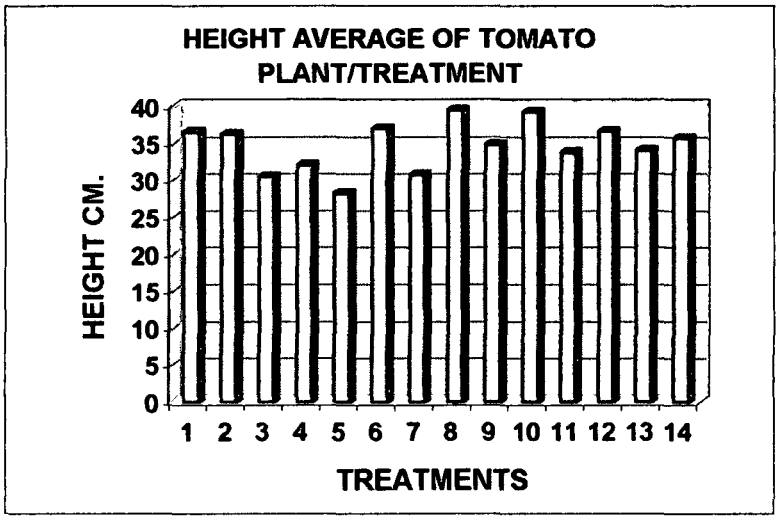
Crop Management

Irrigation and fertilization will take place using drip irrigation, and they are controlled directly by enterprise project responsibles. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONONIA

CROP: TOMATO **SITE:** Facultad de Agronomía de la U.A.S.
transplanting date: November 10th, 2001
Evaluation date: December 24th, 2001 **Evaluated parameter:** Stalk lenght of 5 plants/repetition

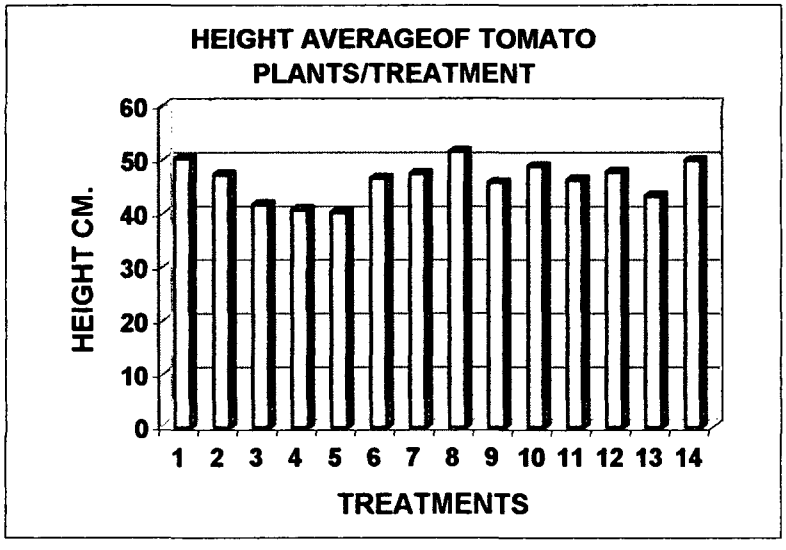
TREATMENTS	REPETITION				
	1	2	3	4	AVERAGE
1. Hen manure + solarizat	37.78	34.04	41.64	32.68	36.54
2. Metam sodium + soliza	34.60	34.80	37.44	38.00	36.21
3. Control	30.18	31.84	29.92	29.96	30.48
4. Dazomet	34.70	32.60	31.28	29.58	32.04
5. Methyl Bromide (15 gr/	28.20	26.32	29.52	28.84	28.22
6. Methyl Bromide (40 gr/	32.76	35.02	36.22	43.94	36.99
7. Dichloropropene	32.06	28.54	33.40	28.98	30.75
8. Metam sodium (50 gr/n	41.70	41.00	39.20	36.14	39.51
9. Cabbage+ solarization	36.06	35.88	33.76	33.64	34.84
10Dichloroprop+Chloropic	40.82	40.40	39.62	36.38	39.31
11Chloropicrin	34.26	35.98	34.78	30.28	33.83
12 Cow manure + solariza	31.48	40.52	38.00	36.80	36.70
13 Corn + solarization	32.06	34.68	35.26	34.10	34.03
14 Solarization	38.10	36.94	34.90	33.00	35.74



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONONIA

CROP: TOMATO **SITE:** Facultad de Agronomía de la U.A.S.
transplanting date: November 10th, 2001
Evaluation date: December 24th, 2001 **Evaluated parameter:** Stalk lenght of 5 plants/repetition

TREATMENT	REPETITION				
	1	2	3	4	AVERAGE
1. Hen manure + solarizat	49.80	50.40	54.20	46.40	50.20
2. Metam sodium + soliza	49.20	46.20	46.80	46.60	47.20
3. Control	39.80	44.20	42.20	40.40	41.65
4. Dazomet	41.06	42.60	39.24	39.76	40.67
5. Methyl Bromide (15 gr/	38.90	38.36	42.40	41.16	40.21
6. Methyl Bromide (40 gr/	44.80	45.40	46.20	49.80	46.55
7. Dichloropropene	46.00	45.60	50.60	47.40	47.40
8. Metam sodium (50 gr/r	55.60	54.00	51.20	45.20	51.50
9. Cabbage+ solarization	47.16	48.60	43.94	43.16	45.72
10Dichloroprop+Chloropic	50.00	49.00	48.00	47.80	48.70
11Chloropicrin	47.00	46.20	47.80	44.00	46.25
12 Cow manure + solariza	44.20	50.80	47.80	47.80	47.65
13 Corn + solarization	41.74	46.58	42.78	41.74	43.21
14 Solarization	52.64	48.00	49.80	48.60	49.76



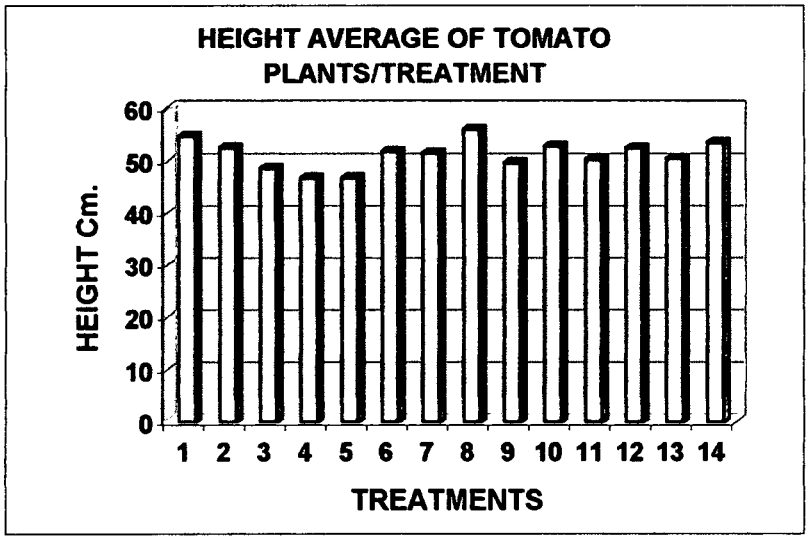
UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

CROP: TOMATO **SITE:** Facultad de Agronomía de la U.A.S.

Transplanting date: November 10th, 2001

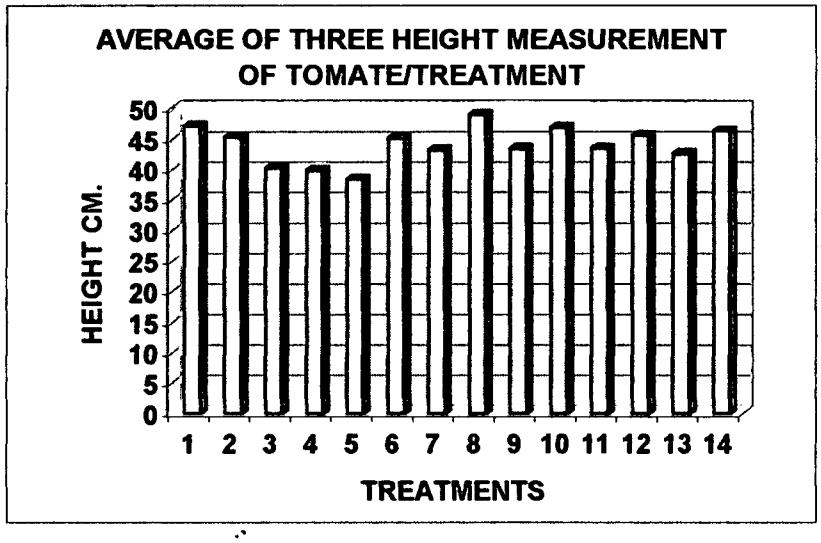
Evaluation date: January 17th, 2002 **Evaluated parameter:** Stalk lenght of 5 plants/repetition

TREATMENT	REPETITION				
	1	2	3	4	AVERAGE
1. Hen manure + solarizati	53.60	54.00	59.00	52.00	54.65
2. Metam sodium + solizati	53.40	52.40	51.00	53.00	52.45
3. Control	48.40	50.60	48.40	46.60	48.50
4. Dazomet	49.00	46.60	46.20	44.80	46.65
5. Methyl Bromide (15 gr/m	47.60	44.40	47.60	47.20	46.70
6. Methyl Bromide (40 gr/m	50.40	49.60	51.60	55.60	51.80
7. Dichloropropene	50.80	50.60	53.60	51.00	51.50
8. Metam sodium (50 gr/m	61.00	56.40	58.60	48.00	56.00
9. Cabbage+ solarization	49.80	52.40	49.00	47.40	49.65
10Dichloroprop+Chloropicr	52.80	53.00	53.20	52.00	52.75
11Chloropicrin	52.20	50.00	49.80	49.00	50.25
12 Cow manure + solarizat	51.00	55.80	50.60	52.20	52.40
13 Corn + solarization	50.40	51.40	49.80	50.20	50.45
14 Solarization	57.00	51.40	53.20	52.20	53.45



SITE: Facultad de Agronomía
transplanting date: November 10th, 2001
Evaluation date: 12/17/01 to 01/17/02
evaluated parameter: Stalk Length

	SAMPLINGS			
TREATMENT	**17/12/01**	**24/12/01**	**17/01/02**	**AVERAGE**
1. Hen manure + solarizati	36.54	50.20	54.65	**47.13**
2. Metam sodium + solizat	36.21	47.20	52.45	**45.29**
3. Control	30.48	41.65	48.50	**40.21**
4. Dazomet	32.04	40.67	46.65	**39.79**
5. Methyl Bromide (15 gr/r	28.22	40.21	46.70	**38.38**
6. Methyl Bromide (40 gr/r	36.99	46.55	51.80	**45.11**
7. Dichloropropene	30.75	47.40	51.50	**43.22**
8. Metam sodium (50 gr/m	39.51	51.50	56.00	**49.00**
9. Cabbage+ solarization	34.84	45.72	49.65	**43.40**
10Dichloroprop+Chloropic	39.31	48.70	52.75	**46.92**
11Chloropicrin	33.83	46.25	50.25	**43.44**
12 Cow manure + solariza	36.70	47.65	52.40	**45.58**
13 Corn + solarization	34.03	43.21	50.45	**42.56**
14 Solarization	35.74	49.76	53.45	**46.32**

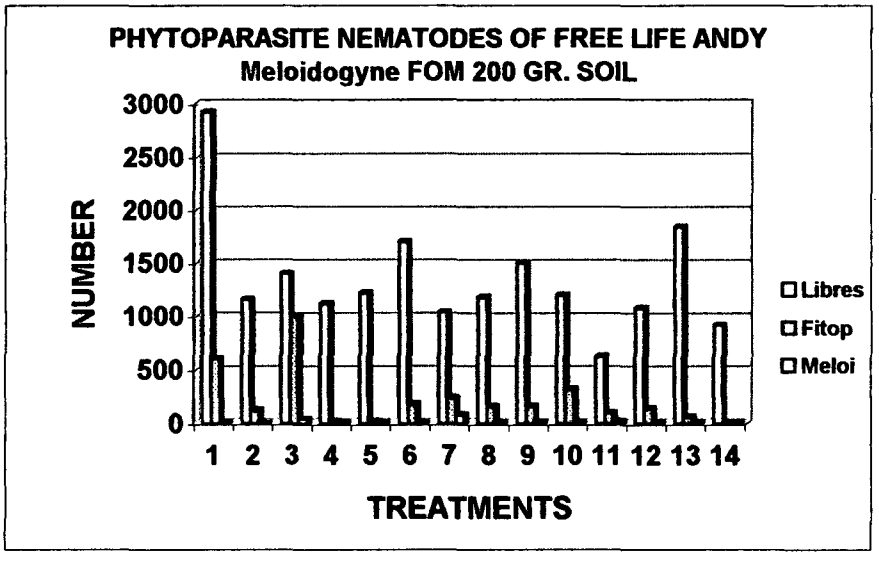


UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

Crop: Tomato
Site: Facultad de Agronomía
Planting date: Nov/10/2001
EvaluaTIOn: First extraction of nematodes from soil samples
Sampling date: February 4th, 2002
Accounting date: 02/13/02

GENUS	NUMBER AND TYPE OF EXTRACTED NEMATODES/TREATMENT													
	TREATMENTS													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Free life	2920	1160	1400	1120	1220	1700	1040	1180	1500	1200	620	1080	1840	920
Phytoparasites	600	120	1000	20	20	180	240	160	160	320	100	140	60	0
Meloidogyne	0	0	40	0	0	0	80	0	0	0	20	0	0	0
Aphelenchoides	140	20	20	0	0	0	0	0	0	60	0	0	0	0
Pratylenchus	40	0	40	0	0	0	0	40	0	100	0	0	0	0
Aphelenchus	40	80	180	20	0	120	80	20	60	20	40	20	20	0
Trichodorus	0	0	100	0	0	0	0	0	20	0	0	100	20	0
Dorylaimus	0	0	0	0	0	0	0	0	0	80	0	0	0	0
Helicotylenchus	200	0	600	0	20	20	0	60	60	0	40	0	0	0
Tylenchorhynchus	0	0	0	0	0	20	0	40	0	0	0	0	0	0
Trophurus	0	20	20	0	0	20	40	0	20	40	0	20	20	0
Paratylenchus	0	0	0	0	0	0	20	0	0	20	0	0	0	0
Tylenchus	180	0	0	0	0	0	20	0	0	0	0	0	0	0

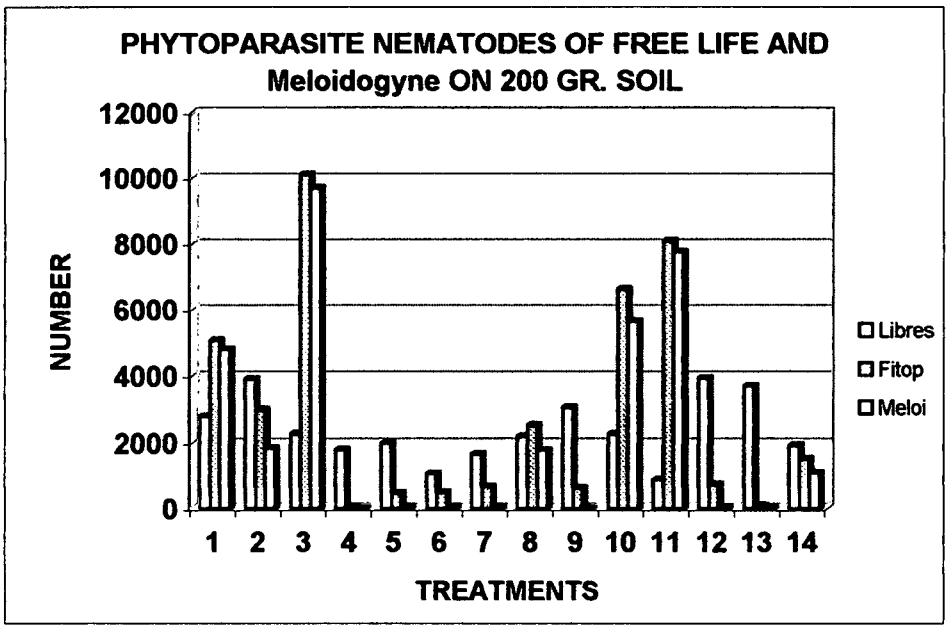
1=Control
2=Chloropicrin
3=Dichloropropen+Chloropicrina
4=Methyl Bromide 40
5=Cabbage+Solarization
6= Metam sodium25+Solarizatio
7= Cpw manure+Solarizat
8= Dazomet
9= Solarization
10=Metam sodium 50
11=Methyl Bromide 15
12=Corn+Solarization
13=Hen manure+Solarization
14=Dichloropropene



Crop: Tomato
Site: Facultad de Agronomía
Planting date: Nov/10/2001
Evaluation: Second extraction of sampling nematodes from soil
Sampling date: May 6th, 2002
Accounting date: 05/16/02

GENUS	NUMBER AND TYPE OF EXTRACTED NEMATODES/TREATMENT													
	TREATMENTS													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Free life	2770	3885	2240	1775	1965	1050	1645	2170	3045	2255	880	3920	3695	1905
Phytoparasited	**5065**	**2980**	**10110**	**35**	**475**	**495**	**665**	**2510**	**625**	**6600**	**8080**	**735**	**90**	**1505**
Meloidogyne	**4785**	**1825**	**9685**	**0**	**40**	**45**	**35**	**1755**	**5**	**5635**	**7745**	**10**	**10**	**1065**
Aphelenchoides	30	170	40	0	5	0	0	35	0	5	15	90	10	30
Pratylenchus	45	25	45	5	0	0	20	15	0	30	30	0	0	15
Aphelenchus	120	835	115	25	215	80	240	245	430	630	80	210	35	115
Trichodorus	0	0	35	0	5	0	0		0	10	5	20	0	5
Dorylaimus	5	20	80	0	25	5	15	45	40	20	35	45	0	20
Helicotylenchus	0	20	0	0	0	0	0	5	0	10	0	5	0	40
Tylenchorhynchus	0	55	60	0	145	335	330	395	120	225	125	270	5	140
Trophurus	60	5	15	0	5	5	0	5	5	10	0	5	5	0
Paratylenchus	15	25	5	0	0	0	0	0	0	25	40	55	0	65
Tylenchus	5	0	30	5	35	25	25	10	25	0	5	25	25	10

1=control
2=Chloropicrin
3=Dichloropropen+Chloropicrin
4=Methyl Bromide 40
5=Cabbage+Solarization
6= Metam sodium25+Solarization
7=Cow manure+Solarization
8= Dazomet
9= Solarization
10=Metam sodium 50
11=Methyl Bromide15
12=Corn+Solarization
13=Hen manure+Solarization
14=Dichloropropene



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMÍA

Crop: Tomato
Site: Facultad de Agronomia
Transplanting date: November 10th, 2001
Measurement parameter: Weeds
Evaluation date: March 8th, 2002

Block I	NUMBER AND TYPE OF WEED									
TREATMENT	Que.	Zac.	Ver.	Tom.	Tro.	Gol.	Coq.	Col.	Mal.	TOTAL
1. Hen manure + solarization	1	8		0	1	0	0	0	0	10
2. Metam sodium + solization	0	0		0	0	0	0	1	0	1
3. Control	0	8		0	1	0	4	0	0	13
4. Dazomet	0	0		0	0	0	0	0	0	0
5. Methyl Bromide (15 gr/m^2)	0	8		0	0	0	0	0	0	8
6. Methyl Bromide (40 gr/m^2)	0	2		1	2	0	0	0	0	5
7. Dichloropropene	0	0		0	0	0	0	0	0	0
8. Metam sodium (50 gr/m^2)	2	3		1	1	9	5	0	0	21
9. Cabbage+ solarization	0	0		0	0	0	0	0	0	0
10Dichloroprop+Chloropicrin	0	1		0	0	0	0	0	0	1
11Chloropicrin	0	0		0	0	0	0	0	0	0
12 Cow manure + solarization	0	0		0	0	0	0	0	0	0
13 Corn + solarization	0	1		0	0	0	0	0	1	2
14 Solarization	0	1		0	0	0	0	0	0	1

Block II	NUMBER AND TYPE OF WEED									
TREATMENT	Que.	Zac.	Ver.	Tom.	Tro.	Gol.	Coq.	Col.	Mal.	TOTAL
1. Hen manure + solarization	0	14		0	0	0	2	1	0	17
2. Metam sodium + solization	0	0		1	0	1	0	0	0	2
3. Control	0	1		0	0	0	1	0	0	2
4. Dazomet	0	0		1	4	1	0	0	0	6
5. Methyl Bromide (15 gr/m^2)	0	0		0	1	0	0	0	0	1
6. Methyl Bromide (40 gr/m^2)	0	0		0	0	0	2	0	0	2
7. Dichloropropene	0	4		0	0	0	1	0	0	5
8. Metam sodium (50 gr/m^2)	0	1		0	2	0	4	0	0	7
9. Cabbage+ solarization	0	0		0	0	0	0	0	0	0
10Dichloroprop+Chloropicrin	0	0		0	2	0	0	0	1	3
11Chloropicrin	0	0		0	1	0	0	0	0	1
12 Cow manure + solarization	0	0		0	0	0	0	0	0	0
13 Corn + solarization	0	0		0	0	3	1	0	0	4
14 Solarization	0	2		0	1	0	0	0	0	3

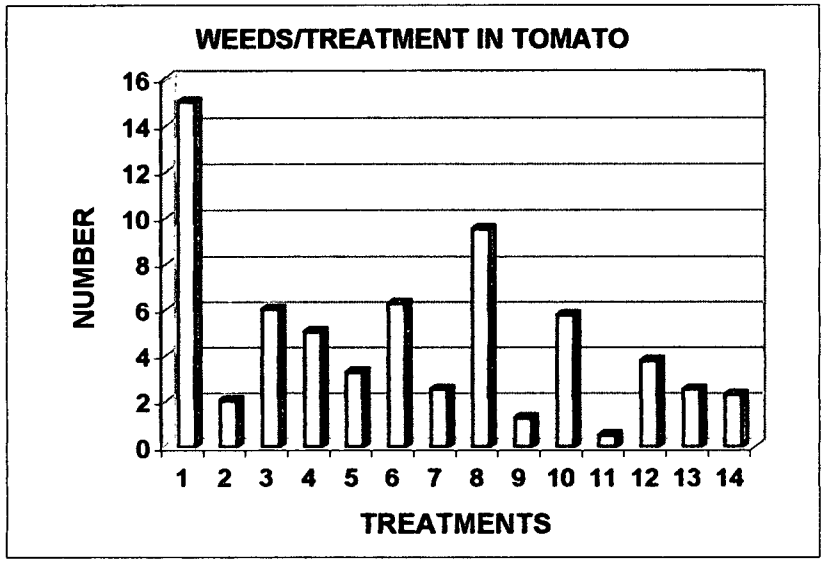
Block III	NUMBER AND TYPE OF WEED									
TREATMENT	Que.	Zac.	Ver.	Tom.	Tro.	Gol.	Coq.	Col.	Mal.	TOTAL
1. Hen manure + solarization	0	18	0	0	1	0	0	0	1	20
2. Metam sodium + solization	0	0	0	0	0	0	0	0	0	0
3. Control	0	0	0	1	1	0	0	0	0	2
4. Dazomet	0	9	0	1	0	0	0	0	0	10
5. Methyl Bromide (15 gr/m^2)	0	4	0	0	0	0	0	0	0	4
6. Methyl Bromide (40 gr/m^2)	0	8	0	1	2	0	0	1	0	12
7. Dichloropropene	0	0	0	0	0	0	1	0	0	1
8. Metam sodium (50 gr/m^2)	0	3	0	0	4	0	0	0	0	7
9. Cabbage+ solarization	0	0	0	0	0	1	0	0	0	1
10Dichloroprop+Chloropicrin	0	19	0	0	0	0	0	0	0	19
11Chloropicrin	0	0	0	0	0	0	0	0	0	0
12 Cow manure + solarization	0	0	0	0	0	0	0	0	0	0
13 Corn + solarization	1	2	0	0	0	0	0	0	0	3
14 Solarization	0	0	0	0	1	0	0	0	0	1

Block IV	NUMBER AND TYPE OF WEED									
TREATMENT	Que.	Zac.	Ver.	Tom.	Tro.	Gol.	Coq.	Col.	Mal.	TOTAL
1. Hen manure + solarization	0	11	0	1	1	0	0	0	0	13
2. Metam sodium + solization	1	0	0	0	0	4	0	0	0	5
3. Control	1	1	0	0	1	0	3	1	0	7
4. Dazomet	0	3	0	0	0	0	1	0	0	4
5. Methyl Bromide (15 gr/m^2)	0	0	0	0	0	0	0	0	0	0
6. Methyl Bromide (40 gr/m^2)	0	2	0	1	0	0	3	0	0	6
7. Dichloropropene	0	3	0	0	1	0	0	0	0	4
8. Metam sodium (50 gr/m^2)	0	2	0	0	0	0	1	0	0	3
9. Cabbage+ solarization	0	0	0	0	0	4	0	0	0	4
10Dichloroprop+Chloropicrin	0	0	0	0	0	0	0	0	0	0
11Chloropicrin	0	1	0	0	0	0	0	0	0	1
12 Cow manure + solarization	0	13	0	0	0	0	2	0	0	15
13 Corn + solarization	0	1	0	0	0	0	0	0	0	1
14 Solarization	0	2	1	0	0	0	1	0	0	4

Que = Quelite
Z.ag = Zacate de aguas
Ver = Verdolaga
Tom = Tomate
Tro = Trompillo
Gol = Golondrina
Coq = Coquillo
Col = Coliflorcillo
Mal = Malva

Transplanting date: November 10th, 2001
Measurement parameter: Weeds
Evaluation date: March 8th, 2002

TOTAL AVERAGE OF WEEDS NUMBER/TREATMENT						
TREATMENTS	REPETITIONS					
	I	II	III	IV	TOTAL	AVERAGE
1. Hen manure + solarization	10	17	20	13	60	**15**
2. Metam sodium + solization	1	2	0	5	8	**2**
3. Control	13	2	2	7	24	**6**
4. Dazomet	0	6	10	4	20	**5**
5. Methyl Bromide (15 gr/m^2)	8	1	4	0	13	**3.25**
6. Methyl Bromide (40 gr/m^2)	5	2	12	6	25	**6.25**
7. Dichloropropene	0	5	1	4	10	**2.5**
8. Metam sodium (50 gr/m^2)	21	7	7	3	38	**9.5**
9. Cabbage+ solarization	0	0	1	4	5	**1.25**
10Dichloroprop+Chloropicrin	1	3	19	0	23	**5.75**
11Chloropicrin	0	1	0	1	2	**0.5**
12 Cow manure + solarization	0	0	0	15	15	**3.75**
13 Corn + solarization	2	4	3	1	10	**2.5**
14 Solarization	1	3	1	4	9	**2.25**



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

CROP: Tomato

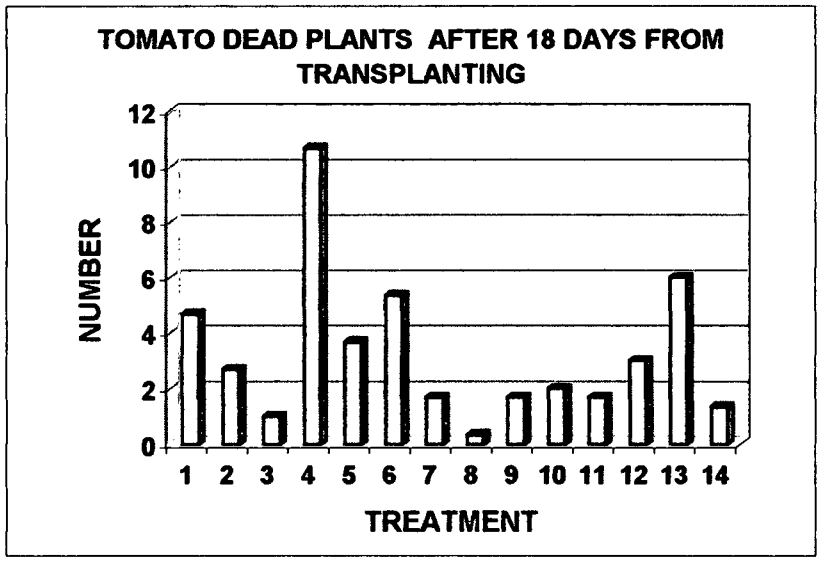
Site: Facultad de Agronomía

Transplanting date: 11/10/01

Evaluated parameter: dead plants after 18 days from transplanting/repetition

Fecha de evaluación: 28/11/01

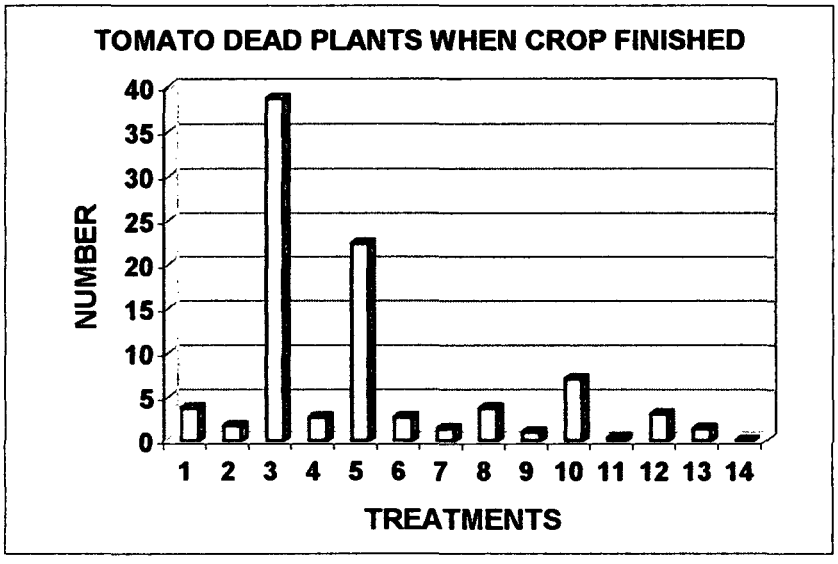
TREATMENT	REPETITION				TOTAL	AVERAGE
	1	2	3	4		
1. Hen manure + solarization	2	2	10	6	20	**4.67**
2. Metam sodium + solization	4	2	2	2	10	**2.67**
3. Control	0	1	2	1	4	**1.00**
4. Dazomet	12	7	13	10	42	**10.67**
5. Methyl Bromide (15 gr/m2)	7	4	0	2	13	**3.67**
6. Methyl Bromide (40 gr/m2)	4	10	2	1	17	**5.33**
7. Dichloropropene	2	3	0	3	8	**1.67**
8. Metam sodium (50 gr/m2)	0	1	0	1	2	**0.33**
9. Cabbage+ solarization	2	1	2	3	8	**1.67**
10Dichloroprop+Chloropicrin	0	1	5	2	8	**2.00**
11Chloropicrin	0	1	4	1	6	**1.67**
12 Cow manure + solarization	2	1	6	2	11	**3.00**
13 Corn + solarization	13	2	3	7	25	**6.00**
14 Solarization	1	3	0	2	6	**1.33**



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

CROP: Tomato
Site: Facultad de Agronomía
Transplanting date: 11/10/01
Evaluated parameter: Dead plants when crop finished/repetition
Evaluation date: 04/11/02

TREATMENT	REPETITION				TOTAL	AVERAGE
	1	2	3	4		
1. Hen manure + solarization	10	1	0	2	13	**3.67**
2. Metam sodium + solization	4	0	1	3	8	**1.67**
3. Control	22	42	52	58	174	**38.67**
4. Dazomet	0	7	1	0	8	**2.67**
5. Methyl Bromide (15 gr/m2)	42	2	23	1	68	**22.33**
6. Methyl Bromide (40 gr/m2)	8	0	0	0	8	**2.67**
7. Dichloropropene	0	4	0	2	6	**1.33**
8. Metam sodium (50 gr/m2)	7	2	2	14	25	**3.67**
9. Cabbage+ solarization	2	1	0	2	5	**1.00**
10Dichloroprop+Chloropicrin	10	10	1	0	21	**7.00**
11Chloropicrin	1	0	0	3	4	**0.33**
12 Cow manure + solarization	2	1	6	2	11	**3.00**
13 Corn + solarization	3	0	1	0	4	**1.33**
14 Solarization	0	0	0	0	0	**0.00**



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

CROP: Tomato

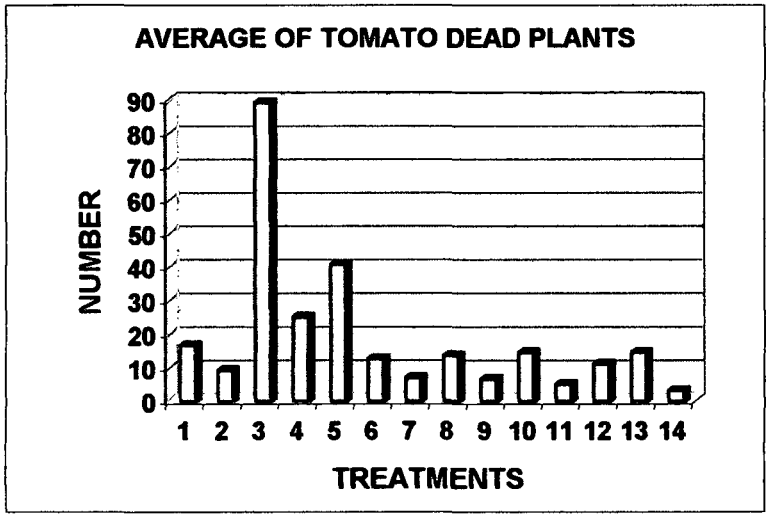
Site: Facultad de Agronomía.

Transplanting date: 11/10/01

Evaluated parameter: Total of dead plants/treatment

Evaluation date: 11/28/01 and 04/11/02

TREATMENT	EVALUATION		TOTAL	AVERAGE
	1	2		
1. Hen manure + solarization	20	13	33	17
2. Metam sodium + solization	10	8	18	9
3. Control	4	174	178	89
4. Dazomet	42	8	50	25
5. Methyl Bromide (15 gr/m2)	13	68	81	41
6. Methyl Bromide (40 gr/m2)	17	8	25	13
7. Dichloropropene	8	6	14	7
8. Metam sodium (50 gr/m2)	2	25	27	14
9. Cabbage+ solarization	8	5	13	7
10Dichloroprop+Chloropicrin	8	21	29	15
11Chloropicrin	6	4	10	5
12 Cow manure + solarization	11	11	22	11
13 Corn + solarization	25	4	29	15
14 Solarization	6	0	6	3



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

Crop: Tomato Planting date: Nov/10/2001

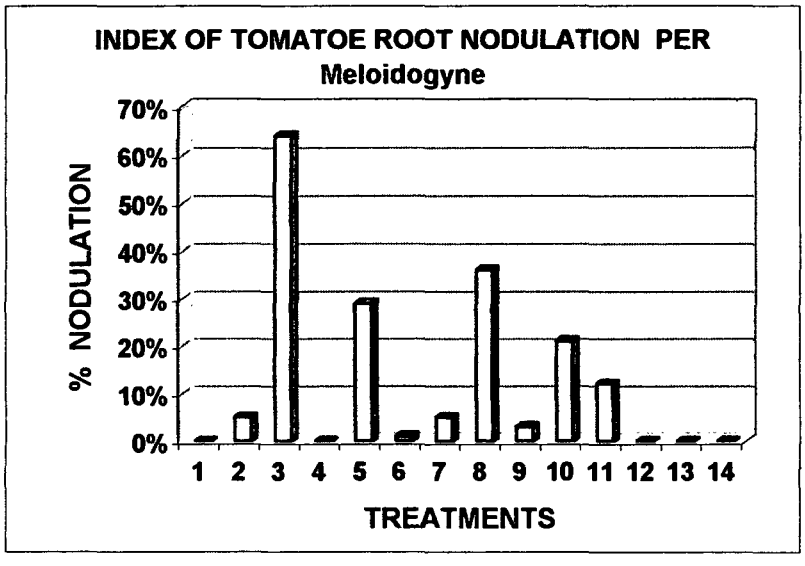
Site: Facultad de Agronomía

Evaluation parameter:% of root nodulation per **Meloidogyne**/repetition

Sampling date: 04/29/02 to 05/08/02

SCALE 1-6

TOTAL AVERAGE OF NODULATION PER *Meloidogyne* /treatment					
TREATMENT	**R I**	**R II**	**R III**	**R IV**	**AVERAGE**
1. Hen manure + solarization	0.00%	0.00%	0.00%	0.00%	0.00%
2. Metam sodium + solization	8.00%	12.00%	0.00%	0.00%	5.00%
3. Control	28.00%	84.00%	76.00%	68.00%	64.00%
4. Dazomet	0.00%	0.00%	0.00%	0.00%	0.00%
5. Methyl Bromide (15 gr/m^2)	20.00%	96.00%	0.00%	0.00%	29.00%
6. Methyl Bromide (40 gr/m^2)	0.00%	4.00%	0.00%	0.00%	1.00%
7. Dichloropropene	0.00%	0.00%	8.00%	12.00%	5.00%
8. Metam sodium (50 gr/m^2)	48.00%	64.00%	32.00%	0.00%	36.00%
9. Cabbage+ solarization	4.00%	4.00%	0.00%	4.00%	3.00%
10Dichloroprop+Chloropicrin	28.00%	56.00%	0.00%	0.00%	21.00%
11Chloropicrin	12.00%	8.00%	24.00%	4.00%	12.00%
12 Cow manure + solarization	0.00%	0.00%	0.00%	0.00%	0.00%
13 Corn + solarization	0.00%	0.00%	0.00%	0.00%	0.00%
14 Solarization	0.00%	0.00%	0.00%	0.00%	0.00%



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

SITE: Campo el porvenir

CROP: Tomato

PLANTING DATE: November 10th, 2001

EVALUATION DATE: March 5th, 2002

TABLE OF WEIGHT AVERAGES, PERCENTAGE OF FRUITS SIZES (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/HARVEST.

TREATMENTS		% OF FRUIT SIZES				
	weight	150 g	125 g	100 g	´- 100 g	Rem
Control	15.838	17.00	18.00	17.50	20.50	27.00
Chloropicrin	20.663	15.00	19.00	12.50	24.50	29.00
Dichloropropene+Chloropicrin	18.550	8.50	11.50	27.50	29.00	23.50
Methyl Bromide 40	15.300	18.50	14.00	20.00	25.00	22.50
Cabbage+Solarization	20.575	28.50	19.00	20.00	22.00	10.50
Metam sod. 25+Solarization	14.038	18.50	20.00	19.50	22.50	19.50
Cow manure+Solarization	20.563	25.00	21.50	18.00	24.00	11.50
Dazomet	18.675	25.00	18.00	21.00	21.00	15.00
Solarization	10.500	15.50	18.00	21.00	19.50	26.00
Metam sodium 50	8.225	16.50	20.00	23.00	22.00	18.50
Methyl Bromide15	6.050	14.37	16.79	17.08	20.67	31.09
Corn+Solarization	13.050	5.50	10.00	16.50	35.00	33.00
Hen manure+Solarization	15.413	4.00	9.50	19.50	36.00	31.00
Dichloropropene	8.000	6.00	9.50	16.50	45.50	22.50

EVALUATION DATE: March 19th, 2002

TABLE OF TOTALWEIGHT AVERAGES, PERCENTAGE OF FRUITS SIZES (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/HARVEST.

TREATMENTS		% OF FRUIT SIZES				
	weight	150 g	125 g	100 g	´- 100 g	Rem
Control	11.650	9.00	18.00	20.50	29.50	23.00
Chloropicrin	14.094	10.00	22.00	18.00	23.50	26.50
Dichloropropene+Chloropicrin	12.550	13.50	18.00	25.00	22.00	21.50
Methyl Bromide 40	13.288	10.00	16.00	27.50	22.00	24.50
Cabbage+Solarization	10.438	10.00	18.50	30.50	20.50	20.50
Metam sod. 25+Solarization	13.038	15.50	22.00	26.00	21.00	15.50
Cow manure+Solarization	15.006	11.50	20.50	30.00	18.50	19.50
Dazomet	8.788	14.00	21.50	23.00	17.00	24.50
Solarization	9.088	13.50	25.00	20.00	17.50	24.00
Metam sodium 50	14.313	13.00	23.00	26.00	18.50	19.50
Methyl Bromide15	12.275	12.00	20.50	26.50	21.00	20.00
Corn+Solarization	14.925	15.50	21.50	23.50	18.50	21.00
Hen manure+Solarization	18.588	10.50	14.50	22.00	23.50	29.50
Dichloropropene	16.213	8.50	15.00	24.50	25.50	26.50

EVALUATION DATE: April 8th, 2002

TABLE OF WEIGHT AVERAGES, PERCENTAGE OF FRUITS SIZE (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/HARVEST.

TREATMENTS		% OF FRUIT SIZES				
	weight	150 g	125 g	100 g	´- 100 g	Rem
Control	47.750	1.00	4.50	10.50	27.00	57.00
Chloropicrin	68.656	3.50	11.50	29.00	27.50	28.50
Dichloropropene+Chloropicrin	37.375	2.00	16.50	29.50	29.00	23.00
Methyl Bromide 40	54.688	3.00	13.00	34.00	19.00	31.00
Cabbage+Solarization	65.625	4.50	16.50	26.00	18.50	34.50
Metam sod. 25+Solarization	47.750	2.00	13.50	28.00	21.00	35.50
Cow manure+Solarization	49.250	2.00	7.50	32.50	27.50	30.50
Dazomet	37.688	1.50	13.00	15.50	42.00	28.00
Solarization	38.219	3.50	11.50	28.50	28.00	28.50
Metam sodium 50	50.188	3.00	9.50	31.50	34.50	21.50
Methyl Bromide15	55.938	3.00	15.50	37.50	22.00	22.00
Corn+Solarization	43.719	5.00	28.00	27.00	20.50	19.50
Hen manure+Solarization	60.563	1.50	13.50	37.50	17.50	30.00
Dichloropropene	46.719	3.00	19.00	29.00	19.00	30.00

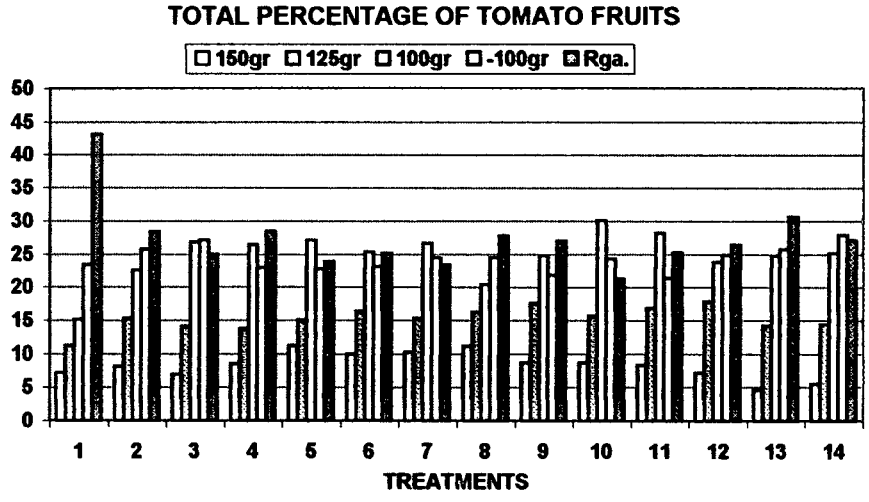
EVALUATION DATE: April 22nd, 2002

TABLE OF WEIGHT AVERAGES, PERCENTAGE OF FRUITS SIZE (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/HARVEST.

TREATMENTS		% OF FRUIT SIZES				
	weight	150 g	125 g	100 g	´- 100 g	Rem
Control	13.150	1.50	4.50	12.00	16.50	65.50
Chloropicrin	39.663	4.00	8.50	30.50	27.50	29.50
Dichloropropene+Chloropicrin	39.375	4.00	10.50	25.00	28.50	32.00
Methyl Bromide 40	57.663	2.50	12.00	24.00	26.00	35.50
Cabbage+Solarization	34.425	2.00	6.00	32.00	30.00	30.00
Metam sod. 25+Solarization	46.213	4.00	10.00	28.00	28.00	30.00
Cow manure+Solarization	43.000	2.50	11.50	26.00	28.00	32.00
Dazomet	46.575	4.00	12.50	22.00	18.00	43.50
Solarization	67.125	2.50	16.00	29.50	22.50	29.50
Metam sodium 50	64.163	2.50	10.00	40.00	22.00	25.50
Methyl Bromide15	48.213	4.00	14.50	31.50	22.00	28.00
Corn+Solarization	60.625	2.50	12.00	28.00	25.50	32.00
Hen manure+Solarization	69.388	2.50	19.50	20.00	26.00	32.00
Dichloropropene	89.138	4.50	14.00	30.50	21.50	29.50

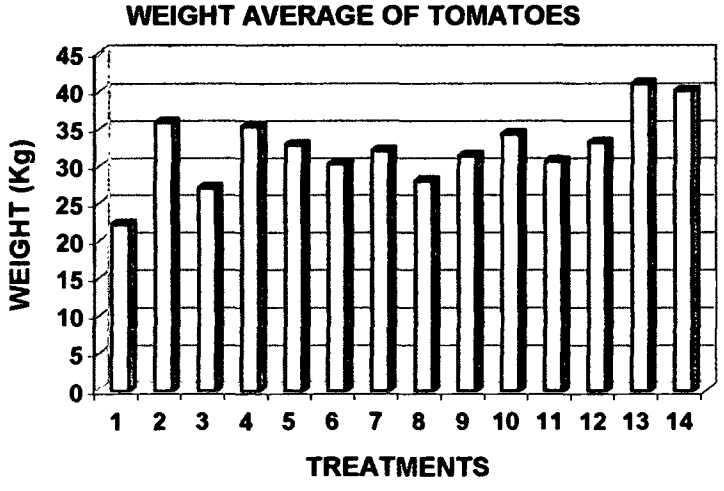
CROP: Tomato
PLANTING DATE: November 10th, 2001
TABLE OF WEIGHT AVERAGES, PERCENTAGE OF FRUITS SIZE (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/HARVEST.

TREATMENTS		% OF FRUIT SIZES				
	weight	150 g	125 g	100 g	'- 100 g	Rem
Control	22.097	7.13	11.25	15.13	23.38	43.13
Chloropicrin	35.769	8.13	15.25	22.50	25.75	28.38
Dichloropropene+Chloropicrin	26.963	7.00	14.13	26.75	27.13	25.00
Methyl Bromide 40	35.234	8.50	13.75	26.38	22.94	28.44
Cabbage+Solarization	32.766	11.25	15.00	27.13	22.75	23.88
Metam sod. 25+Solarization	30.259	10.00	16.38	25.38	23.13	25.13
Cow manure+Solarization	31.955	10.25	15.25	26.63	24.50	23.38
Dazomet	27.931	11.13	16.25	20.38	24.50	27.75
Solarization	31.233	8.75	17.63	24.75	21.88	27.00
Metam sodium 50	34.222	8.75	15.63	30.13	24.25	21.25
Methyl Bromide15	30.619	8.34	16.82	28.14	21.42	25.27
Com+Solarization	33.080	7.13	17.88	23.75	24.88	26.38
Hen manure+Solarization	40.988	4.63	14.25	24.75	25.75	30.63
Dichloropropene	40.017	5.50	14.38	25.13	27.88	27.13



CROP: Tomato
PLANTING DATE: November 10th, 2001
yield total average in KGS. per treatment 4 harvests

TREATMENTS	YIELD TOTAL AVERAGE (KGS.)					
	1	2	3	4	TOTAL	AVERAGE
Control	15.838	11.65	47.75	13.15	88.39	22.10
Chloropicrin	20.663	14.09	68.66	39.66	143.08	35.77
Dichloropropene+Chloropicrin	18.550	12.55	37.38	39.38	107.85	26.96
Methyl Bromide 40	15.300	13.29	54.69	57.66	140.94	35.23
Cabbage+Solarization	20.575	10.44	65.63	34.43	131.06	32.77
Metam sod. 25+Solarization	14.038	13.04	47.75	46.21	121.04	30.26
Cow manure+Solarization	20.563	15.01	49.25	43.00	127.82	31.95
Dazomet	18.675	8.79	37.69	46.58	111.73	27.93
Solarization	10.500	9.09	38.22	67.13	124.93	31.23
Metam sodium 50	8.225	14.31	50.19	64.16	136.89	34.22
Methyl Bromide15	6.050	12.28	55.94	48.21	122.48	30.62
Corn+Solarization	13.050	14.93	43.72	60.63	132.32	33.08
Hen manure+Solarization	15.413	18.59	60.56	69.39	163.95	40.99
Dichloropropene	8.000	16.21	46.72	89.14	160.07	40.02



STATISTIC ANALYSIS ABOUT OBTAINED RESULTS IN TOMATO EXPERIMENT IN FACULTAD DE AGRONOMIA, CULIACÁN, SINALOA.

Number of fruits percentage. Initial 14 treatments were analyzed for percentage variables about number of fruits for different weights. (150, 125, 100, <100 and remain). With a randomized blocks design (DBCA). We carried out comparison of averages using the Tukey test. We used a significance level ($P<0.05$).

Weight in kilograms. Fourteen treatments were analyzed for a weight variable in kilograms with a randomized design (DCA), with arrangement for treatments in divided plots. Repetitions took place in the main plot and samplings in minor plot, with an incomplete factor analysis of 14X4. It was carried out comparison of averages using the Tukey, test. With a significance level ($P<0.05$).

TABLE 1. ANÁLYSIS OF VARIANCE FOR NUMBER FRUIT PERCENTAGE OF 150 GRAMES WEIGHT USING FOURTEEN DIFFERENT TREATMENTS.

F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	13	0.32263010	0.92	0.5427
REPETITION (BLOCKS)	3	17.92650901		
ERROR	39	0.35108782		
TOTAL	55			

C.V.=22.25382%, R2 =80.8942%

TABLE 2. ANÁLYSIS OF VARIANCE FOR NUMBER FRUIT PERCENTAGE OF 125 GRAMES WEIGHT USING FOURTEEN DIFFERENT TREATMENTS.

F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	13	0.24132631	0.65	0.7930
REPETITION (BLOCKS)	3	2.98467511		
ERROR	39	0.36887476		
TOTAL	55			

C.V.=15.76061%, R2 =45.6664%

TABLE 3. ANÁLYSIS OF VARIANCE FOR NUMBER FRUIT PERCENTAGE OF 100 GRAMES WEIGHT USING FOURTEEN DIFFERENT TREATMENTS.

F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	13	0.61608149	2.48	0.0144
REPETITION (BLOCKS)	3	2.22509005		
ERROR	39	0.24864871		
TOTAL	55			

C.V.=10.09629%, R2 =60.2270%

TABLE 4. ANÁLYSIS OF VARIANCE FOR NUMBER FRUIT PERCENTAGE OF <100 GRAMES WEIGHT USING FOURTEEN DIFFERENT TREATMENTS.

F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	13	0.12838019	0.35	0.9778
REPETITION (BLOCKS)	3	0.58741780		
ERROR	39	0.36772619		
TOTAL	55			

C.V.=12.37037%, R2 =19.3062%

TABLE 5. ANÁLYSIS OF VARIANCE FOR NUMBER FRUIT PERCENTAGE OF REMAIN USING FOURTEEN DIFFERENT TREATMENTS.

F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	13	0.76206549	1.94	0.050
REPETITION (BLOCKS)	3	3.81582711		
ERROR	39	0.39291550		
TOTAL	55			

C.V.=12.12480%, R2 =58.2210%

TABLE 6. ANÁLYSIS OF VARIANCE FOR NUMBER FRUIT PERCENTAGE. DIFFERENT WEIGHTS (150, 125, 100, <100 AND REMAIN IN GRAMES). USING FOURTEEN DIFFERENT TREATMENTS.

TREATMENTS	AVERAGE				
	150	125	100	<100	REZAGA
1. Control	7.125[a]	11.250[a]	15.125[b]	23.375[a]	43.125[b]
2. Chloropicrin	8.125[a]	15.250[a]	22.500[ab]	25.750[a]	28.375[ab]
3. Dichlo+Chloropi	7.000[a]	14.125[a]	26.750[a]	27.125[a]	25.000[a]
4. M. Bromide 40	7.125[a]	13.750[a]	26.375[ab]	23.000[a]	28.375[ab]
5. Cabbage+Sol	11.250 a	15.000[a]	27.125[a]	22.750[a]	23.875[a]
6. M. Sodium25+Sol	10.000 a	16.375[a]	25.375[ab]	23.125[a]	25.125[a]
7. Cow manure+Sol	10.250 a	15.250[a]	26.625[a]	24.500[a]	23.375[a]
8. Dazomet	11.125 a	16.250[a]	20.375[ab]	24.500[a]	27.750[ab]
9. Solarization	8.750[a]	17.625[a]	24.750[ab]	21.875[a]	27.000[ab]
10. M. Sodium 50	8.750[a]	15.625[a]	30.125[a]	24.250[a]	21.250[a]
11. M. Bromide 15	8.343[a]	16.823[a]	28.145[a]	21.418[a]	25.273[a]
12. Corn + Sol	7.125[a]	17.875[a]	23.750[ab]	24.875[a]	26.375[ab]
13. Hen manure+Sol	4.625[a]	14.250[a]	24.750[ab]	25.750[a]	30.625[ab]
14. Dichloropropen	5.500[a]	14.375[a]	25.125[ab]	27.875[a]	27.125[ab]
CV=	22.25	15.76	10.09	12.37	12.12
R2=	80.89	45.66	60.22	19.30	58.22

Values with literal difference aren't equal statistically (P<0.05)
DBCA divided plots.

GRAPH 1. FRUIT SIZE PERCENTAGE OF HARVESTED TOMATOES

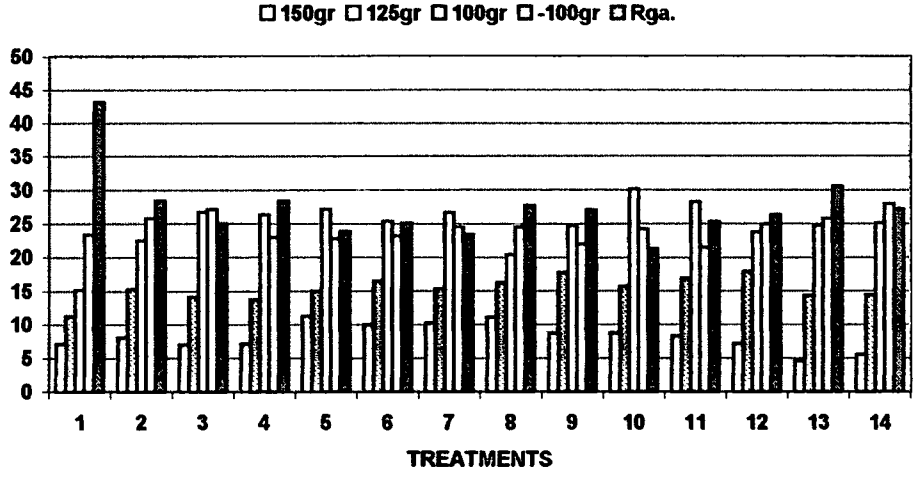


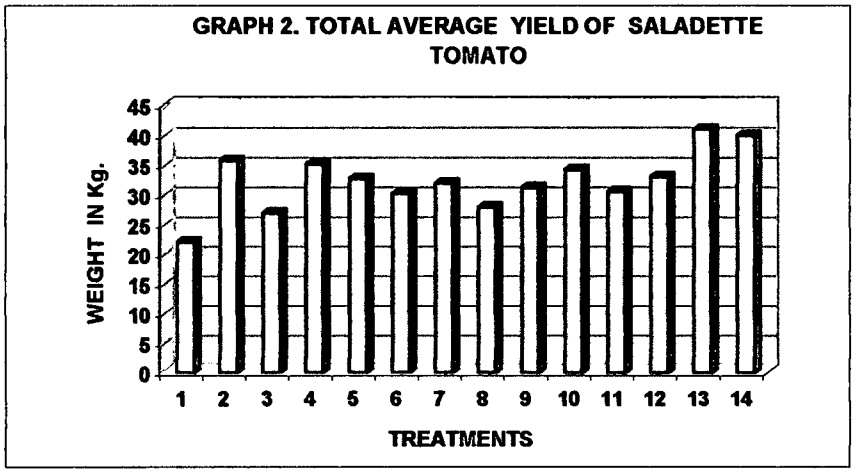
TABLE 7. ANÁLYSIS OF VARIANCE FOR NUMBER FRUIT PERCENTAGE. DIFFERENT WEIGHTS IN KILOGRAMES. USING FOURTEEN DIFFERENT TREATMENTS.

F.V.	G.L.	C.M.	F Calc.	P=
TREATMENTS	13	393.91301511	19.27	0.0001
REPETITION (MAIN PLOT)	3	85.05591518		
TREAT*REP E(a)	39	20.44299050		
SAMPLING (MINOR PLOT)	3	25445.76983631		
TREAT*SAMPLING	39	497.49764080		
REPETITION*SAMPLING	9	138.99398065		
ERROR E(b)	117	14.03507040		
TOTAL	223			

C.V.=11.57474%, R2 =98.4332%

TABLE 8. YIELD IN KILOGRAMES OF TOMATO. USING FOURTEEN DIFFERENT TREATMENTS.

REATMENTS	AVERAGE WEIGHT	
1. Control	22.097^{f}	(10)
2. Chloropicrin	35.769^{abc}	(4)
3. Dichlo+Chloropicrin	26.963^{ef}	(9)
4. Methyl Bromide 40	35.234^{bc}	(3)
5. Cabbage+sol.	32.766^{cd}	(6)
6. MetamSodium25+sol.	30.259^{cde}	(7)
7. Cow manure+sol.	31.955^{cde}	(7)
8. Dazomet	27.931^{de}	(8)
9. Solarization	31.233^{cde}	(7)
10. MetamSodium 50	34.222^{c}	(5)
11. Methyl Bro. 15	30.619^{cde}	(7)
12. Corn + Sol.	33.080^{cd}	(6)
13. Hen manure+Sol.	40.988^{a}	(1)
14. Dichloropropeno	40.017^{ab}	(2)
CV=	11.57474%	
R2=	98.4332%	



STATISTIC INTERPRETATION.

Percentage of fruit number. On table 6, Graph 1. we observe that it wasn't any significative difference (P>0.05) among treatments in percentage variables about fruit sizes 150g., 125g. y <100g. In the meantime in percentage variable of fruits 100 g. We could observe some differences (P<0.05). Treatments 3; Dichloropropene+Chloropicrin, 5; Cabbage+Solarization, 7; Cow manre+Solarization, 10; Metam sodium 50 and 11; Methyl Bromide 15 are superiors than (P<0.05) the other treatments. Second statistic important group were: 2; Chloropicrin, 4; Methyl Bromide 40, 6; Metam sodium 25 + solarization, 8; Dazomet, 9; Solarization, 12; Corn + Solarization, 13; Hen manure + Solarization and 14; Dichloropropene and finally the lowest group (P<0.05) is only control..

We found significant differences in percentage variable about number of fruits in remain weight (P<0.05), treatments 3; Dichloropropene+Chloropicrin, 5; Cabbage+Solarization, 6; Metam sodium 25+Solarization, 7; Cow manure + Solarization, 10; Metam sodium 50 and 11; Methyl Bromide 15, which displayed a minor percentage of remain fruits. In second group are treatments 2; Chloropicrin, 4; Methyl Bromide 40, 8; Dazomet, 9; Solarization, 12; Corn + Solarization, 13; Hen manure + Solarization and 14; Dichloropropene, and finally 1; control was the worst treatment with the main percentage of remain fruits.

Yield in kilograms (weight). On table 8, Graph 2. We found marked differences (P<0.05) among treatments. The best was 13; Hen manure + Solarization. Second place statistically was treatment 14; Dichloropropen, then tirad place 4; Methyl Bromide 40, Fourth place was 2; Chloropicrin, fifth place 10; Metam sodium 50, sixth place was 5; Cabbage + Solarization and 12; Corn + Solarization, number seven place were treatments 6; Metam sodium 25 + Solarization, 7; Cow manure + Solarization, 9; Solarization and 11; Methyl Bromide 15, eighth place 8; Dazomet and ninth place 3; Dichloropropen + Chloropicrin and finally 1; Control with a lower yield than the other treatments.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTION

Last June, 2002, it was established the second test of project "Alternatives to the use of Methyl Bromide in the cultivation of Tomatoes, (*Lycopersicon esculentum* L.), we started some tests, in Agronomy Faculty, Universidad Autonoma de Sinaloa, Culiacán, Sinaloa, Mexico, we started taking some tests, including solarization o soil. We apply different treatments in soil, on November, 2002, in order to analyze the control about soil microorganisms and in crops development also, comparing Methyl bromide. We apply this substance in muddy type soil. Agricultural activities are based in the drip irrigation, using groundwater table.

Treatments: We started the experiment in agricultural season 2002. we applied 14 (fourteen) treatments:

TREATMENTS OR ALTERNATIVES:

1.- Control (no treatment).
2.- 15 gr/m^2 of methyl bromide (75/25 or 80/20).
3.- 40 gr/m^2 of methyl bromide (75/25 or 80/20).
4.- Five kg of sorghum compost, incorporated into the soil, plus four weeks of solarization
5.- Five kg of bovine cattle manure incorporated into soil, plus four weeks of solarization.
6.- .- Five kg of chicken manure incorporated into soil, plus four weeks of solarization.
7- Five kg of fresh broccoli residue (or other cruciferous plant) incorporated into soil, plus four weeks of solarization.
8.- 25 ml/m^2 of metam-sodium (N, methyl sodium ditiocarbamate) plus six weeks of solarization.
9.- 50 ml/m^2 of metam-sodium.
10.- 33 ml/m^2 of chloropicrin.
11.- 40 gr/ m^2 of Dazomet (tetrahydro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona).
12.- 1,3-dichloropropene+chloropicrin,dose recommended by the manufacturer.
13.- 1,3-dichloropropene, dose recommended by the manufacturer (11.2 ml/m^2).
14.- Solarization

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last June, in Agronomy Faculty heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in four rows, after that, they made the installment underground pipeline. Afterwards the beds were marked, raised and flattened. And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in June, 2002. In a piece of land with 56 beds, 50 m length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 14 experimental plots with 4 beds, which we applied next randomized treatments:

1). **Absolute control.** In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application.

2). **Methyl Bromide 80/20**. In the four rows, It was injected 15 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

3). **Methyl Bromide 80/20**. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

4). **Five kg of sorghum compost** incorporated into the soil, plus four weeks of solarization

5). **Five kg of bovine** cattle manure incorporated into soil, plus four weeks of solarization.

6). **Five kg of chicken** cattle manure incorporated into soil, plus four weeks of solarization.

7). **Broccoli** incorporated on the soil and solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it were distributed 5 kg per M^2. It was incorporated by manual labor using hoes, after that, the rows were covered with transparent plastic.

8). **Metham-sodium.** In this four furrows it was applied 25 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

9). **Metham-sodium.** In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

10). **Chloropicrin.** On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 20 days.

11). **Dazomet** (tetrahidro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona). On this furrows soil we distributed by manual labor 40 gr/m^2 dazomet: it was incorporated using hoes, after that, we applied water by sprinkler irrigation during 3 hrs. Finally, it was covered in black/silver plastic.

12). **1,3-dichloropopren + chloropicrin.** These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

13). **1,3-dichloropropen.** These furrows soil were treated using 11.2 ml/m^2 1,2-dichloropropen. This application was carried out using the equipment tractor thereinafter. The furrows were covered in black/silver plastic during 20 days.

14). **Solarization.**

The treatments were applied on damp soil.

Evaluations will be taking place in the two central furrows in each experimental unit. We attached a label in 10 plants (five each row or 10 cm central bed) which were randomized, in order to take size measure.

Planting.

Tomato plants used in this tests are saladette tomato type. This plants grew in polyethylene ashtrays in "Agronomy Faculty" in greenhouses. The plants were 50 days old. They were planting 45 cm between each plant, on furrows with damp soil, covered with plastic.

Crop Management

Irrigation and fertilization will take place using drip irrigation, and they are controlled directly by enterprise project responsible. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

RESULTS:

NEMATODES :

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

Site: Facultad de Agronomia, Culiacán, Sinaloa **Crop: Tomato saladette cv. Gala**

Transplanting date:December 23th, 2002

Evaluation Parameter: Nodulation percent of roots per Meloidogyne/repetition

Evaluation date: April 29th, 2003

scale 1-6

	Repetition I						Repetition II					
	PLANTS						PLANTS					
TREATMENT	1	2	3	4	5	average	1	2	3	4	5	average
1.Control	40%	60%	80%	100%	60%	68.00%	60%	100%	100%	60%	80%	80.00%
2.Chloropicrin	40%	20%	0%	60%	20%	28.00%	20%	60%	80%	40%	0%	40.00%
3.Dichloropropen + chloropicrin	0%	40%	20%	0%	0%	12.00%	0%	20%	0%	0%	20%	8.00%
4.Methil Bromide 40	0%	20%	0%	0%	0%	4.00%	0%	0%	40%	0%	0%	8.00%
5.Cabbage + solarization	0%	0%	0%	0%	0%	0.00%	0%	0%	0%	0%	0%	0.00%
6.Metam sodium 25 + solarization	0%	0%	0%	0%	0%	0.00%	20%	0%	0%	0%	0%	4.00%
7.Cow manure + solarization	0%	0%	0%	0%	0%	0.00%	0%	0%	0%	0%	20%	4.00%
8.Dazomet	0%	0%	0%	0%	0%	0.00%	0%	0%	0%	0%	0%	0.00%
9.Solarization	0%	0%	20%	0%	0%	4.00%	0%	0%	0%	0%	0%	0.00%
10.Metam sodium 50	40%	40%	20%	0%	20%	24.00%	0%	20%	40%	60%	0%	24.00%
11.Methyl Bromide 15	0%	0%	60%	0%	0%	12.00%	0%	20%	0%	40%	0%	12.00%
12.Maize + solarization	0%	20%	0%	0%	0%	4.00%	0%	0%	0%	0%	0%	0.00%
13.Hen manure + solarization	0%	0%	0%	0%	0%	0.00%	0%	0%	0%	0%	0%	0.00%
14.Dichloropropen	0%	0%	20%	0%	0%	4.00%	0%	0%	0%	0%	0%	0.00%

	Repetition III						Repetition IV					
	PLANTS						PLANTS					
TREATMENT	1	2	3	4	5	average	1	2	3	4	5	average
1.Control	80%	80%	100%	100%	100%	92.00%	80%	100%	100%	100%	100%	96.00%
2.Chloropicrin	20%	40%	60%	40%	60%	44.00%	0%	60%	60%	40%	60%	44.00%
3.Dichloropropen + chloropicrin	0%	0%	20%	0%	20%	8.00%	0%	20%	20%	0%	40%	16.00%
4.Methil Bromide 40	0%	0%	0%	0%	0%	0.00%	0%	0%	0%	0%	0%	0.00%
5.Cabbage + solarization	0%	20%	0%	0%	0%	4.00%	0%	0%	0%	40%	0%	8.00%
6.Metam sodium 25 + solarization	0%	0%	20%	0%	0%	4.00%	0%	0%	0%	0%	0%	0.00%
7.Cow manure + solarization	20%	0%	0%	0%	0%	4.00%	0%	0%	0%	0%	0%	0.00%
8.Dazomet	0%	0%	0%	0%	0%	0.00%	0%	0%	0%	0%	0%	0.00%
9.Solarization	0%	0%	0%	0%	0%	0.00%	0%	0%	20%	0%	0%	4.00%
10.Metam sodium 50	0%	20%	0%	40%	40%	20.00%	0%	0%	20%	0%	40%	12.00%
11.Methyl Bromide 15	0%	0%	0%	40%	20%	12.00%	0%	0%	0%	0%	20%	4.00%
12.Maize + solarization	20%	0%	0%	20%	20%	12.00%	0%	0%	40%	0%	0%	8.00%
13.Hen manure + solarization	0%	0%	0%	0%	0%	0.00%	0%	0%	0%	0%	0%	0.00%
14.Dichloropropen	20%	0%	0%	20%	0%	8.00%	0%	0%	40%	0%	0%	8.00%

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

Site: Facultad de Agronomia, Culiacán, Sinaloa **Crop**: Tomato saladette cv. Gala

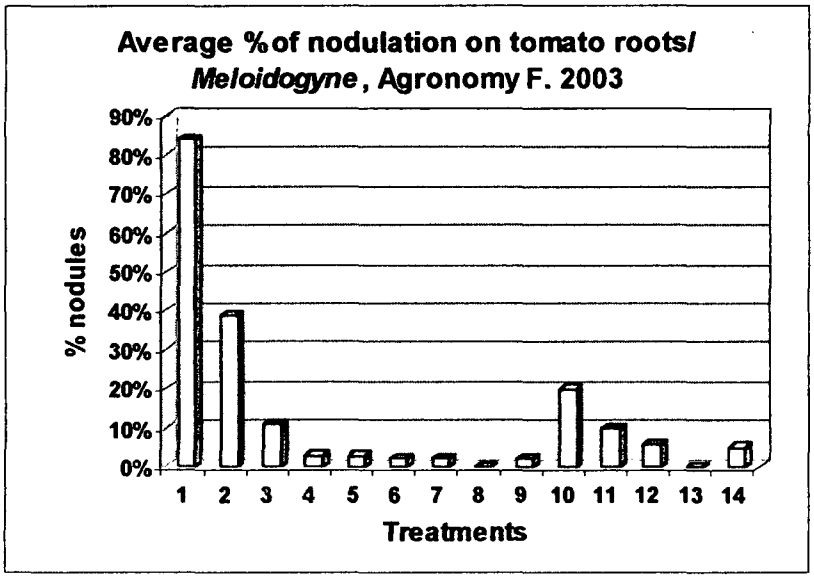
Transplanting date:December 23th, 2002

Evaluation Parameter: Nodulation percent of roots per ***Meloidogyne*** /repetition

Evaluation date: April 29th, 2003

Scale 1-6

Total average (%) of nodulation per *Meloidogyne* /repetition/treatment						
TREATMENT	R I	R II	R III	R IV	TOTAL	average
1.Control	68.00%	80.00%	92.00%	96.00%	336.00%	**84.00%**
2.Chloropicrin	28.00%	40.00%	44.00%	44.00%	156.00%	**39.00%**
3.Dichloropropen + chloropicrin	12.00%	8.00%	8.00%	16.00%	44.00%	**11.00%**
4.Methil Bromide 40	4.00%	8.00%	0.00%	0.00%	12.00%	**3.00%**
5.Cabbage + solarization	0.00%	0.00%	4.00%	8.00%	12.00%	**3.00%**
6.Metam sodium 25 + solarization	0.00%	4.00%	4.00%	0.00%	8.00%	**2.00%**
7.Cow manure + solarization	0.00%	4.00%	4.00%	0.00%	8.00%	**2.00%**
8.Dazomet	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
9.Solarization	4.00%	0.00%	0.00%	4.00%	8.00%	**2.00%**
10.Metam sodium 50	24.00%	24.00%	20.00%	12.00%	80.00%	**20.00%**
11.Methyl Bromide 15	12.00%	12.00%	12.00%	4.00%	40.00%	**10.00%**
12.Maize + solarization	4.00%	0.00%	12.00%	8.00%	24.00%	**6.00%**
13.Hen manure + solarization	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
14.Dichloropropen	4.00%	0.00%	8.00%	8.00%	20.00%	**5.00%**

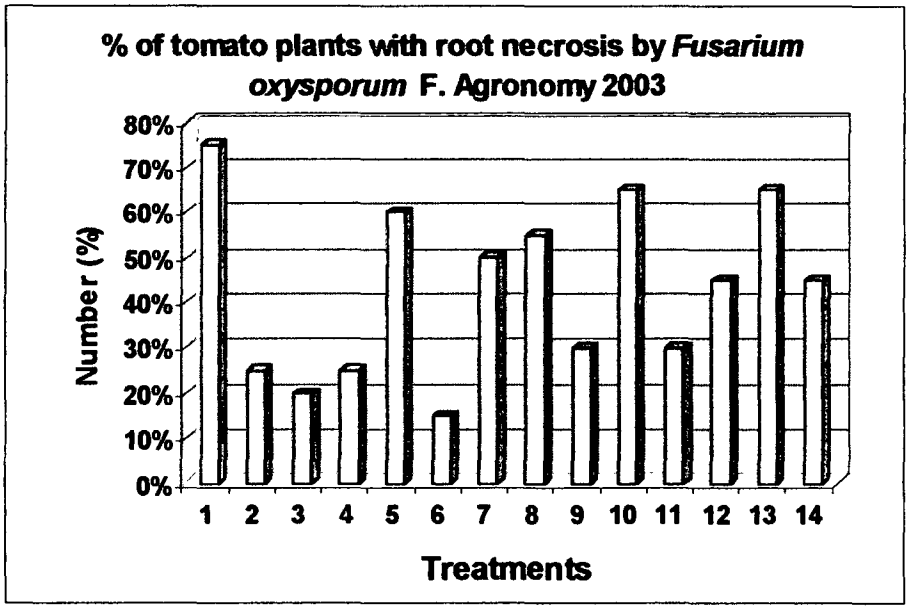


FUNGUS:

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

Site: Facultad de Agronomia, Culiacán, Sinaloa **Crop**: Tomato saladette cv. Gala
Transplanting date: December 23th, 2002
Evaluation parameter: Number and % of plants with root necrosis/*Fusarium oxysporum* /treatment
Evaluation date:April 29th, 2003
Number of plants/repetition: 33 = 132 plants/treatment

	REPETITION								PLANTS	%
TREATMENT	I		II		III		IV		TOTAL	AVERAGE
1.Control	26	80%	26	80%	20	60%	26	80%	98	75%
2.Chloropicrin	7	20%	0	0%	20	60%	7	20%	34	25%
3.Dichloropropen + chloropicrin	7	20%	7	20%	0	0%	13	40%	27	20%
4.Methil Bromide 40	13	40%	13	40%	7	20%	0	0%	33	25%
5.Cabbage + solarization	26	80%	20	60%	13	40%	20	60%	79	60%
6.Metam sodium 25 + solarization	0	0%	7	20%	13	40%	0	0%	20	15%
7.Cow manure + solarization	26	80%	20	60%	7	20%	13	40%	66	50%
8.Dazomet	26	80%	7	20%	26	80%	13	40%	72	55%
9.Solarization	7	20%	7	20%	13	40%	13	40%	40	30%
10.Metam sodium 50	20	60%	20	60%	20	60%	26	80%	86	65%
11.Methyl Bromide 15	13	40%	7	20%	7	20%	13	40%	40	30%
12.Maize + solarization	13	40%	20	60%	7	20%	20	60%	60	45%
13.Hen manure + solarization	26	80%	20	60%	20	60%	20	60%	86	65%
14.Dichloropropen	20	60%	13	40%	7	20%	20	60%	60	45%



YIELD:

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

Site: Facultad de Agronomia, Culiacán, Sinaloa **Crop**: Tomato saladette cv. Gala

Transplanting date: December 23th, 2002

Evaluation date: April 8th, 2003

TABLES OF TOTAL AVERAGE WEIGHT. PERCENTAGE OF FRUIT SIZES (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/CUT ON 40 M. LINEAR

TREATMENTS	AVERAGE	FRUIT SIZES/WEIGHT (Kg)				
	WEIGHT kg.	150gr	125gr	100gr	'- 100gr	REMAIN
1.Control	6.375	0.00	0.59	1.80	2.16	1.83
2.Chloropicrin	7.025	0.10	0.26	2.01	2.34	2.06
3.Dichloropropen + chloropicrin	28.425	0.30	2.60	13.74	8.61	3.18
4.Methil Bromide 40	9.625	0.18	0.83	3.35	3.55	1.73
5.Cabbage + solarization	8.725	0.13	0.56	2.74	3.63	1.68
6.Metam sodium 25 + solarization	14.200	0.25	1.06	6.25	4.25	2.39
7.Cow manure + solarization	18.175	0.00	0.69	7.98	6.04	3.48
8.Dazomet	9.900	0.00	0.64	2.68	3.08	3.51
9.Solarization	14.675	0.18	2.09	6.20	3.20	3.01
10.Metam sodium 50	14.425	0.43	2.18	5.95	3.16	2.71
11.Methyl Bromide 15	12.175	0.40	1.24	4.14	3.89	2.51
12.Maize + solarization	7.813	0.00	0.23	1.96	2.73	2.90
13.Hen manure + solarization	16.888	0.08	1.20	8.58	4.78	2.26
14.Dichloropropen	16.675	0.55	1.91	5.79	5.40	3.03

Evaluation date: April 14th, 2003

TABLES OF TOTAL AVERAGE WEIGHT. PERCENTAGE OF FRUIT SIZES (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/CUT ON 40 M. LINEAR

TREATMENTS	TOTAL	FRUIT SIZES/WEIGHT (Kg)				
	WEIGHT kg.	150gr	125gr	100gr	'- 100gr	REMAIN
1.Control	3.525	0.075	0.225	0.425	1.550	1.250
2.Chloropicrin	4.975	0.100	0.400	1.138	1.850	1.488
3.Dichloropropen + chloropicrin	5.200	0.038	0.275	1.388	2.300	1.200
4.Methil Bromide 40	4.050	0.163	0.225	1.025	1.438	1.200
5.Cabbage + solarization	4.550	0.075	0.275	0.963	1.975	1.263
6.Metam sodium 25 + solarization	7.125	0.163	0.563	1.488	3.675	1.238
7.Cow manure + solarization	6.275	0.163	0.238	1.200	3.525	1.150
8.Dazomet	4.150	0.113	0.250	0.838	1.425	1.525
9.Solarization	5.188	0.038	0.263	1.138	2.325	1.425
10.Metam sodium 50	3.988	0.113	0.200	0.650	1.838	1.188
11.Methyl Bromide 15	3.175	0.075	0.225	0.688	0.950	1.238
12.Maize + solarization	4.525	0.113	0.288	1.375	1.750	1.000
13.Hen manure + solarization	5.350	0.163	0.300	1.525	2.150	1.213
14.Dichloropropen	5.400	0.188	0.225	1.213	2.275	1.500

Evaluation date:April 17th, 2003

TABLES OF TOTAL AVERAGE WEIGHT. PERCENTAGE OF FRUIT SIZES (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/CUT ON 40 M. LINEAR

TREATMENTS	TOTAL	FRUIT SIZES/WEIGHT (Kg)				
	WEIGHT kg.	150gr	125gr	100gr	´- 100gr	REMAIN
1.Control	3.650	0.038	0.338	1.363	1.063	0.850
2.Chloropicrin	6.550	0.075	0.488	2.188	2.388	1.413
3.Dichloropropen + chloropicrin	5.475	0.000	0.050	0.788	2.750	1.888
4.Methil Bromide 40	5.350	0.113	0.275	1.338	2.113	1.513
5.Cabbage + solarization	3.175	0.038	0.150	0.825	1.350	0.813
6.Metam sodium 25 + solarization	6.200	0.000	0.300	1.688	3.013	1.200
7.Cow manure + solarization	5.400	0.000	0.150	0.988	2.988	1.275
8.Dazomet	4.763	0.000	0.175	0.975	1.925	1.688
9.Solarization	4.425	0.000	0.100	0.950	2.088	1.288
10.Metam sodium 50	6.625	0.038	0.075	1.400	3.338	1.775
11.Methyl Bromide 15	6.550	0.075	0.138	1.350	3.488	1.500
12.Maize + solarization	3.725	0.000	0.163	0.988	0.913	1.663
13.Hen manure + solarization	5.350	0.038	0.238	1.350	2.663	1.063
14.Dichloropropen	5.600	0.100	0.238	1.363	2.563	1.338

Evaluation date: April 20th, 2003

TABLES OF TOTAL AVERAGE WEIGHT. PERCENTAGE OF FRUIT SIZES (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/CUT ON 40 M. LINEAR

TREATMENTS	TOTAL	FRUIT SIZES/WEIGHT (Kg)				
	WEIGHT kg.	150gr	125gr	100gr	´- 100gr	REMAIN
1.Control	1.788	0.000	0.350	0.488	0.513	0.438
2.Chloropicrin	5.488	0.075	1.000	1.975	1.213	1.225
3.Dichloropropen + chloropicrin	9.338	0.000	0.988	3.813	1.775	2.763
4.Methil Bromide 40	11.538	0.000	1.563	3.113	2.513	4.350
5.Cabbage + solarization	8.550	0.000	0.600	2.038	1.325	4.588
6.Metam sodium 25 + solarization	17.950	0.000	3.550	7.588	3.688	3.125
7.Cow manure + solarization	14.113	0.000	1.200	4.088	3.000	4.575
8.Dazomet	6.188	0.000	0.513	1.238	0.613	3.825
9.Solarization	8.925	0.000	1.063	2.325	1.375	4.163
10.Metam sodium 50	7.713	0.000	0.775	2.525	2.263	2.150
11.Methyl Bromide 15	6.863	0.000	0.250	1.400	1.588	3.625
12.Maize + solarization	3.975	0.000	0.825	1.400	0.950	0.800
13.Hen manure + solarization	7.050	0.000	1.425	1.850	1.463	2.313
14.Dichloropropen	7.925	0.000	1.338	2.150	1.000	3.438

evaluation date: April 24th, 2003

TABLES OF TOTAL AVERAGE WEIGHT. PERCENTAGE OF FRUIT SIZES (150g; 125g; 100g; Y -100g.) AND REMAIN/TREATMENT/CUT ON 40 M. LINEAR

TREATMENTS	TOTAL	FRUIT SIZES/WEIGHT (Kg)				
	WEIGHT kg.	150	125	100	'- 100	REMAIN
1.Control	2.725	0.038	0.338	1.000	0.775	0.575
2.Chloropicrin	6.013	0.150	0.763	1.900	1.738	1.463
3.Dichloropropen + chloropicrin	7.400	0.000	0.425	2.038	2.563	2.625
4.Methil Bromide 40	8.438	0.113	0.788	2.200	2.575	3.013
5.Cabbage + solarization	5.863	0.038	0.338	1.425	1.575	2.488
6.Metam sodium 25 + solarization	12.075	0.000	1.500	4.075	4.175	2.325
7.Cow manure + solarization	9.750	0.000	0.538	2.225	3.750	3.238
8.Dazomet	5.475	0.000	0.313	1.125	1.313	2.725
9.Solarization	6.663	0.000	0.475	1.575	2.275	2.338
10.Metam sodium 50	7.163	0.038	0.413	1.950	2.800	1.963
11.Methyl Bromide 15	6.705	0.075	0.218	1.363	2.525	2.525
12.Maize + solarization	3.850	0.000	0.525	1.175	0.913	1.238
13.Hen manure + solarization	6.200	0.038	0.763	1.588	2.175	1.638
14.Dichloropropen	6.763	0.113	0.725	1.700	1.963	2.263

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

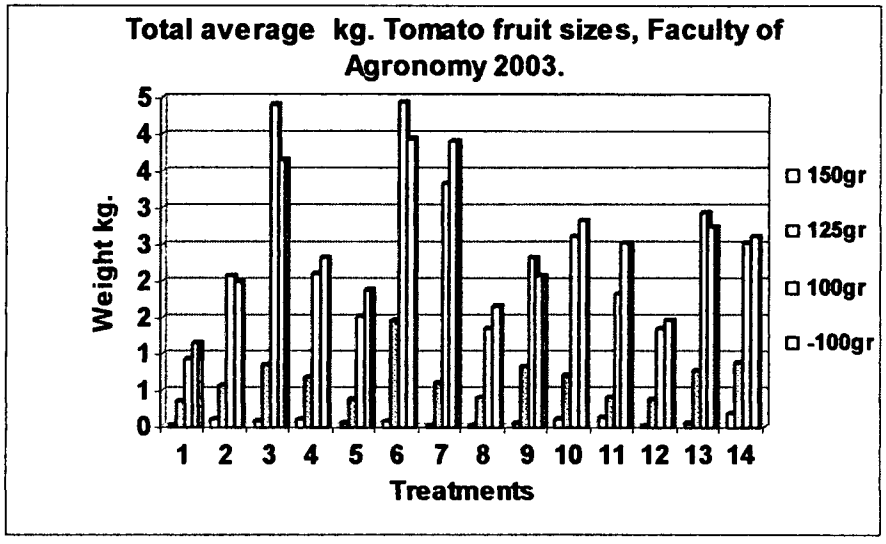
Site: Facultad de Agronomia, Culiacán, Sinaloa Cultivo: Tomate saladette cv. Gala

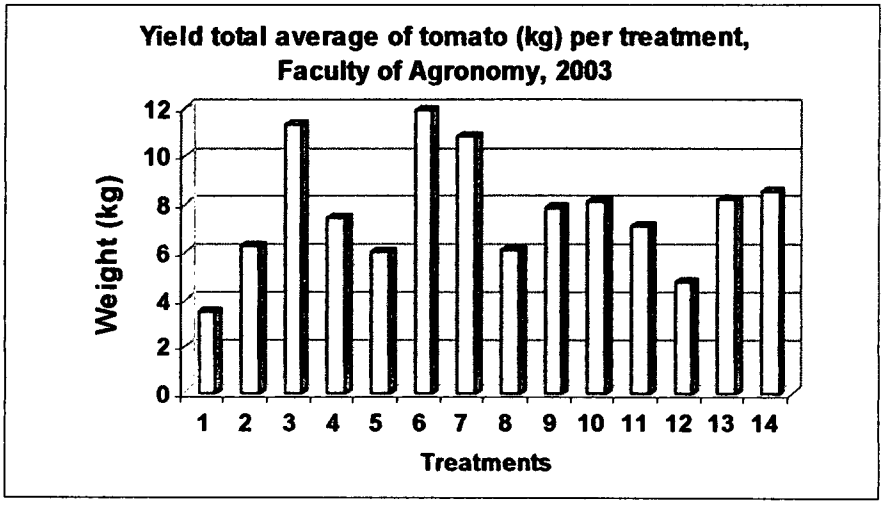
Transplanting date: September 23th, 2002

Evaluation parameter: Average of total yield (weight and fruit sizes) on 40 m linear /treatment

Evaluation date: April 8th to 24th, 2003 (5 cuts)

	Average	FRUIT AVERAGE SIZES				
TREATMENT	weight (KG)	150gr	125gr	100gr	'- 100gr	REMAIN
1.Control	3.498	0.023	0.350	0.935	1.158	1.033
2.Chloropicrin	6.268	0.100	0.580	2.063	1.978	1.498
3.Dichloropropen + chloropicrin	11.298	0.068	0.863	4.385	3.648	2.335
4.Methil Bromide 40	7.443	0.090	0.678	2.105	2.333	2.238
5.Cabbage + solarization	6.010	0.048	0.378	1.523	1.865	2.198
6.Metam sodium 25 + solarization	11.885	0.083	1.455	4.433	3.935	1.980
7.Cow manure + solarization	10.823	0.033	0.595	3.320	3.900	2.725
8.Dazomet	6.100	0.023	0.395	1.345	1.658	2.680
9.Solarization	7.823	0.043	0.813	2.313	2.068	2.588
10.Metam sodium 50	8.130	0.115	0.725	2.605	2.820	1.865
11.Methyl Bromide 15	7.083	0.140	0.410	1.815	2.523	2.195
12.Maize + solarization	4.748	0.023	0.370	1.355	1.458	1.543
13.Hen manure + solarization	8.188	0.055	0.763	2.920	2.740	1.710
14.Dichloropropen	8.500	0.198	0.883	2.503	2.598	2.320





FINAL CONCLUSION. The treatments with greater production (export and national) were: dichloropropeno + Chloropicrin, and metam sodium + solarization. These are alternatives to the use of methyl bromide for the control of pathogens of the ground in tomato, nevertheless biofumigation could be a good treatment of control that could be adopted by lower producers.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

FINAL PROJECT REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP: Strawberry (*Fragaria* spp), variety being used by the grower, and harvest will be fruits.

PROJECT AREAS: Experimental units will be located in "San Juanito" ranch, Valle de San Quintín, Baja California, México.

Executive Manager: Ing. Jaime González Sandoval.
Farmer: Ing. Conrado González Sandoval

Enterprise Address: Carretera Transpeninsular, Km 171.9, Colonia Vicente Guerrero, Valle de San Quintín, Baja California, México.

Tels: (01) (616) 6-24-94, 6-24-91

Culiacan, Sinaloa, March, 2004.

FINAL PROJECT REPORT: Alternatives to the use of Methyl Bromide in the cultivation of **strawberry** (*Fragaria* spp.). This tasks were developed In Agricultural enterprise "Don Juanito", located in Colonia Vicente Guerrero, Valle de San Quintín, Baja California, Mexico. Universidad Autónoma de Sinaloa, Agronomy Faculty Responsible: MC. Francisco Javier Estrada Ramirez, Project Coordinator, and MC. Sostenes Montoya Angulo, Agronomist, in tests implementation. QFB. María de la Luz Acosta Pineda y MC. Carlos Morales Cazarez Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

Introduction

During October, 1999, we started some tests in Baja California, Mexico, which consisted in the aplication of different treatments on soil, in order to analyze the control about soil microorganisms and in crops development, comparing Methyl bromide. We apply this substance in alluvial arenaceous land, with region characteristics (flora and fauna) half-dessert. Agricultural activities are based in the drip irrigation, using groundwater table.

The applied treatments were:

1) Control (no treatment);
2) Methyl Bromide 15 gr/m^2, 80/20
3) Methyl Bromide 40 gr/m^2, 80/20
4) Solarization (4 weeks)
5) Hen Manure, 5 kg and solarization (4 weeks)
6) Cow manure slightly done (5 kg) and solarization (4 weeks)
7) Fresh chinese broccoli (5 kg) and solarization (4 weeks)
8) Metham sodium (N, methyl sodium ditiocarbamate) and solarization (4 weeks)
9) Metham Sodium (50 ml/m^2)
10) Chloropicrin (33 ml/m^2)
11) Dazomet (tetrahidro-3-5 dimetil-2H1.3.5-tiazidin-s tiona) (40 gr/m^2
12) 1,3-Dichloropropen (65%) + chloropicrin (35%) (27 ml/m^2)
13) 1,3-Dichloropropen (11.2 ml/m^2)
14) Compost (5 kg/m^2)

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last September, using machinery. It was carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the instalment underground pipeline. (We didn't stablish tests and applied Methyl bromide in all the land). Afterwards the beds were marked, arised and flattened. And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in October 8th, 1999. First we marked the block margins using stakes, afterwards, we drew lines using lame in order to defin the four blocks. In a piece of land with 56 beds; 50 M lenght, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 14 experimental plots with 4 beds, which we applied next randomized treatments.

1). Absolute control. In this experimental unit consist on 4 rows, 10 M. lenght, and we didn't realized any fungicide or organic matter application on the soil. The soil remained covered with plastic until the crop cycle finished.

2). Methyl Bromide 80/20 (15 gr/m^2). In the soil in the 4 rows in this experimental unit it was injected 15 gr M^2 (80% methil bromide and 20% chloropicrin) M^2. The application was carried out using a John Deere tractor. The soil will remain covered with plastic until the crop cycle finish.

3). Methyl Bromide 80/20 (40 gr/m2). It was applied 40 grs M^2 in the four rows (80% methyl bromide and 20% cholopicrin). The application was aproximattely 30 cm depth. The soil remained covered with plastic until the crop cycle finish.

4). Solarization. The four rows were padded or was covered with transparent plastic until the crop finish.

5). Hen manure was incorporated to the soil with the solarization. It was distributed on the soil, in that 10 mts. four rows 200 kgs hens manure, aproximattely 5 kgs per M^2. It was incorpored by manual labour using hoes and the rows were covered with transparent plastic.

6). Cow Manure was incorporated to the soil with the solarization. It was distributed 200 kg. Cow manure, aproximattely 5 kg. Per M^2. It was incorpored by manual labour using hoes, and the rows were covered with transparent plastic.

7). Green cabbage incorporated on the soil with the solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it was distributed 5

kg per M^2. It was incorporated by manual labour using hoes, after that, the rows were covered with transparent plastic.

8). Metham-sodium (N, methyl ditiocarbamato sodium) with solarization. Using drip irrigation it was applied aproximattely 25 ml/m^2 metham sodium. Before the application the rows were covered with transparent plastic.

9). Metham-sodium. In this four furrows it was applied 50 ml/m^2 metham sodium. After the aplication the furrows were covered in black/silver plastic.

10). Chloropicrin. On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 22 days.

11). Dazomet (tetrahidro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona). On this furrows soil we distributed by manual labour 40 gr/m^2 dazomet: it was incorporated using hoes, after that, we applied water by sprinkler irrigation during 3 hrs. Finally, it was covered in black/silver plastic.

12). 1,3-dichloropopreno + chloropicrin. These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product, using the same equipment used to apply the chloropicrin and the furrows were covered in black/silver plastic until the crop cycle finish.

13). 1,3-dichloropropen. This furrows soil was treated using 11.2 ml/m^2 1,3-dichloropropen. This application was made using the equipment thereinafter. The furrows were covered in black/silver plastic until the crop cycle finish.

14). Compost incorpored to the soil with solarization. Here we dispersed compost (200 kg) compound by fish organic wastes, some meals, paper and weeds, approximately 5 kg/m^2. It was incorpored by mean of manual labor, using hoes and the furrows were covered in transparent plastic.

Before the beds were covered with the organic treatments, dazomet and metham sodium were applied using sprinkling irrigation in order to damp the organics and descend the chemical products. The applications was carried out in damp soil.

Planting

Planting was carried out with exported seedlings from California, United States, and it was carried out in November 11th, put in a seedling on the soil, through holes in plastic each 40 cm.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTION.

During October, 2000, it was established the second test of project "Alternatives to the use of Methyl Bromide in the cultivation of **strawberry** (*Fragaria* spp.)", we started some tests in "Don Juanito" Ranch, San Quintin, Baja California, Mexico, which consisted in the aplication of different treatments on soil, in order to analyze the control about soil microorganisms and in crops development, comparing Methyl bromide. We apply this substance in alluvial arenaceous land, with region characteristics (flora and fauna) half-dessert. Agricultural activities are based in the drip irrigation, using groundwater table.

Treatments: Based on before obtained results during last season 1999-2000 we selected 8 (eight) treatments.

The applied treatments were:

1) Chloropicrin (33 ml/m^2)
2) 1,3-Dichloropropen (65%) + chloropicrin (35%) (27 ml/m^2)
3) Methyl Bromide 40 gr/m^2, 80/20
4) Metham Sodium (50 ml/m^2)
5) Control (no treatment);
6) Dazomet (tetrahidro-3-5 dimetil-2H1.3.5-tiazidin-s tiona) (40 gr/m^2
7) Commercial Methyl bromide (total)
8) Testigo.

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last September, using machinery. It was carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the instalment underground pipeline. (We didn't stablish tests and applied Methyl bromide in all the land). Afterwards the beds were marked, arised and flattened.

And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in September 28th, 2000. First we marked the block margins using stakes, afterwards, we drew lines using lame in order to defin the four blocks. In a piece of land with 28 beds; 98 M lenght, inside the enterprise commercial land. It was traced four blocks 20 m each; we selected 7 experimental plots with 4 beds, which we applied next randomized treatments.

1). Chloropicrin. On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 22 days.

2). 1,3-dichloropopreno + chloropicrin. These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product, using the same equipment used to apply the chloropicrin and the furrows were covered in black/silver plastic until the crop cycle finish.

3). Methyl Bromide 80/20 (40 gr/m2). It was applied 40 grs M^2 in the four rows (80% methyl bromide and 20% cholopicrin). The application was aproximattely 30 cm depth. The soil remained covered with plastic until the crop cycle finish.

4). Metham-sodium. In this four furrows it was applied 50 ml/m^2 metham sodium. After the aplication the furrows were covered in black/silver plastic.

5). Absolute control. In this experimental unit consist on 4 rows, 10 M. lenght, and we didn't realized any fungicide or organic matter application on the soil. The soil remained covered with plastic until the crop cycle finished.

6). Dazomet (tetrahidro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona). On this furrows soil we distributed by manual labour 40 gr/m^2 dazomet: it was incorporated using hoes, after that, we applied water by sprinkler irrigation during 3 hrs. Finally, it was covered in black/silver plastic.

7). Methyl Bromide 80/20 (80% methyl bromide and 20% cholopicrin). The application was aproximattely 30 cm depth. The soil remained covered with plastic until the crop cycle finish. Commercial application.

Before the beds were covered with the organic treatments, dazomet and metham sodium were applied using sprinkling irrigation in order to damp the organics and descend the chemical products. The applications was carried out in damp soil.

Planting

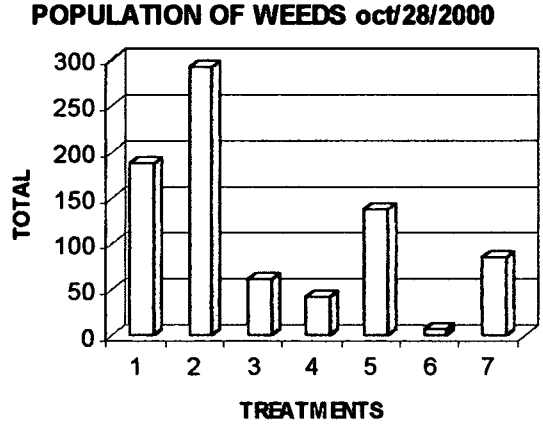
Planting was carried out with exported seedlings from California, United States, and it was carried out in November 11th, put in a seedling on the soil, through holes in plastic each 40 cm.

WEEDS.

Site: Rancho "Don Juanito", col. Vicente Guerrero, San Quintín, B.C.
Crop: Strawberry.
Beginning of Experiment: 29/sept/2000.
Evaluation date: 28/oct/2000.
Evaluation parameter: Population of Weeds.

28/OCT./2000

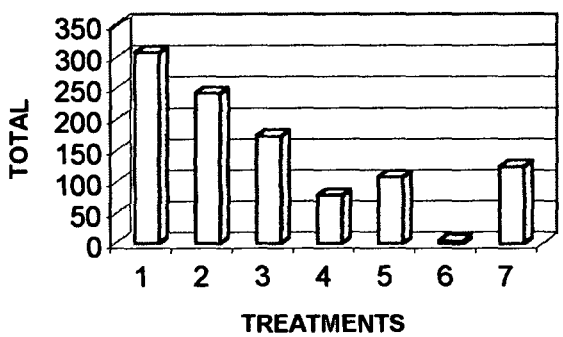
TREATMENTS	BLOCKS				
	I	II	III	IV	Total
1. Chloropicrin	43	20	82	43	188
2. Dichloro+Chloropicrin	41	207	31	15	294
3. Methyl bro. Sideline	1	8	29	23	61
4. Metam-sodium 50	8	10	7	17	42
5. Control	38	32	26	42	138
6. Dazomet	1	1	3	1	6
7. Methyl Bro. Commer.	16	24	29	17	86



Site: Rancho "Don Juanito", col. Vicente Guerrero, San Quintín, B.C.
Crop: Strawberry.
Beginning of Experiment: 29/sept/2000.
Evaluation date: 28/oct/2000.
Evaluation parameter: Population of Weeds.

09/nov./2000	BLOCKS				
TREATMENTS	I	II	III	IV	Total
1. Chloropicrin	68	54	97	87	306
2. Dichloro+Chloropicrin	79	108	41	13	241
3. Methyl bro. Sideline	38	46	44	44	172
4. Metam-sodium 50	20	20	17	20	77
5. Control	0	42	32	32	106
6. Dazomet	0	3	0	1	4
7. Methyl Bro. Commer.	24	20	29	50	123

POPULATION OF WEEDS nov./09/2000

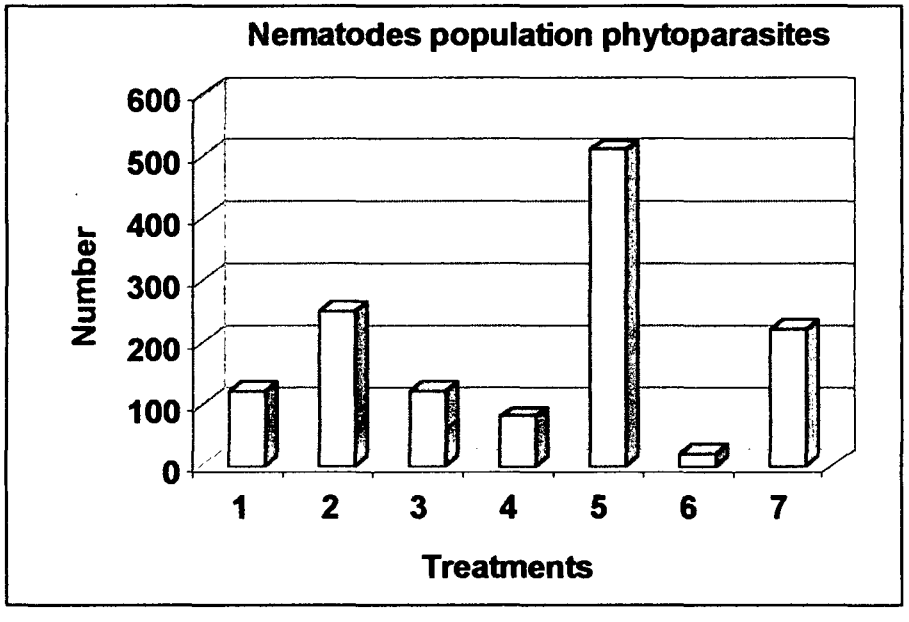


NEMATODES.

Site: Rancho Don Juanito, Col. Vicente Guerrero, B.C.S.
Crop: Strawberry
Measurement parameter: nematodes population
Planting: October 26th, 2000 **evaluation:** December, 2000

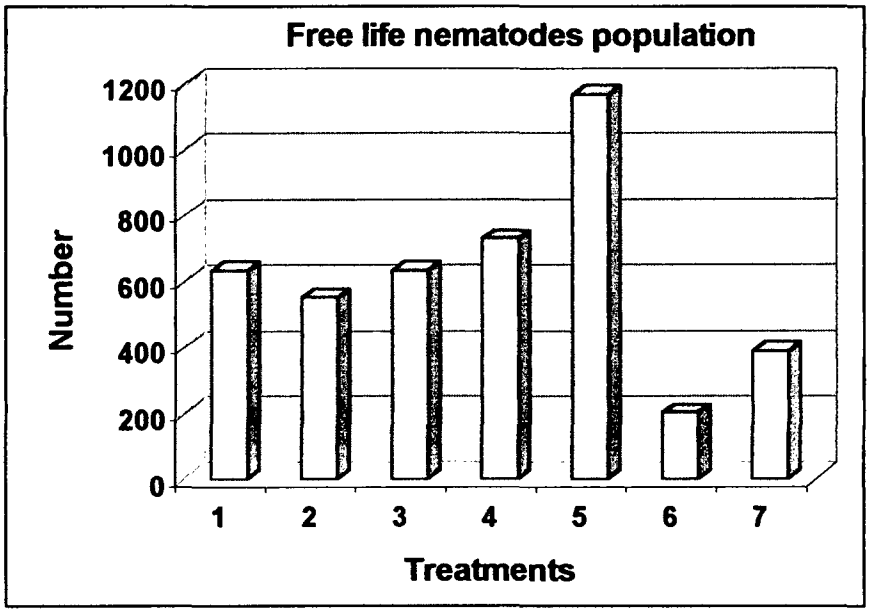
Phytoparasites Nematodes

TREATMENT	BLOCK				AVERAGE
	I	II	III	IV	
1. Chloropicrin	180	60			120
2. Dichlorop.+Chloropic.	260	240			250
3. Methyl bromide	140	100			120
4. Metam sodium 50	80	80			80
5. Control	520	500			510
6. Dazomet	0	40			20
7. Methyl bromide C.	220	220			220



Free live nematodes

TREATMENT	BLOCK				
	I	II	III	1V	AVERAGE
1. Chloropicrin	1160	104			632
2. Dichlorop.+Chloropic.	100	1000			550
3. Methyl bromide	1140	124			632
4. Metam sodium 50	520	940			730
5. Control	1160	1180			1170
6. Dazomet	280	120			200
7. Methyl bromide C.	240	540			390



YIELD.

STATISTIC ANALYSIS OF STRAWBERRY OBTAINED RESULTS IN EXPERIMENT WHICH TOOK PLACE IN "DON JUANITO" CAMP, LA GARROCHA, SAN QUINTÍN BAJA CALIFORNIA, MÉXICO. CYCLE 2000-2001

Crop: Strawberry
Measurement parameter: Yield-total weight **(pounds)** of strawberry. Domestic and Export market.

FEBRUARY

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	17.05	15.55	14.95	11.65	59.20	14.80
2. Dichloroprop+chloropicrin	15.55	14.10	13.75	14.90	58.30	14.58
3. Methyl Bro on sideline	15.60	14.45	15.30	15.25	60.60	15.15
4. Metam sodium	14.90	13.80	14.90	14.15	57.75	14.44
5. Control	13.95	14.70	13.95	13.35	55.95	13.99
6. Dazomet	11.85	12.45	9.40	11.95	45.65	11.41
7. Methyl Bro-total	14.05	14.85	13.50	15.90	58.30	14.58

MARCH

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	30.05	33.10	30.10	23.15	116.40	29.10
2. Dichloroprop+chloropicrin	31.95	30.80	30.15	29.17	122.07	30.52
3. Methyl Bro on sideline	31.05	24.60	28.90	24.00	108.55	27.14
4. Metam sodium	27.35	29.10	33.20	30.80	120.45	30.11
5. Control	32.10	28.75	30.03	31.85	122.73	30.68
6. Dazomet	19.40	20.10	12.45	21.10	73.05	18.26
7. Methyl Bro-total	30.85	33.90	30.85	31.73	127.33	31.83

APRIL

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	39.71	49.05	43.65	36.39	168.80	42.20
2. Dichloroprop+chloropicrin	45.40	41.75	42.20	45.70	175.05	43.76
3. Methyl Bro on sideline	46.40	40.50	43.41	38.85	169.16	42.29
4. Metam sodium	42.80	45.15	47.20	45.80	180.95	45.24
5. Control	46.65	43.80	42.90	46.95	180.30	45.08
6. Dazomet	33.03	31.15	14.15	29.35	107.68	26.92
7. Methyl Bro-total	48.66	45.35	48.25	44.40	186.66	46.67

SUM OF FEBRUARY, MARCH AND APRIL

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	86.81	97.70	88.70	71.19	344.40	86.10
2. Dichloroprop+chloropicrin	92.90	86.65	86.10	89.77	355.42	88.86
3. Methyl Bro on sideline	93.05	79.55	87.61	78.10	338.31	84.58
4. Metam sodium	85.05	88.05	95.30	90.75	359.15	89.79
5. Control	92.70	87.25	86.88	92.15	358.98	89.75
6. Dazomet	64.28	63.70	36.00	62.40	226.38	56.60
7. Methyl Bro-total	93.56	94.10	92.60	92.03	372.29	93.07

ANALYSIS OF VARIANCE

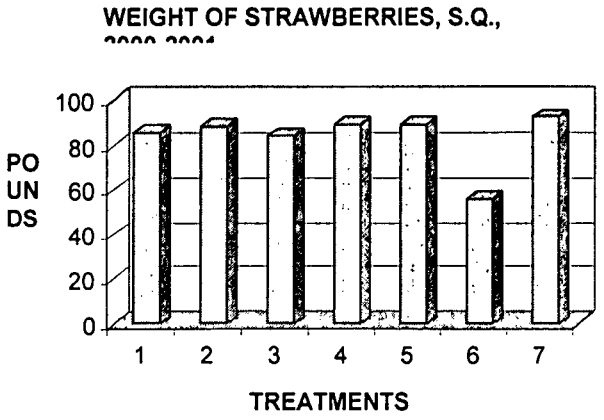
FV	GL	SC	CM	F	P F
Treatments	6	3712.28125	618.713562	10.2427	0.000
Repetitions	3	120.93750	40.312500	0.6739	0.582
Error	18	1076.78125	59.821182		
Total	27	4910.00000			

C.V. = 9.20%

TABLE OF AVERAGES

TREATMENTS	AVERAGE	
7. Methyl Bromide-total	93.0725	A
4. Metam sodium	89.7875	A
5. Control	89.7450	A
2. Dichloropro+chloropicrin	88.8550	A
1. Chloropicrin	86.1000	A
3. Methil Bromide on sideline	84.5775	A
6. Dazomet	56.5950	B

Level of significance = 0.05
Tukey = 18.0599
Values of tables : q (0.05) = 4.67



YIELD OF STRAWBERRIES. DOMESTIC AND EXPORT MARKET, agricultural cycle 2000-2001.

Crop: Strawberry
Measurement parameter: Yield-total number of strawberries. Domestic and export market.

FEBRUARY

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	138	137	140	103	518	129.50
2. Dichloroprop+chloropicrin	128	136	118	122	504	126.00
3. Methyl Bro on sideline	141	117	113	124	495	123.75
4. Metam sodium	155	130	142	117	544	136.00
5. Control	130	149	124	126	529	132.25
6. Dazomet	81	104	25	85	295	73.75
7. Methyl Bro-total	121	141	116	151	529	132.25

MARCH

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	277.00	264.00	261.00	164.00	966	241.50
2. Dichloroprop+chloropicrin	282.00	265.00	296.00	225.00	1068	267.00
3. Methyl Bro on sideline	270.00	156.00	232.00	160.00	818	204.50
4. Metam sodium	252.00	257.00	307.00	277.00	1093	273.25
5. Control	308.00	264.00	280.00	304.00	1156	289.00
6. Dazomet	113.00	139.00	13.00	152.00	417	104.25
7. Methyl Bro-total	276.00	329.00	283.14	276.00	1164	291.04

APRIL

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	714.00	780.00	705.00	557.00	2756	689.00
2. Dichloroprop+chloropicrin	745.00	687.00	743.00	741.00	2916	729.00
3. Methyl Bro on sideline	780.00	656.00	725.00	625.00	2786	696.50
4. Metam sodium	681.00	710.00	827.00	770.00	2988	747.00
5. Control	810.00	722.00	717.00	805.00	3054	763.50
6. Dazomet	474.00	433.00	45.00	386.00	1338	334.50
7. Methyl Bro-total	886.00	746.00	822.00	727.00	3181	795.25

SUM OF FEBRUARY, MARCH AND APRIL

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	1129	1181	1106	824	4240	1060.00
2. Dichloroprop+chloropicrin	1155	1088	1157	1088	4488	1122.00
3. Methyl Bro on sideline	1191	929	1070	909	4099	1024.75
4. Metam sodium	1088	1097	1276	1164	4625	1156.25
5. Control	1248	1135	1121	1235	4739	1184.75
6. Dazomet	668	676	83	623	2050	512.50
7. Methyl Bro-total	1283	1216	1221	1154	4874	1218.54

ANALYSIS OF VARIANCE

FV	GL	SC	CM	F	P F
Treatments	6	1403330.000000	233888.328125	11.2277	0.000
Repetitions	3	52976.000000	17658.666016	0.8477	0.512
Error	18	374964.000000	20831.333984		
Total	27	1831270.000000			

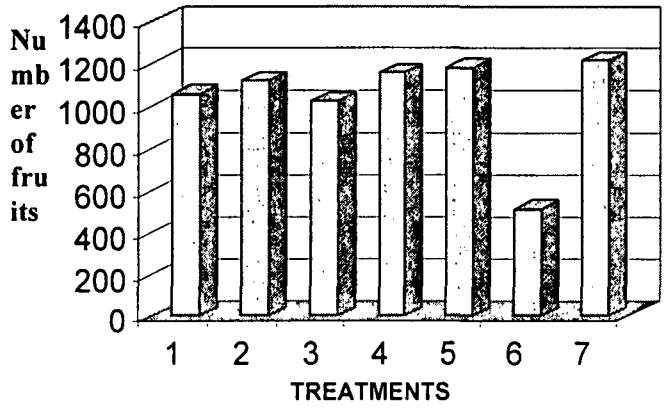
C.V. = 13.89%

TABLE OF AVERAGE

TREATMENTS	AVERAGE	
7. Methyl Bromide-total	1218.5000	A
5. Control	1184.7500	A
4. Metam-sodium	1154.2500	A
2. Dichloropro+chloropicrin	1118.0000	A
1. Chloropicrin	1060.0000	A
3. Methyl Bromide on sideline	1024.7500	A
6. Dazomet	512.5000	B

Level of significance = 0.05
Tukey = 337.0121 Values of tables : q (0.05) = 4.67.

TOTAL OF STRAWBERRIES



Crop: Strawberry
Measurement parameter: Yield-Number of fruits-
FIRST QUALITY. EXPORT

FEBRUARY

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	84	84	83	57	308	77.00
2. Dichloroprop+chloropicrin	80	59	56	77	272	68.00
3. Methyl Bro on sideline	93	83	79	81	336	84.00
4. Metam sodium	87	73	103	78	341	85.25
5. Control	69	88	70	63	290	72.50
6. Dazomet	35	53	4	35	127	31.75
7. Methyl Bro-total	81	90	55	102	328	82.00

MARCH

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	170	185	169	102	626	156.50
2. Dichloroprop+chloropicrin	188	171	185	140	684	171.00
3. Methyl Bro on sideline	176	106	160	99	541	135.25
4. Metam sodium	149	177	222	172	720	180.00
5. Control	178	167	179	201	725	181.25
6. Dazomet	70	72	6	83	231	57.75
7. Methyl Bro-total	187	234	195	191	807	201.75

APRIL

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	414	471	438	352	1,675	418.75
2. Dichloroprop+chloropicrin	433	410	439	451	1,733	433.25
3. Methyl Bro on sideline	439	372	414	389	1,614	403.50
4. Metam sodium	448	429	451	472	1,800	450.00
5. Control	520	425	458	472	1,875	468.75
6. Dazomet	253	256	28	242	779	194.75
7. Methyl Bro-total	523	472	462	396	1,853	463.25

SUM OF FEBRUARY, MARCH AND APRIL

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	668	740	690	511	2609	652.25
2. Dichloroprop+chloropicrin	701	640	680	668	2689	672.25
3. Methyl Bro on sideline	708	561	653	569	2491	622.75
4. Metam sodium	684	679	776	722	2861	715.25
5. Control	767	680	707	736	2890	722.50
6. Dazomet	358	381	38	360	1137	284.25
7. Methyl Bro-total	791	796	712	689	2988	747.00

ANÁLYSIS OF VARIANCE

FV	GL	SC	CM	F	P F
Treatments	6	605532.000000	100922.000000	14.0965	0.000
Repetitions	3	17624.000000	5874.666504	0.8206	0.502
Error	18	128869.000000	7159.388672		
Total	27	752025.000000			

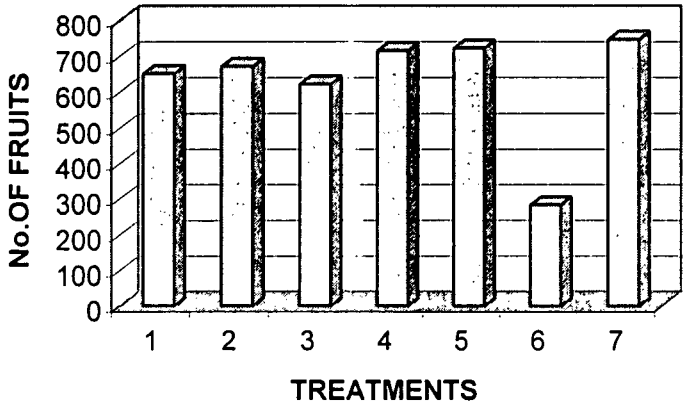
C.V. = 13.41%

TABLE OF RECORDS

TREATMENTS	AVERAGE	
7. Methyl Bromide-total	747.0000	A
5. Control	722.5000	A
4. Metam-sodium	715.2500	A
2. Dichloropro+chloropicrin	672.2500	A
1. Chloropicrin	652.2500	A
3. Methyl Bromide on sideline	622.7500	A
6. Dazomet	284.2500	B

Level of significance = 0.05
Tukey = 197.5718
Values of tables : q (0.05) = 4.67.

STRAWBERRIES FOR EXPORT



Crop: Strawberry
Measurement parameter: Yield-Number of fruits **SECOND QUALITY-DOMESTIC.**

FEBRUARY

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	54	54	57	47	212	53.00
2. Dichloroprop+chloropicrin	50	77	62	45	234	58.50
3. Methyl Bro on sideline	50	37	34	43	164	41.00
4. Metam sodium	69	57	40	39	205	51.25
5. Control	61	61	54	63	239	59.75
6. Dazomet	46	52	21	50	169	42.25
7. Methyl Bro-total	40	53	61	52	206	51.50

MARCH

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	107	79	92	62	340	85.00
2. Dichloroprop+chloropicrin	94	94	111	85	384	96.00
3. Methyl Bro on sideline	94	50	72	61	277	69.25
4. Metam sodium	103	80	85	105	373	93.25
5. Control	130	97	101	103	431	107.75
6. Dazomet	43	67	7	69	186	46.50
7. Methyl Bro-total	89	95	88	85	357	89.29

APRIL

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	268	273	238	177	956	239.00
2. Dichloroprop+chloropicrin	303	292	297	273	1,165	291.25
3. Methyl Bro on sideline	349	259	316	248	1,172	293.00
4. Metam sodium	243	305	343	299	1,190	297.50
5. Control	281	280	286	330	1,177	294.25
6. Dazomet	215	193	51	143	602	150.50
7. Methyl Bro-total	347	268	265	308	1,188	297.00

SUM OF FEBRUARY, MARCH AND APRIL

TREATMENTS	R1	R2	R3	R4	TOTAL	AVERAGE
1. Chloropicrin	429	406	387	286	1508	377.00
2. Dichloroprop+chloropicrin	447	463	470	403	1783	445.75
3. Methyl Bro on sideline	493	346	422	352	1613	403.25
4. Metam sodium	415	442	468	443	1768	442.00
5. Control	472	438	441	496	1847	461.75
6. Dazomet	304	312	79	262	957	239.25
7. Methyl Bro-total	476	416	414	445	1751	437.79

ANALYSIS OF VARIANCE

FV	GL	SC	CM	F	P F
Treatments	6	141875.000000	23645.833984	7.2125	0.001
Repetitions	3	11853.500000	3951.166748	1.2052	0.336
Error	18	59012.500000	3278.472168		
Total	27	212741.000000			

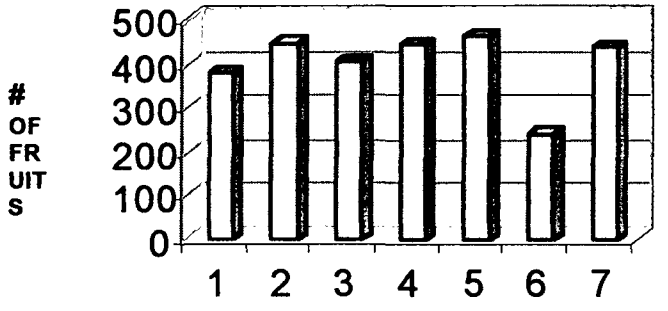
C.V. = 14.28%

TABLE OF RECORDS

TREATMENTS	AVERAGE	
7. Methyl Bromide-total	461.7500	A
5. Control	445.7500	A
4. Metam-sodium	442.0000	A
2. Dichloropro+chloropicrin	437.7500	A
1. Chloropicrin	403.2500	A
3. Methyl Bromide on sideline	377.2500	A
6. Dazomet	239.2500	B

Level of significance = 0.05
Tukey = 133.6973 Values of tables : q (0.05) = 4.67.

FRUITS OF SECOND QUALITY - DOMESTIC



TOTAL YIELD . SECOND QUALITY. DOMESTIC MARKET. CYCLE 2000-2001

GENERAL CONCLUSION: Based on obtained results in statistic analysis about number and weight of strawberries, domestic and export market which were harvested each treatment. We could observe that there is not significant differences among next treatments: 7 methyl bromide-total; 2 dichloroprop+chloropicrin; 5 control; 4 metam sodium; 1 chloropicrin; 3 Methyl Bromide on sideline. The worst treatment was 6; dazomet.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMÍA - UAS

INTRODUCTION.

During September 2001, it was established the third test of project "Alternatives to the use of Methyl Bromide in the cultivation of **strawberry** (*Fragaria* spp.)" we started some tests in "Don Juanito" Ranch, San Quintin, Baja California, Mexico, which consisted in the application of different treatments on soil, in order to analyze the control about soil microorganisms and in crops development, comparing Methyl bromide. We apply this substance in alluvial arenaceous land, with region characteristics (flora and fauna) half-dessert. Agricultural activities are based in the drip irrigation, using groundwater table.

Treatments: Based on before obtained results during last season 2000-2001 we selected 5 (five) treatments.

The applied treatments were:

1) Chloropicrin (33 ml/m^2)
2) 1,3-Dichloropropen (65%) + chloropicrin (35%) (27 ml/m^2)
3) Methyl Bromide 40 gr/m^2, 80/20
4) Metham Sodium (50 ml/m^2)
5) Control (no treatment);

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last September, using machinery. It was carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the installment underground pipeline. (We didn't establish tests and applied Methyl bromide in all the land). Afterwards the beds were marked, arised and flattened.

And finally we put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in September 20th, 2001. First we marked the block margins using stakes, afterwards, we drew lines using lame in order to define the four blocks. In a piece of land with 20 beds; 90 M length, inside the enterprise commercial land. It was traced four blocks 20 m each; we selected 5 experimental plots with 4 beds, which we applied next randomized treatments.

1). Chloropicrin. On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 22 days.

2). 1,3-dichloropopreno + chloropicrin. These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product, using the same equipment used to apply the chloropicrin and the furrows were covered in black/silver plastic until the crop cycle finish.

3). Methyl Bromide 80/20 (40 gr/m2). It was applied 40 grs M^2 in the four rows (80% methyl bromide and 20% chloropicrin). The application was approximately 30 cm depth. The soil remained covered with plastic until the crop cycle finish.

4). Metham-sodium. In this four furrows it was applied 50 ml/m^2 metham sodium. After the application the furrows were covered in black/silver plastic.

5). Absolute control. In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application on the soil. The soil remained covered with plastic until the crop cycle finished.

Planting

Planting was carried out with exported seedlings from California, United States, and it was carried out in October 22$^{nd.}$ 2001, put in a seedling on the soil, through holes in plastic each 40 cm.

YIELD.

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA
SITE: Rancho "Don juanito" Col. Vicente Guerrero (campo la Garrocha), B.C.
CROP: Strawberries
PLANTING DATE: October 06th, 2001
EVALUATION PARAMETER: Number of exportable strawberries/treatment on 4 m. lineals
EVALUATION: January 02th, to May 31th, 2002

JANUARY

TREATMENTS	NUMBER OF STRAWBERRY (FIRST EXPORT)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	59	57	61	65	242
2. Dichloropropen+chloropicrin	46	51	53	68	218
3. Methyl Bromide 40	62	76	47	55	240
4. Metam sodium 50	51	59	47	70	227
5. Absolute control	58	59	59	46	222
6. Total Methyl Bromide	51	68	56	77	252

FEBRUARY

TREATMENTS	NUMBER OF STRAWBERRY (FIRST EXPORT)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	111	89	123	86	409
2. Dichloropropen+chloropicrin	71	78	74	96	319
3. Methyl Bromide 40	47	50	62	41	200
4. Metam sodium 50	82	103	85	84	354
5. Absolute control	82	123	83	95	383
6. Total Methyl Bromide	92	79	85	113	369

MARCH

TREATMENTS	NUMBER OF STRAWBERRY (FIRST EXPORT)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	282	274	297	361	1214
2. Dichloropropen+chloropicrin	272	268	305	378	1223
3. Methyl Bromide 40	285	256	262	243	1046
4. Metam sodium 50	200	255	269	319	1043
5. Absolute control	262	263	264	240	1029
6. Total Methyl Bromide	339	272	309	281	1201

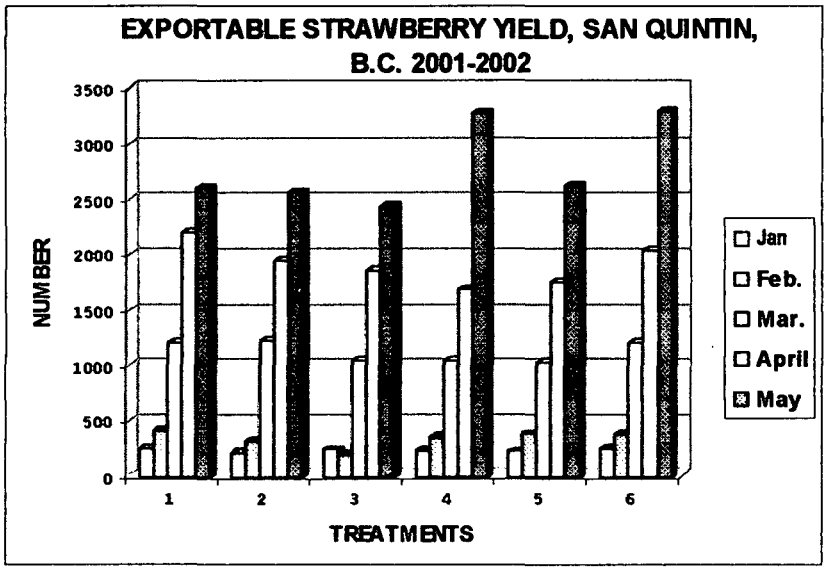
APRIL

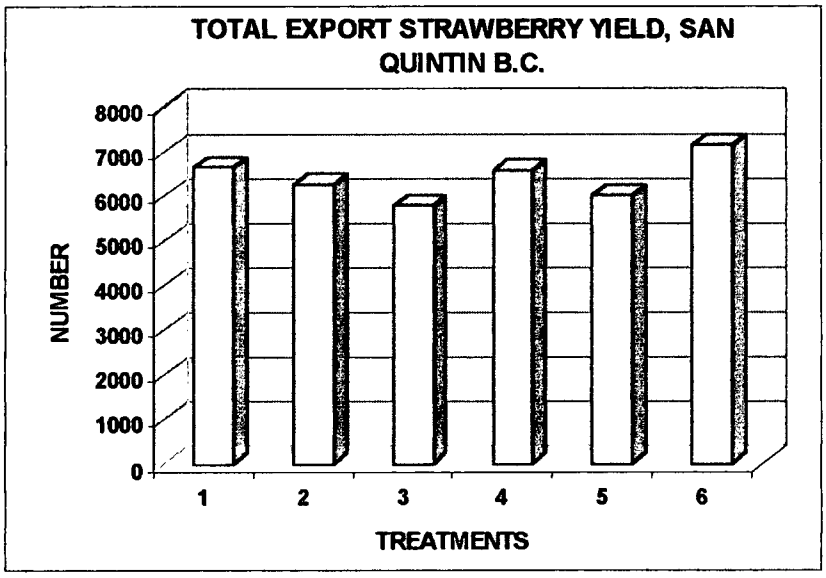
TREATMENTS	NUMBER OF STRAWBERRY (FIRST EXPORT)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	566	517	500	613	2196
2. Dichloropropen+chloropicrin	415	496	503	535	1949
3. Methyl Bromide 40	493	439	446	488	1866
4. Metam sodium 50	327	395	493	471	1686
5. Absolute control	426	449	464	410	1749
6. Total Methyl Bromide	568	518	434	526	2046

MAY

TREATMENTS	NUMBER OF STRAWBERRY (FIRST EXPORT)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	807	626	583	592	2608
2. Dichloropropen+chloropicrin	710	606	641	602	2559
3. Methyl Bromide 40	593	614	656	568	2431
4. Metam sodium 50	801	796	934	746	3277
5. Absolute control	778	497	693	655	2623
6. Total Methyl Bromide	869	736	937	742	3284

TREATMENTS	TOTAL OF EXPORTABLE STRAWBERRY PER TREATMENT ON 16 M. LINEAL						
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	TOTAL	AVERAGE
1. Chloropicrin	242	409	1214	2196	2608	6669	1334
2. Dichloropro+chloropicrin	218	319	1223	1949	2559	6268	1254
3. Methyl Bromide 40	240	200	1046	1866	2431	5783	1157
4. Metam sodium 50	227	354	1043	1686	3277	6587	1317
5. Absolute control	222	383	1029	1749	2623	6006	1201
6. Total Methyl Bromide	252	369	1201	2046	3284	7152	1430





FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

SITE: Rancho "Don juanito" Col. Vicente Guerrero (campo la Garrocha), B.C.

CROP: Strawberries

PLANTING DATE: October 6th, 2001

EVALUATION PARAMETER: Number of domestic strawberries/treatment on 4 m. lineal

EVALUATION: January 2th, to May 31th, 2002

JANUARY

TREATMENTS	NUMBER OF STRAWBERRY (DOMESTIC)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	10	13	13	3	39
2. Dichloropropen+chloropicrin	20	3	11	13	47
3. Methyl Bromide 40	8	13	9	7	37
4. Metam sodium 50	18	7	12	9	46
5. Absolute control	11	9	11	9	40
6. Total Methyl Bromide	19	4	19	4	46

FEBRUARY

TREATMENTS	NUMBER OF STRAWBERRY (DOMESTIC)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	15	32	23	30	100
2. Dichloropropen+chloropicrin	20	20	27	19	86
3. Methyl Bromide 40	25	30	13	7	75
4. Metam sodium 50	31	26	30	21	108
5. Absolute control	23	17	19	16	75
6. Total Methyl Bromide	18	18	33	26	95

MARCH

REATMENTS	NUMBER OF STRAWBERRY (DOMESTIC)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	90	126	106	95	417
2. Dichloropropen+chloropicrin	126	103	114	124	467
3. Methyl Bromide 40	110	93	104	94	401
4. Metam sodium 50	78	103	102	101	384
5. Absolute control	87	90	66	49	292
6. Total Methyl Bromide	89	106	64	104	363

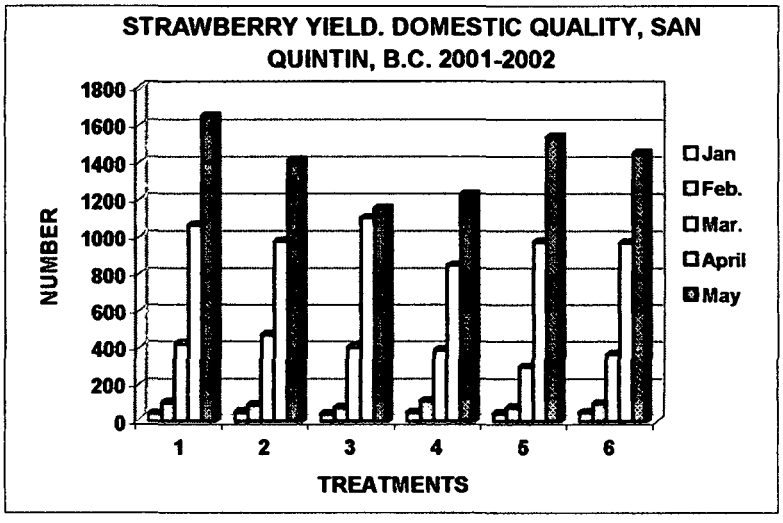
APRIL

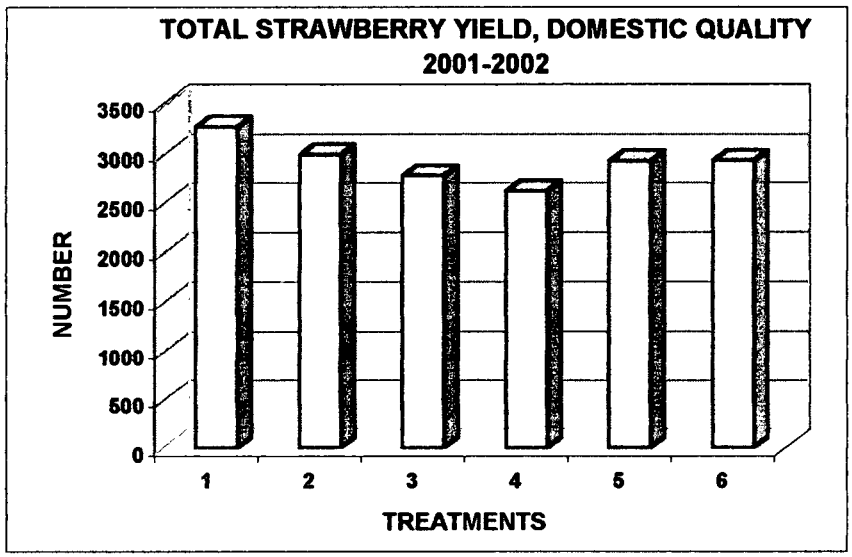
TREATMENTS	NUMBER OF STRAWBERRY (DOMESTIC)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	226	240	285	311	1062
2. Dichloropropen+chloropicrin	163	231	267	312	973
3. Methyl Bromide 40	270	229	269	331	1099
4. Metam sodium 50	197	180	232	237	846
5. Absolute control	230	233	250	259	972
6. Total Methyl Bromide	234	278	208	248	968

MAY

TREATMENTS	NUMBER OF STRAWBERRY (DOMESTIC)				
	R-I	R-II	R-III	R-IV	TOTAL
1. Chloropicrin	338	328	386	596	1648
2. Dichloropropen+chloropicrin	311	275	391	432	1409
3. Methyl Bromide 40	311	255	253	334	1153
4. Metam sodium 50	317	357	263	290	1227
5. Absolute control	316	426	407	387	1536
6. Total Methyl Bromide	362	298	429	358	1447

TREATMENTS	DOMESTIC STRAWBERRIES PER TREATMENT ON 16 M. LINEAL						
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	TOTAL	AVERAGE
1. Chloropicrin	39	100	417	1062	1648	3266	653
2. Dichloropro+chloropicrin	47	86	467	973	1409	2982	596
3. Methyl Bromide 40	37	75	401	1099	1153	2765	553
4. Metam sodium 50	46	108	384	846	1227	2611	522
5. Absolute control	40	75	292	972	1536	2915	583
6. Total Methyl Bromide	46	95	363	968	1447	2919	584





Final Conclusion. From the treatments proven in both places Chloropicrin and dichloropropen + Chloropicrin, turned out to be similar to the methyl Bromide, reason why they are an alternative to the use of methyl bromide for the control of pathogens of the ground in Mexico, nevertheless biofumigation could be a good treatment of control that could adopt the lower producers

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

FINAL PROJECT REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP: Strawberry (*Fragaria* spp), variety being used by the grower, and harvest will be fruits.

PROJECT AREAS: Experimental units will be located in Km. 52.5, La Barca Road, San Miguel El Grande,

Arandas, Jalisco, Mexico.

Executive Manager: Sr. José Carlos González Fonseca

Field Technician: Sr. David Hernández

Tels: (01 - 378) 4-58-00.

Fax: (378) 4-65-00.

Culiacan, Sinaloa, March, 2004.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

FINAL PROJECT REPORT. Demonstration Project of Alternatives to the use of Methyl Bromide in the cultivation of **Strawberry**, (*Fragaria spp*). The development in Arandas, Jalisco Mexico. In this field have been working MC. Francisco Javier Estrada Ramirez, coordinator in this project. And MC. Sostenes Montoya Angulo, agronomist who is implementing the tests. QFB. María de la Luz Acosta Pineda y MC. Carlos Morales Cazarez Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

INTRODUCTION.

Last June, 2001, in Arandas, Jalisco, Mexico, we started taking some tests. We apply different treatments in soil, in order to analyze the control about soil microorganisms and in crops development also, comparing Methyl bromide. We apply this substance in muddy type soil.

Treatments: We started the experiment in agricultural season 2001. we applied 9 (nine) treatments:

TREATMENTS OR ALTERNATIVES:

1.- Control (no treatment).
2.- 15 gr/m^2 of methyl bromide (75/25 or 80/20).
3.- 40 gr/m^2 of methyl bromide (75/25 or 80/20).
4.- Five kg of pineapple compost, incorporated into the soil, plus four weeks of solarization
5- Five kg of fresh broccoli residue (or other cruciferous plant) incorporated into soil, plus four weeks of solarization.
6.- 25 ml/m^2 of metam-sodium (N, methyl sodium ditiocarbamate) plus six weeks of solarization.
7.- 50 ml/m^2 of metam-sodium.
8.- 33 ml/m^2 of chloropicrin.
9.- 1,3-dichloropropene+chloropicrin,dose recommended by the manufacturer.

BODY OF THE REPORT

Land preparation.

The activities in cooperative farmer land started in last June, in Arandas, Jalisco, heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they made the installment underground pipeline. Afterwards the beds were marked, arised and flattened. The bed marks were marked 1.20 m between each one.

Experiment Design

The treatment designs were carried out in June, 2001. In a piece of land with 54 beds, 30 m length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 36 experimental plots with 3 beds, which we applied next randomized treatments:

1). **Absolute control.** In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application.

2). **Methyl Bromide 80/20**. In the four rows, It was injected 15 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

3). **Methyl Bromide 80/20**. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

4). **Five kg of pineapple compost** incorporated into the soil, plus four weeks of solarization

5). **Broccoli** incorporated on the soil and solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it were distributed 5 kg per M^2. It was incorporated by manual labour using hoes, after that, the rows were covered with transparent plastic.

6). **Metham-sodium.** In this four furrows it was applied 25 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

7). **Metham-sodium.** In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

8). **Chloropicrin.** On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 20 days.

9). **1,3-dichloropopren + chloropicrin.** These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this

product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

The treatments were applied on damp soil.

Evaluations will be taking place in the central furrow in each experimental unit.

Planting.

Strawberry plants were planed on no covered soil. Double furrow separated 35 cm each.

Crop Management

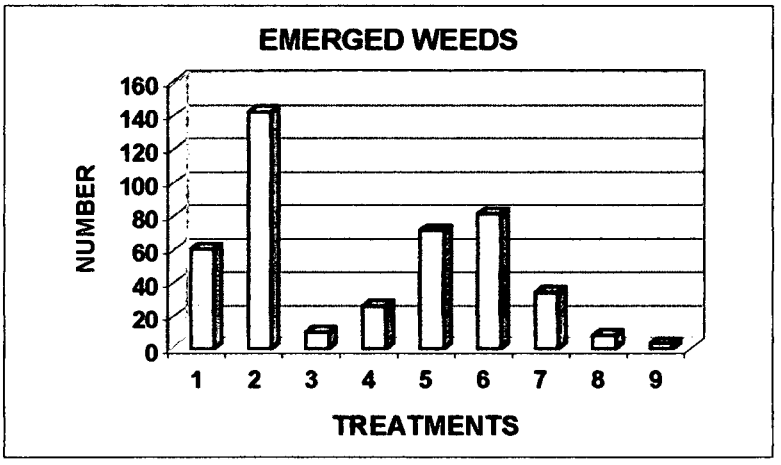
Irrigation and fertilization will take place using drip irrigation, and they are controlled directly by farm technician. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

RESULTS:

WEEDS

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA
PROJECT: ALTERNATIVES TO THE USE METHYL BROMIDE IN STRAWBERRIES
SITE: FRESAS ARANDAS, ARANDAS, JALISCO
SITE: FRESAS ARANDAS, ARANDAS, JALISCO
Evaluation parameter: Emergence of weeds
Evaluation date: September 25th, 2001

TREATMENTS	NUMBER AND TYPE OF WEEDS							
	Verdolaga	Zacate	Quelite	Enrredadera	Coquillo	Oxalis	Meloncillo	TOTAL
cabbage+solarization	5	6	5	0	43	0	1	60
Control	82	3	5	0	49	3	0	142
Methyl Bromide 40	1	0	0	0	5	2	2	10
Dichloro.+Chloropicrin	2	1	1	0	16	1	5	26
M. sodium+solarization	5	24	1	5	36	0	0	71
Pinneaple wastes	12	6	4	2	54	1	2	81
Metam sodium 50	7	14	4	0	3	1	5	34
Chloropicrin	0	1	0	0	7	0	0	8
Methyl Bromide 15	0	1	0	0	0	0	2	3

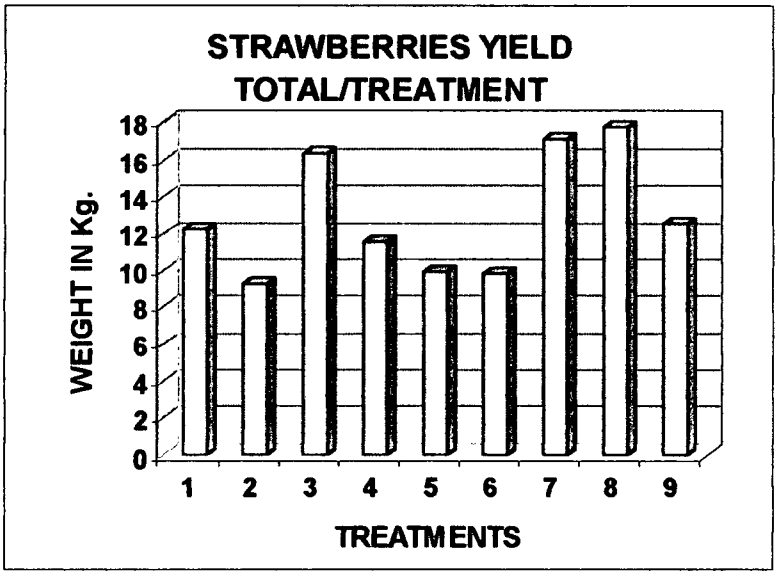


YIELD:

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

SITE: Strawberries Arandas S.A de C.V. Arandas, Jalisco.
Planting date: September 25th, 2001
Evaluation parameter: Yield of strawberries in Kgs, on 8 lineal meters/treatment
evaluation date: April 3rd, to June 22th, 2002

TREATMENTS	EVALUATION DATE									
	03-Abr	12-Abr	19-Abr	27-Abr	04-May	11-May	18-May	25-May	01-Jun	08-Jun
1.Cabbage+Solarization	3.1	1.6	0.9	0.7	0.9	1.3	0.6	0.8	0.9	1.4
2.Control	1.6	1.1	0.8	0.5	0.52	0.8	0.6	1.1	1.3	1
3.Methyl Bromide 40	3.3	2.3	0.9	0.8	1	1.5	1	1.6	2	2
4.Metam sodium+Solar.	3.7	1.6	0.75	0.6	0.5	0.9	0.7	1	0.9	0.9
5.Pinneaple+Solariz.	2.7	1.6	0.6	0.8	0.7	0.7	0.5	0.6	0.7	1
6.Metam sodium 50	2.2	1.4	0.6	0.6	0.7	0.8	0.4	0.7	1.2	1.2
7.Chloropicryn	3.1	2	1.2	0.8	1	1.6	1.1	2	2	2.3
8.Bromuro de metilo 15	3.3	2.1	1	0.5	1	1.5	1.4	2	2.7	2.3
9.Dichloro+Chlororop.	2.4	1.6	0.6	0.5	1	1.8	0.9	1	1.3	1.4



FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

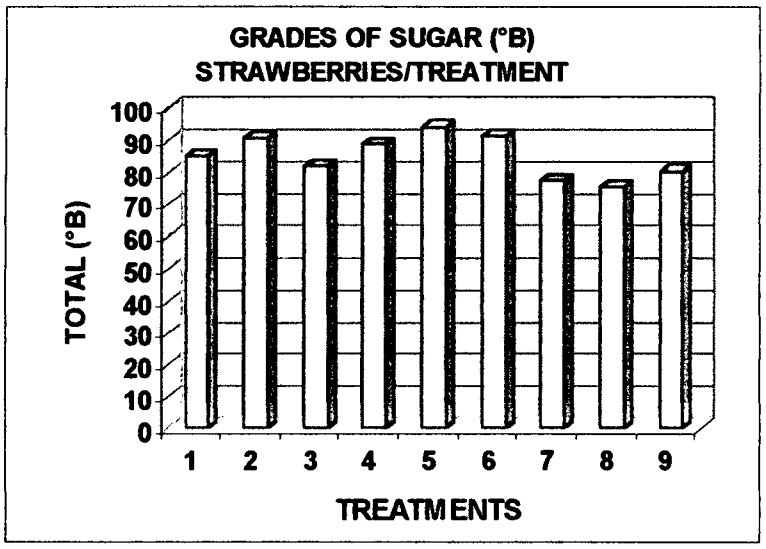
SITE: Strawberries Arandas S.A de C.V. Arandas, Jalisco.

Planting date: September 25th, 2001

Evaluation parameter: Evaluation in grades of sugar (°B) strawberries/treatment

Evaluation date: from april 3rd, to June 8th, 2002

TREATMENTS	EVALUATION DATE										
	03-Abr	12-Abr	19-Abr	27-Abr	04-May	11-May	18-May	25-May	01-Jun	08-Jun	TOTAL
1.Cabbage+Solarization	8	7.4	8	8.2	9.8	9	10.2	9	8.2	7.4	**85.2**
2.Control	8.4	8.3	10.8	8.4	9.8	9	10.2	9	8	9	**90.9**
3.Methyl Bromide 40	7.8	6.6	8.4	8.8	9.2	8	9	9.1	7.8	7.5	**82.2**
4.Metam sodium+Solar.	7.6	8.6	9.6	9.3	11	9	9	9.1	8.2	7.4	**88.8**
5.Pinneaple+Solariz.	8	8.4	10.4	9.7	10.6	9.8	10.4	10.4	8.2	8.6	**94.5**
6.Metam sodium 50	8	8.1	9.8	10.1	11.2	8.8	10.1	9	8	8.4	**91.5**
7.Chloropicryn	5.6	7.1	8	9	8.6	8.2	7.9	9.4	6.4	7.7	**77.9**
8.Bromuro de metilo 15	6.4	6	8.2	7.5	8.6	8.4	9	8.6	6.8	6.5	**76**
9.Dichloro+Chlororop.	7	7.4	8	8.6	9.6	8	9.2	7.4	7.7	7.6	**80.5**



Final conclusion. From the treatments proven Chloropicrin and dichloropropen + Chloropicrin, turned out to be similar to the methyl Bromide, reason why they are an alternative to the use of methyl bromide for the control of pathogens of the ground in Mexico, nevertheless biofumigation could be a good treatment of control that could adopt the lower producers

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

FINAL PROJECT REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP: Tobacco (*Nicotiana tabacum*) variety being used by the grower, and harvest will be seedlings.

PROJECT AREAS: Experimental units will be located in Nayarit:

Researcher Technician: Ing. José Ibarra Anaya,

Enterprise Address: 12 de Octubre #36,

Col. Landereñas, Xalisco,

Nayarit, Mexico. C.P. 63780,

Telephone number: (01)(32) 11-11-33, 11-11-34, Fax: (01)(32) 11-09-77

Culiacan, Sinaloa, March, 2004.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

FINAL PROJECT REPORT. Demonstration Project of Alternatives to the use of Methyl Bromide in the cultivation of **Tobacco**, (*Nicotiana Tabacum*). The development in Santiago Ixcuintla, Nayarit, Mexico. In this field have been working MC. Francisco Javier Estrada Ramirez, coordinator in this project. And MC. Sostenes Montoya Angulo, agronomist who is implementing the tests. QFB. María de la Luz Acosta pineda y MC. Carlos Morales Cazarez, Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

INTRODUCTION

Last August, 2001, in Santiago Ixcuintla, Nayarit, Mexico, we started taking some tests. Experiment was established chemistry substances. The bed were covered with transparent plastic in order to retain fumigant.

Treatments: We started the experiment in agricultural season 2001. we applied 6 (six) treatments:

TREATMENTS OR ALTERNATIVES:

1.- Control (no treatment).
2.- 40 gr/m^2 of methyl bromide (75/25 or 80/20).
3.- 50 ml/m^2 of metam-sodium.
4.- 33 ml/m^2 of chloropicrin.
5.- 1,3-dichloropropene+chloropicrin,dose recommended by the manufacturer.
6.- 1,3-dichloropropene, dose recommended by the manufacturer (11.2 ml/m^2).

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last August, in Santiago Ixcuintla, machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in four beds,. Afterwards the beds were marked, arised and flattened. The bed marks were marked 1 m between each one.

Experiment Design

The treatment designs were carried out in August, 2001. In a piece of land with 4 beds, 60 m length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 24 experimental plots with 1 bed, which we applied next randomized treatments:

1). **Absolute control.** In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application.

2). **Methyl Bromide 80/20**. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

3). **Metham-sodium.** In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

4). **Chloropicrin.** On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 20 days.

5). **1,3-dichloropopren + chloropicrin.** These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

6). **1,3-dichloropropen.** These furrows soil were treated using 11.2 ml/m^2 1,2-dichloropropen. This application was carried out using the equipment tractor thereinafter. The furrows were covered in black/silver plastic during 20 days.

The treatments were applied on damp soil.

Evaluations will be taking place in 1 M^2 each repetition.

Sowing.

Tobacco sowing were made directly on soil. Beds were covered using a plastic net.

Crop Management

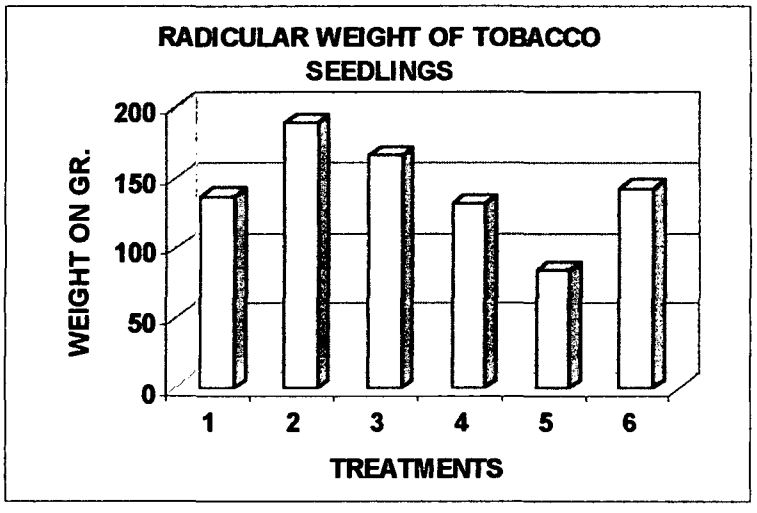
Irrigation will take place using sprinkling irrigation, and fertilization will be handwork. They are controlled directly by farm technicians. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

RESULTS:

Vegetative growth.

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA
Enterprise: Tabacos del Pacifico Norte S.A de C.V.
Crop: Tabaco - Plantulas
Sowing date: 23/sept/01
Evaluation parameter: Radicular total weight on gr. of 10 useful plants/repetition

TREATMENTS	02-Nov-01				15-Nov-01				18-Nov-01				24-Nov-01				
	REPETITION				REPETITION				REPETITION				REPETITION				
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	TOTAL
1. Dichloropropene+Chloropicrin	4.8	4.8	5.6	6.6	6.5	7.7	8.4	4.3	7.5	17.8	10.0	9.8	9.0	15.0	9.0	10.0	136.8
2. Methyl Bromide 40	6.7	10	7.7	12	7.5	10.0	6.0	20.0	7.0	18.2	7.0	21.8	10.0	17.0	9.0	19.0	189.5
3. Dichloropropene	6.5	9.9	8.8	5.0	4.2	11.5	7.7	7.5	16.2	20.2	7.7	9.3	14.6	18.4	8.5	11.0	167.0
4. Metam-sodium 50	6.0	8.8	8.3	5.6	6.4	7.5	6.6	6.0	8.6	10.1	8.0	11.8	10.0	9.0	9.0	10.0	131.7
5. Control	0	2.5	5.9	0	4.5	5.0	4.0	3.0	5.2	7.5	10.0	8.3	3.0	8.0	9.6	7.8	84.3
6. Chloropicrin	8.8	3.9	8.4	8.7	9.8	7.6	8.7	10.0	9.8	7.6	8.7	10.0	10.0	8.4	10.8	11.7	142.9



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

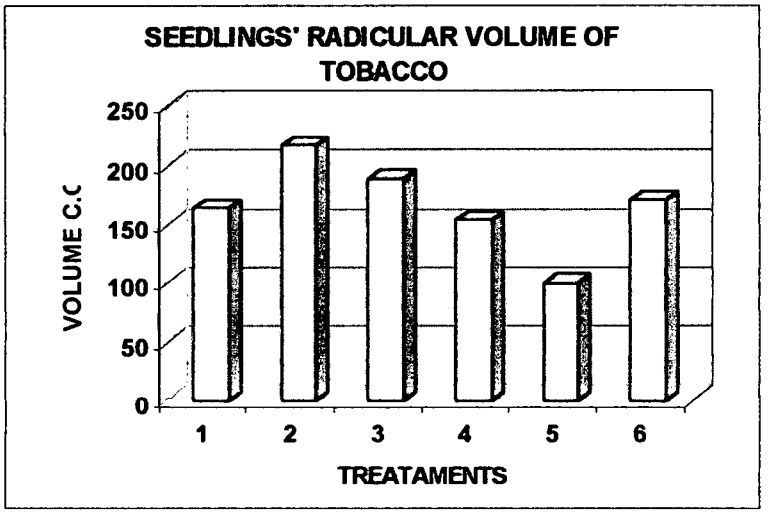
ENTERPRISE: Tabacos del Pacifico Norte S.A de C.V.

Crop: Tobacco - Seddlings

Sowing date: 23/sept/01

Measurement parameter: Total radicular volume of 10 useful plants/repetition, in cubic centimeter (c.c)

TREATMENTS	02-Nov-01				15-Nov-01				18-Nov-01				24-Nov-01				
	REPETITION				REPETITION				REPETITION				REPETITION				
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	TO
1. Dichloropropene+Chloropicrin	5.0	5.0	7.0	6.0	10.0	9.0	11.0	5.0	12.0	16.0	14.0	12.0	12.0	17.0	11.0	12.0	1
2. Methyl Bromide 40	5	10	9	14	7.0	12.0	7.0	23.0	10.0	22.0	8.0	25.0	12.0	20.0	10.0	23.0	
3. Dichloropropene	8.0	11.0	10.0	5.0	5.0	13.0	8.0	7.0	17.0	24.0	5.9	10.0	17.0	23.0	11.0	14.0	1
4. Metam-sodium 50	7.0	9.0	9.0	7.0	8.0	9.0	8.0	8.0	9.0	10.0	10.0	14.0	13.0	10.0	11.0	12.0	1
5. Control	0	4	8	0	4.0	6.0	6.0	5.0	5.0	8.0	14.0	8.0	4.0	9.0	11.0	8.0	
6. Chloropicrin	10.0	5.0	10.0	10.0	10.0	9.0	11.0	14.0	10.0	9.0	11.0	14.0	12.0	9.0	13.0	14.0	1



UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

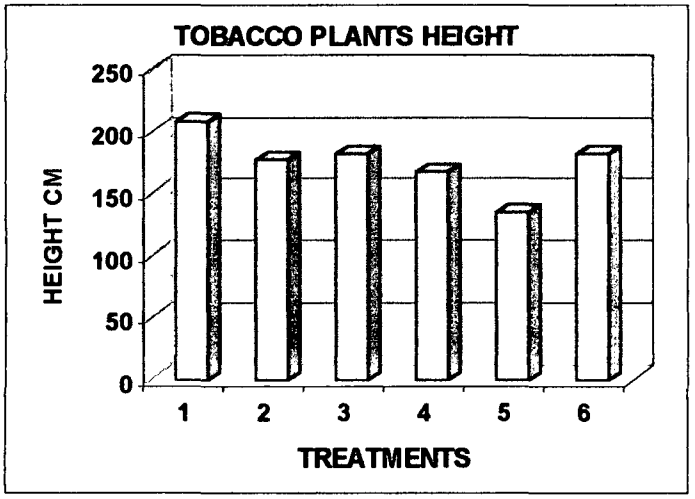
Enterprise: Tabacos del Pacifico Norte S.A de C.V.

Crop: Tobacco - Seedlings

Sowing date: Sept/23th/01

Evaluation parameter: Total averages (cm.) height of 10 useful plants/repetition

TREATMENTS	02-Nov-01				15-Nov-01				18-Nov-01				24-Nov-01				
	REPETITION				REPETITION				REPETITION				REPETITION				
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	II	IV	TOTAL
1. Dichloropropen+Chloropicr	11.9	2.0	12.3	8.9	15.0	13.7	12.3	14.2	17.4	14.9	14.3	13.4	15.6	15.1	14.3	12.9	207.9
2. Methyl Bromide 40	7.4	6.2	4.8	6.6	11.0	11.3	12.3	10.8	16.4	12.5	14.3	9.9	15.8	12.8	14.2	11.0	177.0
3. Dichloropropene	10.1	8.5	10.9	9.4	13.3	13.3	13.1	12.3	10.7	13.0	10.4	12.6	10.7	12.1	10.5	11.7	182.3
4. Metam Sodium 50	9.7	6.7	8.6	6.6	12.7	10.2	10.7	9.5	13.5	9.1	14.7	9.8	13.5	9.5	13.4	10.0	167.9
5. Control	0.4	3.2	4.7	0.0	7.7	8.8	7.1	5.7	13.9	17.1	13.2	11.7	3.6	14.8	12.0	10.9	134.5
6. Chloropicrin	7.1	4.5	5.2	13.1	11.4	12.5	13.0	15.2	11.4	12.5	13.0	15.2	9.2	11.4	12.7	14.2	181.3



WEEDS.

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMÍA

ENTERPRISE: Tabacos del Pacifico Norte S.A de C.V

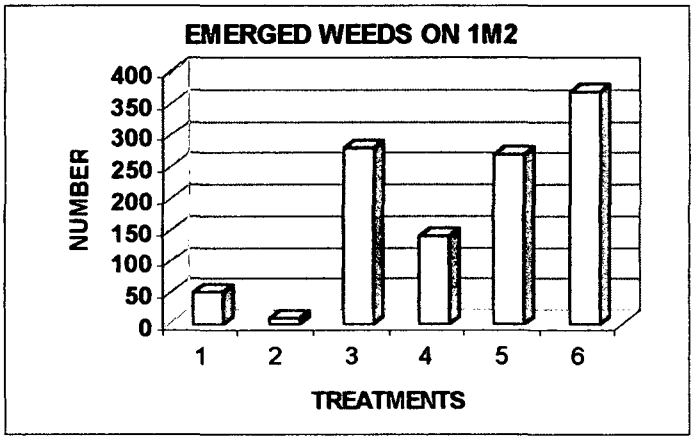
CROP: Tobacco Site: Santiago Ixcluintla, Nayarit

Sowing date: Sept/23/01.

Measurement parameter: Total of emerged weeds on 1 m2/repetition

Evaluation date: 21/oct./01.

	REPETITION					
TREATMENTS	**I**	**II**	**III**	**IV**	**TOTAL**	**AVERAGE**
1. Dichloropropen+Chloropicrin	1	38	67	104	210	52.5
2. Methyl Bromide 40	3	5	12	25	45	11.2
3. Dichloropropene	207	277	225	405	1114	278.5
4. Metam Sodium 50	110	203	66	180	559	139.7
5. Control	236	231	339	272	1078	269.5
6. Chloropicrin	317	357	409	383	1466	366.5



YIELD

UNIVERSIDAD AUTONOMA DE SINALOA - FACULTAD DE AGRONOMIA

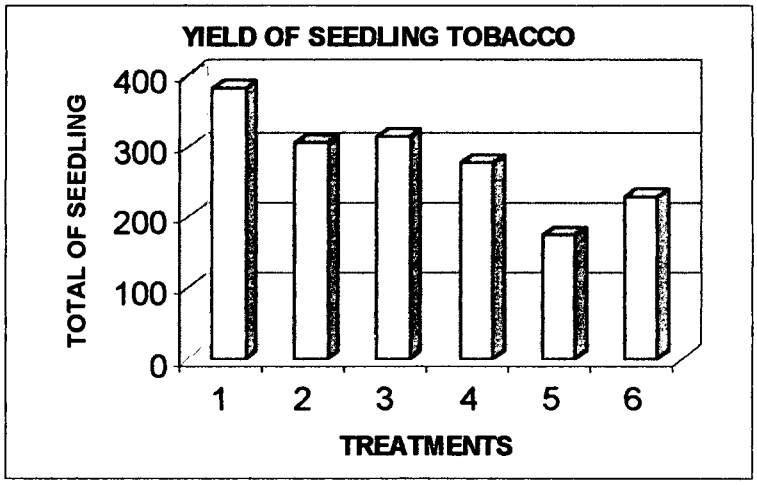
ENTERPRISE: Tabacos del Pacifico Norte S.A de C.V.

CROP: Tobacco - Seedlings

Sowing date: 23/sept/01

Evaluation parameter: Yield of useful plants on 50 cm2/repetition

TREATMENTS	02-Nov-01				15-Nov-01				18-Nov-01				24-Nov-01				
	REPETITION				REPETITION				REPETITION				REPETITION				
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	TOT
1. Dichloropropene+Chloropicrin	27	4	29	18	38	25	26	27	28	18	27	30	25	20	18	22	
2. Methyl Bromide 40	18	13	8	10	19	18	22	25	37	16	23	11	30	18	25	13	
3. Dichloropropene	19	19	24	8	26	24	11	14	17	27	13	29	20	25	13	26	
4. Metam-sodium 50	20	14	14	12	23	17	19	14	29	20	16	13	23	18	12	14	
5. Control	1	6	11	0	9	13	8	6	5	26	18	23	3	18	12	16	
6. Chloropicrin	13	6	9	29	21	14	11	15	21	14	11	15	15	11	13	11	



STATISTIC ANÁLYSIS OF USEFUL TOBACCO PLANTS HARVESTED PER TREATMENT, IN SANTIAGO IXCUINTLA NAYARIT.

VARIABLE = Useful tobacco plants from 50 cm^2

TREAT.	1	2	3	4
1. Dichlorop. + Chlorop.	118.0000	67.0000	100.0000	97.0000
2. Methyl Bro. 40	104.0000	65.0000	78.0000	59.0000
3. Dichloropropen	82.0000	95.0000	61.0000	77.0000
4. Metan-Sod. 50	95.0000	69.0000	61.0000	53.0000
5. Control	18.0000	63.0000	49.0000	45.0000
6. Chloropicrina	70.0000	45.0000	44.0000	70.0000

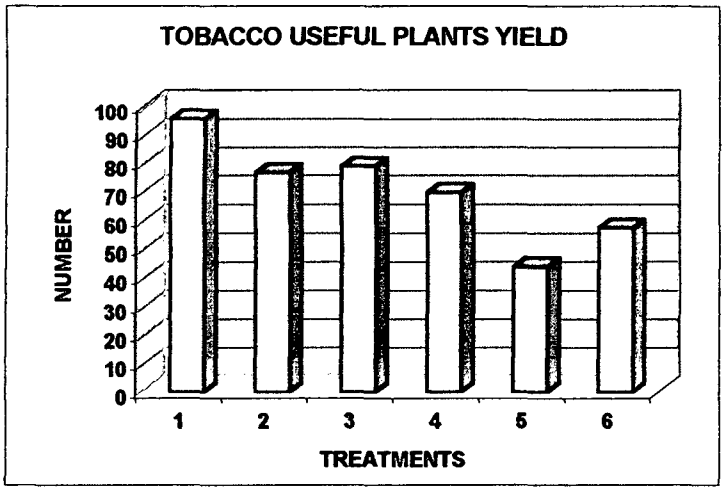
ANALYSIS OF VARIANCE

FV	GL	SC	CM	F	P>F
TREAT	5	25.687500	5.137500	3.9959	0.013
ERROR	18	23.142334	1.285685		
TOTAL	23	48.829834			

C.V. = 13.73 %

TABLE OF AVERAGES

TREAT.	AVERAGE
1	95.500000 A
3	78.750000 AB
2	76.500000 AB
4	69.500000 AB
6	57.250000 AB
5	43.750000 B



FINAL CONCLUSION. Obtained results were analyzed by Tukey method (P = .95), whit next result. The best significative result was the application of Dichloropropene + Chloropicrin, with 95.5 useful plants on 50 cm^2 average. Next significance group was treatments dichloropropene, 78.75 useful plants average; Methyl Bromide 40, 76.5 useful plants; Metam-Sodium 50, 69.5 useful plants and Chloropicrin 57.25 useful plants. We didn't find significative differences. And all of them were meaningfully more efficient than control, with 43.75 useful plants average. Dichloropropene + Chloropicrin does not control the weed, which makes difficult the harvest of plants, whereas the use of floating trays (floating) gives superior results, but has not been tried because tests on great scale already exist that verify their effectiveness. At the moment, approximately 80% of tobacco plants take place in trays in Nayarit.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

FINAL PROJECT REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP: Melon (*Cucumis melo* L.)

PROJECT AREAS: Rancho "La Campana", ubicado a 45 km. De La Paz, Todos Santos Road, La Paz, Baja California, Sur. Tests were stablished on sand texture field, and the soil was irrigated using water from deep holes.

Executive Manager: Lic. Ignacio Rodríguez Múñiz.
Fiel Manager: Ing. Martín Castañeda Mata. Cell phone: (112) 7-33-16

Enterprise Address: Toronja No. 4481, La Paz, B.C.S.

Tels: (112) 5-72-67, 5-98-13
Fax: (112) 5-72-97

Culiacan, Sinaloa, March, 2004.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

FINAL PROJECT REPORT: Alternatives to the use of Methyl Bromide in the cultivation of melon. (*Cucumis melo* L.). In Agricultural enterprise Agrodelicias de la Baja Sur, S.A. de C.V. located on Km 10, Todos Santos Road, New Ranch (La Campana), Ejido El Carrizal, La Paz, Baja California Sur, Mexico. Universidad Autónoma de Sinaloa, Agronomy Faculty Responsible: MC. Francisco Javier Estrada Ramirez, Project Coordinator, and MC. Sostenes Montoya Angulo, Agronomist, in the tests implementation, QFB. María de la Luz Acosta Pineda and Carlos Morales Cazarez, Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

INTRODUCTION

During August, 1999, it was established the test of project "Alternatives to the use of Methyl Bromide in the cultivation of **melon.** (*Cucumis melo* L.). we started some tests in Ranch "La Campana", La Paz, Baja California, Sur, Mexico, which consisted in the aplication of different treatments on soil, in order to analyze the control about soil microorganisms and in crops development, comparing Methyl bromide. We apply this substance in alluvial arenaceous land, with region characteristics (flora and fauna) half-dessert. Agricultural activities are based in drip irrigation, using groundwater table in "La Campana" Ranch, this activity is carried out in seven wills which are strategically distributed. The tests site is at rach south, in an arenaceous land, which has acid PH. We applied agricultural lime in order to obtain the appropiate PH, to the melon seed (PH 6.5). In this land it hadn't taken place any seed three years ago, and the last cultivation in this land was tomatoe.

The applied treatments were:
1) Control (no treatment);
2) Methyl Bromide 15 gr/m^2, 80/20
3) Methyl Bromide 40 gr/m^2, 80/20
4) Solarization (4 weeks)
5) Hen Manure, 5 kg and solarization (4 weeks)
6) Cow manure slightly done (5 kg) and solarization (4 weeks)
7) Fresh chinese broccoli buried (5 kg) and solarization (4 weeks)
8) Metham sodium (N, methyl sodium ditiocarbamate) and solarization (4 weeks)
9) Metham Sodium (50 ml/m^2)
10) Chloropicrin (33 ml/m^2)
11) Dazomet (tetrahidro-3-5 dimetil-2H1.3.5-tiazidin-s tiona) (40 gr/m^2
12) 1,3-Dichloropropen (65%) + chloropicrin (35%) (27 ml/m^2)

13)1,3-Dichloropropen (11.2 ml/m^2)

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last July, when "Agrodelicias de la Baja Sur" enterprise heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the instalment underground pipeline. Afterwards the beds were marked, arised and flattened. And finally they put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in August 25th, 1999. First we marked the block margins using stakes, afterwards, we drew lines using lame in order to defin the blocks. In a piece of land with 56 beds; 50 M lenght, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 13 experimental plots with 4 beds, which we applied next randomized treatments:

1). Absolute control. In this experimental unit consist on 4 rows, 10 M. lenght, and we didn't realized any fungicide or organic matter application on the soil. The soil remained covered with plastic.

2). Methyl Bromide 80/20 (15 gr/m^2). In the soil, in the 4 rows in this experimental unit it was injected 15 gr M^2 (80% methyl bromide and 20% chloropicrin) M^2. The application was through irrigation pipeline. Actually the soil remained covered with plastic.

3). Methyl Bromide 80/20. In the four rows, It was applied 40 grs M^2 (80% methyl bromide and 20% chloropicrin). Actually the soil remained covered with plastic.

4). Solarization. The four rows were padded or was covered with transparent plastic.

5). Hen manure was incorporated to the soil and solarization. It was distributed on the soil, in that 10 mts. four rows 200 kgs hens manure, aproximattely 5 kgs per M^2. It was incorpored by manual labour using hoes and the rows were covered with transparent plastic.

6). Cow Manure was incorporated to the soil with the solarization. It was distributed 200 kg. Cow manure, aproximattely 5 kg. Per M^2. It was incorpored by manual labour using hoes, and the rows were covered with transparent plastic.

7). Green cabbage incorporated on the soil and solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it were distributed 5 kg

per M^2. It was incorporated by manual labour using hoes, after that, the rows were covered with transparent plastic.

8). Metham-sodium (N, methyl ditiocarbamato sodium) with solarization. This product was Sprinkled using a garden watering can. It was applied aproximattely 25 ml/m^2 metham sodium. After the application, the rows were covered with transparent plastic.

9). Metham-sodium. In this four furrows it was applied. We sprinkled this product using a garden watering can; approximately 50 ml/m^2 metham sodium. After the aplication, the furrows were covered in black/silver plastic.

10). Chloropicrin. On this four furrows were applied $33ml/m^2$ chloropicrin using a little drip aplication equipment. The furrows were covered in black/silver plastic.

11). Dazomet(tetrahidro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona). On this furrows soil we distributed by manual labour 40 gr/m^2 dazomet: it was incorporated using hoes, after that, we applied water by sprinkler irrigation during 3 hrs. Finally, the furrows were covered in black/silver plastic.

12). 1,3-dichloropopreno + chloropicrin. These furrows soil were treated using 27 ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment that we used to apply the chloropicrin and the furrows are covered in black/silver plastic nowadays.

13). 1,3-dichloropropen. These furrows soil were treated using 11.2 ml/m^2 1,3-dichloropropen. This application was carried out using the equipment thereinbefore. The furrows are covered in black/silver plastic nowadays.

The treatments were applied in damp soil.

Evaluations are taking place in the two central furrows in each experimental unit. We attached a label in 10 plants (five each row or 10 cm central bed) which were randomized, in order to take size measures.

Seeding
The seeding was carried out in September 22th, putting a seed on the ground through little holes in plastic each 45 cm.

RESULTS

Germination Percentage
Six days after carry out the seeding. It was estimated the germinated seed percentage in all the treatments. We counted the two furrows or central beds holes in plastic of the experimental units; afterwards, it was counted the emerged

seedlings and using this records, it was calculated the germination percentage; which is displayed in tables thereinafter:

Crop: Melon
Site: Rancho La Campana, La Paz, B.C.S.
Parameter: Germination percentage
Seeding date: September 22th, 1999
Date: September 28th, 1999
Media per blocks table. germination percentage in melon seeds.

TREATMENT	BLOCK				MEDIA
	I	II	III	1V	
Control	96	89.29	94.34	96.08	93.93
Cabbage	78.57	880.89	92.16	89.09	87.18
Telone C35	92.45	93.75	87.27	90.57	91.01
Methyl bromide 40	89.09	94.12	94,23	96.37	93.45
Telone II	87.03	88.68	90	85.45	87.79
Chloropicrin	94.12	88.89	98.04	9107	93.03
Metham sodium 25	79.59	94.23	94.64	96	91.12
Methyl bromide 15	98.15	90.91	85.71	88	90.69
Solarization	94.44	70.37	83.02	88.68	84.13
Metham sodium 50	88.68	78.18	84.9	84	83.94
Hen manure	49.02	47.17	33.33	54.72	46.06
Dazomet	52.83	66.67	77.36	87.5	71.09
Cow manure	78.43	62	58.82	52.73	63

Root desease incidence.- We are carrying out plant observations in order to detect symptoms like yellow leaves, no development, withering or dead, however, nowadays we haven't detected any abnormality.

Nematodes Population. Seven weeks after central furrows transplanting, in each experimental unit, near plant roots, 0-30 cm depth. We took five soil subsampling, in order to obtain one kg. Sampling. Immediatly after that, the soil samplers were procesed using sieves 60 and 325 mesh per $Inch^2$.

We put into a 1,000 ml graduate test tube 400 ml of water, we stirred each soil sample perfectly homogenized. We stirred hard and we put out in a small cask containing 4 liters of water. Afterwards the soil was disolved in water, allowed to stand for 20 seconds and this water with the soil was passed through a 60 mesh sieves and this soil with water was put into a second small cask. Subsequently it was stirred again allowing to stand for 20 seconds, then it was passed through a 325 sieve mesh. The soil retained in this sieve mesh was taken using a teaspoon and it was passed into a 100 ml flask and it was taken to the Faculty of Agronomy Pthytopatology lab in order to carry out nematodes extraction. In lab the soil from the flasks was put on a piece of toilet paper which was on a wire mesh, which was

on a plastic funnel. In the funnel extreme it was put a flexible plastic hose which was stopped up using a pincer; the funnel was filled up of water until this touch the sieved soil. After 24 hours, from the bottom extreme hose, we pick up a 10 ml. Sample; it was gauged again using clean water, and after 24 hours again it was taken another water sample with nematodes. This activity was repeated in all 52 samples.

Using a biological microscope we observed the nematodes and we counted which we found in 1 ml. Aliquots. Afterwards we calculed the founded populations in 20 ml of water which we obtained using the sieve funnel method. These samples correspond to the soil 200 ml populations.

The records obtained are displayed in next tables:

Crop: Melon
Site: Rancho La Campana, La Paz, B.C.S.
Parameter: Nematode populations
Fecha de siembra: September 22th, 1999
Fecha: November 15-20th, 1999

Block I	NEMATODES					Total
TREATMENT	Aphelenc	Longidorus	Tylechus	Dorilaimi	V. Libre	Phytoparasites
Control	0	0	20	0	160	20
Cabbage	0	0	0	0	2860	0
Telone C35	0	0	0	0	580	0
Methyl bromide 40	0	0	0	0	460	0
Telone II	0	0	0	0	120	0
Chloropicrin	0	0	0	0	360	0
Metham sodium 25	0	20	0	0	980	20
Methyl bromide 15	0	0	0	0	780	0
Solarization	0	0	0	0	160	0
Metham sodium 50	0	0	0	0	380	0
Hen manure	20	0	0	0	2840	20
Dazomet	0	0	0	0	1.6	0
Cow manure	0	40	0	0	720	40

Block II	NEMATODES					Total
TREATMENT	Aphelenc	Longidorus	Tylechus	Dorilaimi	V. Libre	Phytoparasites
Control	0	0	0	0	100	0
Cabbage		40	0	0	2220	40
Telone C35	0	0	0	0	560	0
Methyl bromide 40		40	0	0	760	40
Telone II	0	0	0	0	140	0
Chloropicrin	0	0	0	0	380	0
Metham sodium 25		20	0	0	980	20
Methyl bromide 15	0	0	0	0	880	0
Solarization	0	0	0	0	320	0
Metham sodium 50	0	0	0	0	200	0
Hen manure	40	0	0	0	3480	40
Dazomet	0	20	0	0	440	20
Cow manure	0	60	0	0	2220	60

Block III	NEMATODES					Total
TREATMENT	Aphelenc	Longidorus	Tylechus	Meloidog	V. Libre	Phytoparasites
Control	0	0	0	0	160	0
Cabbage	0	0	0	0	660	0
Telone C35	0	0	0	0	560	0
Methyl bromide 40	0	20	0	0	1120	20
Telone II	0	20	0	0	60	20
Chloropicrin	0	20	0	0	340	20
Metham sodium 25	0	0	0	0	140	0
Methyl bromide 15	0	0	0	0	120	0
Solarization	0	40	0	0	160	40
Metham sodium 50	0	40	0	0	440	40
Hen manure	20	0	0	0	2640	20
Dazomet	0	0	0	0	600	0
Cow manure	20	0	0	80	1860	100

Block IV	NEMATODES					Total
TREATMENT	Aphelenc	Longidorus	Tylench	Meloidog	V. Libre	Phytoparasites
Control	0	60	0	0	1400	60
Cabbage	0	0	20	0	900	20
Telone C35	0	0	0	0	580	0
Methyl bromide 40	0	0	0	0	45	0
Telone II	0	0	0	0	660	0
Chloropicrin	0	0	0	0	700	0
Metham sodium 25	0	40	0	0	420	40
Methyl bromide 15	0	0	0	0	240	0
Solarization	0	0	0	0	360	0
Metham sodium 50	0	0	0	0	120	0
Hen manure	20	20	0	20	2460	60
Dazomet	20	0	20	0	120	40
Cow manure	20	0	20	40	560	80

Aphelenc = *Aphelenchus
Longidorus = *Longidorus*
Tylenchor = *Tylechorhynchus*
Tylechus = *Tylenchus*
Dorilaimi = Dorilaimides Group
Trophurus = *Trophurus*
V. Libre = Life free Nematodes (no estiletto).

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTION.

During September, 2000, it was established the second test of project "Alternatives to the use of Methyl Bromide in the cultivation of **melon.** (*Cucumis melo* L.). we started some tests in Ranch "La Campana", La Paz, Baja California, Sur, Mexico, which consisted in the aplication of different treatments on soil, in order to analyze the control about soil microorganisms and in crops development, comparing Methyl bromide. We apply this substance in alluvial arenaceous land, with region characteristics (flora and fauna) half-dessert. Agricultural activities are based in drip irrigation, using groundwater table in "La Campana" Ranch, this activity is carried out in seven wills which are strategically distributed. The tests site is at rach south, in an arenaceous land, which has acid PH. We applied agricultural lime in order to obtain the appropiate PH, to the melon seed (PH 6.5). In this land it hadn't taken place any seed three years ago, and the last cultivation in this land was tomatoe.

Treatments: Based on obtained results during before experiment from agricultural period 1999-2000 we selected 8 (eight) treatments:

The applied treatments were:
1) Control (no treatment);
2) Cabbage buried (5 kg) and solarization (3 weeks)
3) Metham Sodium (50 ml/m^2)
4) Methyl Bromide 40 gr/m^2, 80/20
5) 1,3-Dichloropropen (11.2 ml/m^2)
6) 1,3-Dichloropropen (65%) + chloropicrin (35%) (27 ml/m^2)
7) Dazomet (tetrahidro-3-5 dimetil-2H1.3.5-tiazidin-s tiona) (40 gr/m^2
8) Chloropicrin (33 ml/m^2)

BODY OF REPORT

Land preparation

The activities in cooperative farmer land started in last July, when "Agrodelicias de la Baja Sur" enterprise heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the instalment underground pipeline. Afterwards the beds were marked, arised and flattened. And finally they put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in August, 2000. First we marked the block margins using stakes, afterwards, we drew lines using lame in order to defin the blocks. In a piece of land with 56 beds; 50 M lenght, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 13 experimental plots with 4 beds, which we applied next randomized treatments:

1). Absolute control. In this experimental unit consist on 4 rows, 10 M. lenght, and we didn't realized any fungicide or organic matter application on the soil. The soil remained covered with plastic.

2). Green cabbage incorporated on the soil and solarization. In order to apply this treatment, we chopped the cabbage in small pieces: then it were distributed 5 kg per M^2. It was incorporated by manual labour using hoes, after that, the rows were covered with transparent plastic.

3). 1,3-dichloropopren + chloropicrin. These furrows soil were treated using 27 ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment that we used to apply the chloropicrin and the furrows are covered in black/silver plastic nowadays.

4). Methyl Bromide 80/20. In the four rows, It was applied 40 grs M^2 (80% methyl bromide and 20% chloropicrin). Actually the soil remained covered with plastic.

5). Chloropicrin. On this four furrows were applied $33ml/m^2$ chloropicrin using a little drip aplication equipment. The furrows were covered in black/silver plastic.

6). Metham-sodium. In this four furrows it was applied. We sprinkled this product using a garden watering can; approximately 50 ml/m^2 metham sodium. After the aplication, the furrows were covered in black/silver plastic.

7). Dazomet(tetrahidro-3-5 dimethyl-2H-1.3.5-tiadizin-2 tiona). On this furrows soil we distributed by manual labour 40 gr/m^2 dazomet: it was incorporated using hoes, after that, we applied water by sprinkler irrigation during 3 hrs. Finally, the furrows were covered in black/silver plastic.

8). 1,3-dichloropropen. These furrows soil were treated using 11.2 ml/m^2 1,3-dichloropropen. This application was carried out using the equipment thereinbefore. The furrows are covered in black/silver plastic nowadays.

The treatments were applied in damp soil.

Evaluations are taking place in the two central furrows in each experimental unit. We attached a label in 10 plants (five each row or 10 cm central bed) which were randomized, in order to take size measures.

Seeding

The seeding was carried out in September 22th, putting a seed on the ground through little holes in plastic each 45 cm.

RESULTS

Germination Percentage

Six days after carry out the seeding. It was estimated the germinated seed percentage in all the treatments. We counted the two furrows or central beds holes in plastic of the experimental units; afterwards, it was counted the emerged seedlings and using this records, it was calculated the germination percentage, which is displayed in tables thereinafter:

Root desease incidence.- We are carrying out plant observations in order to detect symptoms like yellow leaves, no development, withering or dead, however, nowadays we haven't detected any abnormality.

Nematodes Population. Seven weeks after central furrows transplanting, in each experimental unit, near plant roots, 0-30 cm depth. We took five soil subsampling, in order to obtain one kg. Sampling. Immediatly after that, the soil samplers were procesed using sieves 60 and 325 mesh per $Inch^2$.

We put into a 1,000 ml graduate test tube 400 ml of water, we stirred each soil sample perfectly homogenized. We stirred hard and we put out in a small cask containing 4 liters of water. Afterwards the soil was disolved in water, allowed to stand for 20 seconds and this water with the soil was passed through a 60 mesh sieves and this soil with water was put into a second small cask. Subsequently it was stirred again allowing to stand for 20 seconds, then it was passed through a 325 sieve mesh. The soil retained in this sieve mesh was taken using a teaspoon and it was passed into a 100 ml flask and it was taken to the Faculty of Agronomy Pthytopatology lab in order to carry out nematodes extraction. In lab the soil from the flasks was put on a piece of toilet paper which was on a wire mesh, which was on a plastic funnel. In the funnel extreme it was put a flexible plastic hose which was stopped up using a pincer; the funnel was filled up of water until this touch the sieved soil. After 24 hours, from the bottom extreme hose, we pick up a 10 ml. Sample; it was gauged again using clean water, and after 24 hours again it was taken another water sample with nematodes. This activity was repeated in all 52 samples.

Using a biological microscope we observed the nematodes and we counted which we found in 1 ml. Aliquots. Afterwards we calculed the founded populations in 20 ml of water which we obtained using the sieve funnel method. These samples correspond to the soil 200 ml populations.

Records obtained are displayed in next tables:

FACULTAD DE AGRONOMÍA DE LA U.A.S.
ESTS WERE CARRIED OUT USING FUMIGANTS TO THE SOIL DURING SEASON 2000-2001
MELON CROP, CAMPANA RANCH

UNIVERSIDAD AUTONOMA DE SINALOA
FACULTAD DE AGRONOMÍA

Site: Rancho La Campana, La Paz, B.C.S. **Crop:** Melon
Measurement parameter: nematode population
Sowing date: September 12th, 2000 **Evaluation date:** December, 2000

Block I		NEMATODES												Total
TREATMENT	Aphel	Aphe	Tyle	Long	Tylechus	Doril	Troph	Ditil	Praty	Mloi	Hemic	Hoplol	Free live	Phytoparasites
Control	0	0	40	0	40	0	0	0	100	0	60	0	200	240
Cabbage	0	0	60	0	20	0	0	20	40	120	0	0	440	260
Metam sodium 50	0	100	20	0	0	40	0	0	120	0	0	0	1740	280
Methyl Bromide	0	0	0	0	0	0	0	20	0	0	0	0	520	20
Dichloropropen	0	0	0	0	0	40	0	0	0	0	0	0	1520	40
Dichorop.+Chloropic.	0	0	0	0	40	0	0	0	0	0	0	0	860	40
Dazomet	20	20	0	0	20	0	0	0	20	0	0	0	1820	60
Chloropicrin	0	0	0	0	20	0	0	0	0	0	0	0	3000	20

Block II		NEMATODES											
TREATMENT	Aphel	Aphe	Tyle	Long	Tylechus	Doril	Troph	Ditil	Praty	Meloi	Hemic	Hoplol	Free live
Control	0	0	0	0	40	0	0	0	120	0	60	0	2200
Cabbage	0	0	20	0	40	20	0	0	100	20	0	0	640
Metam sodium 50	40	40	0	0	0	0	20	0	20	0	0	0	1480
Methyl Bromide	0	0	0	0	20	0	0	20	0	0	0	0	440
Dichloropropen	0	0	0	0	0	0	0	20	0	0	0	0	1480
Dichorop.+Chloropic.	0	0	0	0	60	0	0	0	0	0	0	0	560
Dazomet	0	0	20	0	60	20	0	20	0	0	0	0	2280
Chloropicrin	0	0	0	0	0	0	0	0	0	0	0	0	2420

FACULTAD DE AGRONOMÍA UNIVERSIDAD AUTONOMA DE SINALOA

Site: Rancho La Campana, La Paz, B.C.S. **Crop:** Melon
Measurement parameter: nematode population
Sowing date: September 12th, 2000 **Evaluation date:** December, 2000

Block III		NEMATODES												Total
TREATMENT	Aphel	Aphe	Tyle	Long	Tylechus	Doril	Troph	Ditil	Praty	Meloi	Hemic	Hoplol	Free live	Phytoparasites
Control	0	0	20	0	40	0	0	0	100	0	0	0	2620	160
Cabbage	0	0	120	0	20	120	0	2200	20	40	0	0	960	2520
Metam sodium 50	40	60	0	0	120	0	0	0	20	0	0	0	1340	240
Methyl Bromide	0	0	0	0	0	0	0	20	0	0	0	0	480	20
Dichloropropen	0	0	0	0	0	20	0	0	0	0	0	0	1280	20
Dichorop.+Chloropic.	0	0	0	0	20	0	0	0	0	0	0	0	560	20
Dazomet	20	0	20	0	20	20	0	0	20	0	0	0	1560	100
Chloropicrin	0	0	0	0	40	0	0	0	0	0	0	0	1800	40

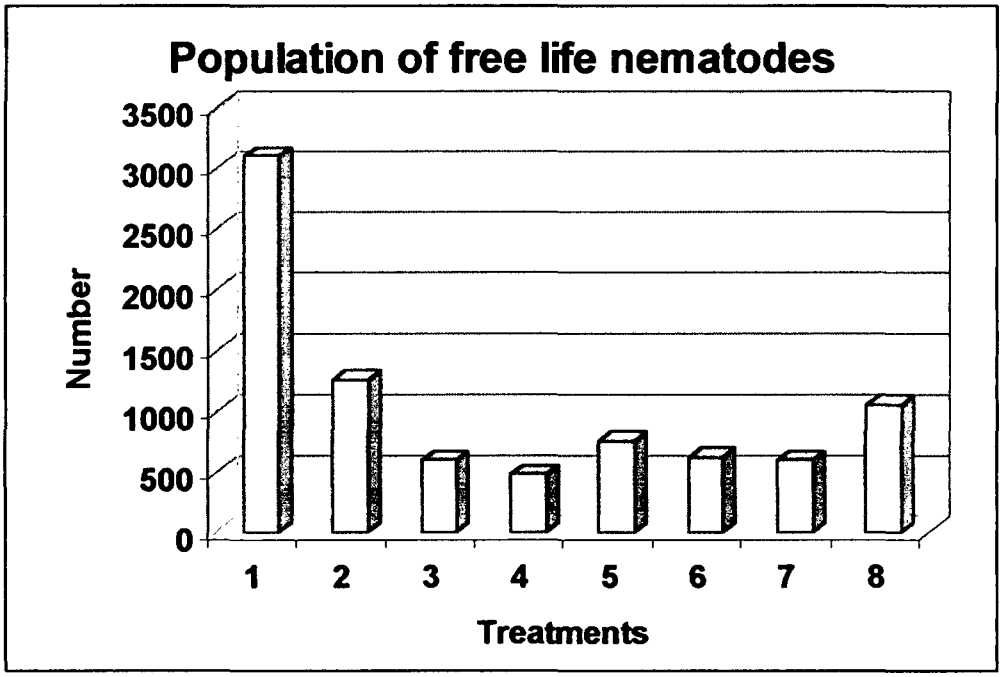
Block IV		NEMATODES												Total
TREATMENT	Aphel	Aphe	Tyle	Long	Tylen	Doril	Troph	Ditil	Praty	Meloi	Hemic	Hoplol	Free live	Phytoparasites
Control	0	0	40	0	40	0	0	0	100	0	60	0	7800	240
Cabbage	0	0	60	0	20	0	0	20	40	120	0	0	1320	260
Metam sodium 50	0	100	20	0	0	40	0	0	120	0	0	0	1400	280
Methyl Bromide	0	0	0	0	0	0	0	20	0	0	0	0	520	20
Dichloropropen	0	0	0	0	0	40	0	0	0	0	0	0	920	40
Dichorop.+Chloropic.	0	0	0	0	40	0	0	0	0	0	0	0	700	40
Dazomet	20	20	0	0	20	0	0	0	20	0	0	0	1860	80
Chloropicrin	0	0	0	0	20	0	0	0	0	0	0	0	2940	20

Aphel=Aphelenchoides, Aphe=Aphelenchus, Tyle=Tylenchorrhynchus, Long=Longidorus, Tylen=Tylenchus, Doril=Dorilaymus, Troph=Trophurus, Ditil=Ditylenchus, Praty=Pratylenchus, Meloi=Meloidogyne, Hemic=Hemicicliophora,

Seeding date: september 12nd, 2000 **evaluation date**:November 19th, 2000

Free life nematodes

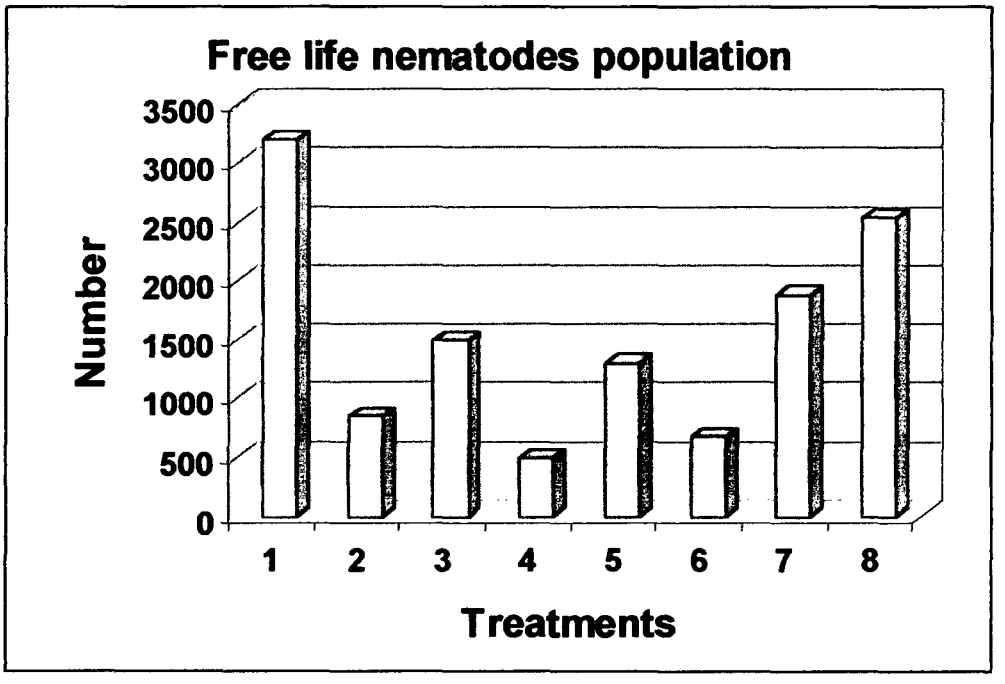
TRAETMENT	BLOCK				AVERAGE
	I	II	III	1V	
Control					3100
Cabbage					1260
Metam sodium 50					600
Metthyl bromide					480
Dichloropropen					760
Dichlorop.+Chloropic.					620
Dazomet					600
Chloropicrin					1060



free life nematodes

Planting date: september 12nd, 2000 **evaluation date**: December, 2000

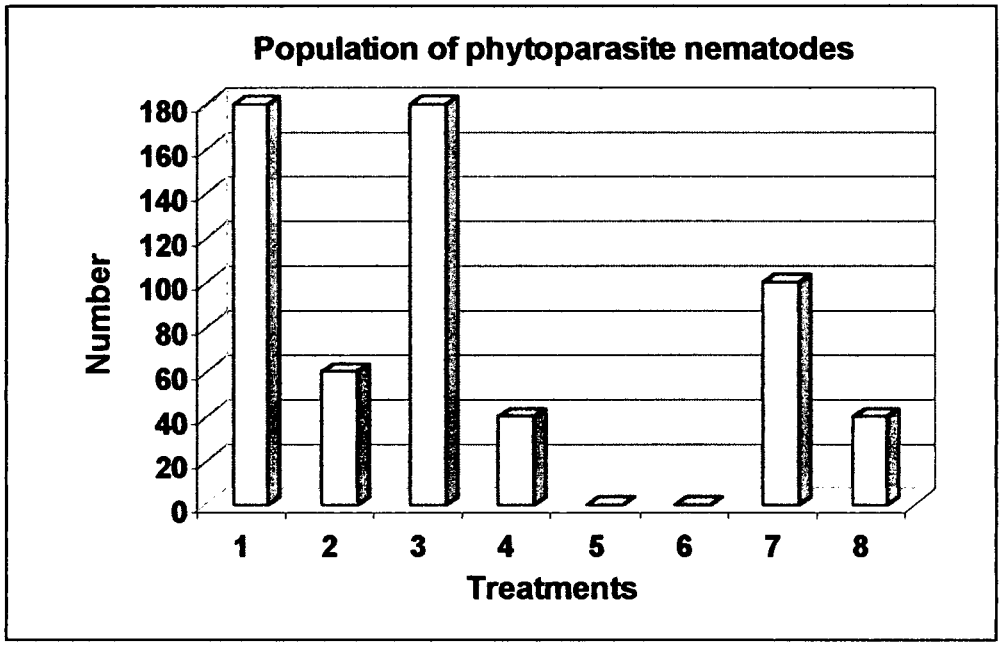
TREATMENT	BLOCK				
	I	II	III	1V	AVERAGE
Control	200	2200	2620	7800	3205
Cabbage	440	640	960	1320	840
Metam sodium 50	1740	1480	1340	1400	1490
Metthyl bromide	520	440	480	520	490
Dichloropropen	1520	1480	1280	920	1300
Dichlorop.+Chloropic.	860	560	560	700	670
Dazomet	1820	2280	1560	1860	1880
Chloropicrin	3000	2420	1800	2940	2540



Nematodes phytoparasites

Seeding date: September 12nd, 2000 **evaluation date**: November 10th 2000

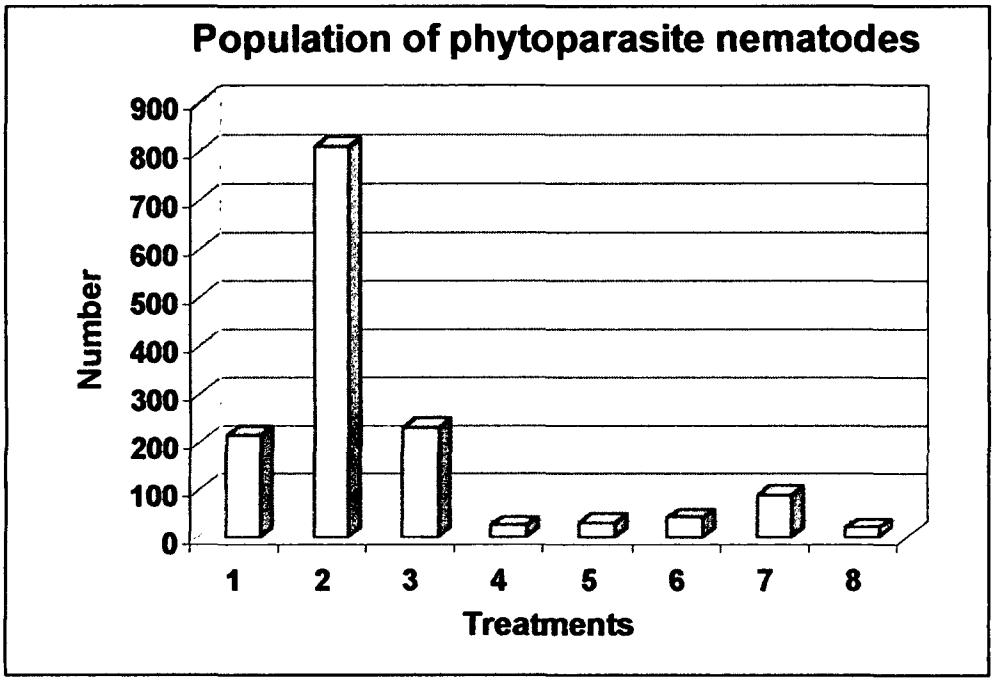
TREATMENT	BLOCK				
	I	II	III	1V	AVERAGE
Control					180
Cabbage					60
Metam sodium 50					180
Metthyl bromide					40
Dichloropropen					0
Dichlorop.+Chloropic.					0
Dazomet					100
Chloropicrin					40



Seeding date: September 12nd, 2000 **evaluation date**: December, 2000

Nematodes phytoparasite

TREATMENT	BLOCK				
	I	II	III	1V	AVERAGE
Control	240	220	160	240	215
Cabbage	260	200	2520	260	810
Metam sodium 50	280	120	240	280	230
Metthyl bromide	20	40	20	20	25
Dichloropropen	40	20	20	40	30
Dichlorop.+Chloropic.	40	60	20	40	40
Dazomet	60	120	100	80	90
Chloropicrin	20	0	40	20	20



PRODUCTION OF FUITS: Production evaluation took place in December 2000, on 2 central beds 10 lineal meters each repetition per treatment. Fruit were classified sizes and commercial categories 6,9,12,15,18, and 23 and remains. In order to compare results per treatment, we separated exportation fruits per repetition and remain fruits, and we considered total average production per categories and we recorded separately in order to observe differences among treatments. The results are showed on (1,2, 3 and 4) graphs.

FACULTAD DE AGRONOMÍA UNIVERSIDAD AUTONOMA DE SINALOA
Site: Rancho La Campana, La Paz, B.C.S. Crop: Melon
Measurement parameter: Yield on 10 m lineal
Seeding date: September 12th, 2000 Evaluation date: December, 2000
REPETITION III

TREATMENT	# FRUITS PER CATEGORY (EXPORT)						T. FRUT		TOTAL
	6	9	12	15	18	23	EXPORT	REMAIN	FRUITS
1. Control	0	2	23	34	23	0	82	28	110
2. Cabbage+solarization	0	1	1	10	6	18	36	35	71
3. Dichloropropen + Chloropicrin	0	0	11	11	5	0	27	29	56
4. Methyl Bromide	0	0	15	28	16	6	65	21	86
5. Cloropicrina	0	0	28	47	11	1	87	10	97
6. Metam sodium	0	0	13	18	16	11	58	35	93
7.Dazomet	0	0	3	18	9	0	30	14	44
8. Dichloropropen	0	3	22	29	15	0	69	23	92

REPETITION II

TREATMENT	# FRUITS PER CATEGORY (EXPORT)						T. FRUT		TOTAL
	6	9	12	15	18	23	EXPORT	REMAIN	FRUITS
1. Control	0	0	24	25	12	0	61	7	68
2. Cabbage+solarization	0	1	5	5	3	18	32	39	71
3. Dichloropropen + Chloropicrin	0	0	5	9	8	0	22	24	46
4. Methyl Bromide	0	0	12	22	15	6	55	35	90
5. Cloropicrina	0	2	28	22	9	1	62	16	78
6. Metam sodium	0	3	23	23	13	3	65	28	93
7.Dazomet	0	1	3	14	17	0	35	18	53
8. Dichloropropen	0	1	49	18	14	0	82	16	98

FACULTAD DE AGRONOMÍA UNIVERSIDAD AUTONOMA DE SINALOA
Site: Rancho La Campana, La Paz, B.C.S. Crop: Melon
Measurement parameter: Yield on 10 m lineal
Sowing date: September 12th, 2000 Evaluation date: December, 2000
REPETITION I

TREATMENT	# FRUITS PER CATEGORY (EXPORT)						T. FRUT		TOTAL
	6	9	12	15	18	23	EXPORT	REMAIN	FRUITS
1. Control	0	1	14	28	13	0	56	24	80
2. Cabbage+solarization	0	2	4	8	3	1	18	51	69
3. Dichloropropen + Chloropicrin	0	0	3	18	8	0	29	19	48
4. Methyl Bromide	0	0	11	32	22	18	83	32	115
5. Cloropicrina	0	1	31	16	9	0	57	13	70
6. Metam sodium	0	0	13	19	10	0	42	37	79
7.Dazomet	0	0	10	16	10	0	36	19	55
8. Dichloropropen	0	7	32	26	11	0	76	19	95

REPETITION IV

TREATMENT	# FRUITS PER CATEGORY (EXPORT)						T. FRUT		TOTAL
	6	9	12	15	18	23	EXPORT	REMAIN	FRUITS
1. Control	0	3	13	19	21	0	56	41	97
2. Cabbage+solarization	0	0	5	5	4	19	33	34	67
3. Dichloropropen + Chloropicrin	0	2	5	8	5	0	20	31	51
4. Methyl Bromide	0	0	3	31	11	7	52	27	79
5. Cloropicrina	0	2	12	36	15	0	65	11	76
6. Metam sodium	0	1	12	23	19	4	59	32	91
7.Dazomet	0	0	1	9	9	0	19	22	41
8. Dichloropropen	0	3	14	23	5	0	45	35	80

STATISTIC ANÁLISIS OF OBTAINED RESULTS IN MELON'S EXPERIMENT IN "LA CAMPANA" RANCH, LA PAZ, B.C. DURING 2000

VARIABLE: **Export melon's number**

TREATMENTS	BLOCKS 1	2	3	4
1. Control*	56.0000	61.0000	82.0000	56.0000
2. Cabbage + Solarization	18.0000	32.0000	36.0000	33.0000
3. Dichloropropen + Chloropicrin*	29.0000	22.0000	27.0000	20.0000
4. Methyl Bromide*	83.0000	55.0000	65.0000	52.0000
5. Chloropicrin*	57.0000	62.0000	87.0000	65.0000
6. Metan Sodium*	42.0000	65.0000	58.0000	59.0000
7. Dazomet	36.0000	35.0000	30.0000	19.0000
8. Dichloropropen*	76.0000	82.0000	69.0000	45.0000

ANALYSIS OF VARIANCE

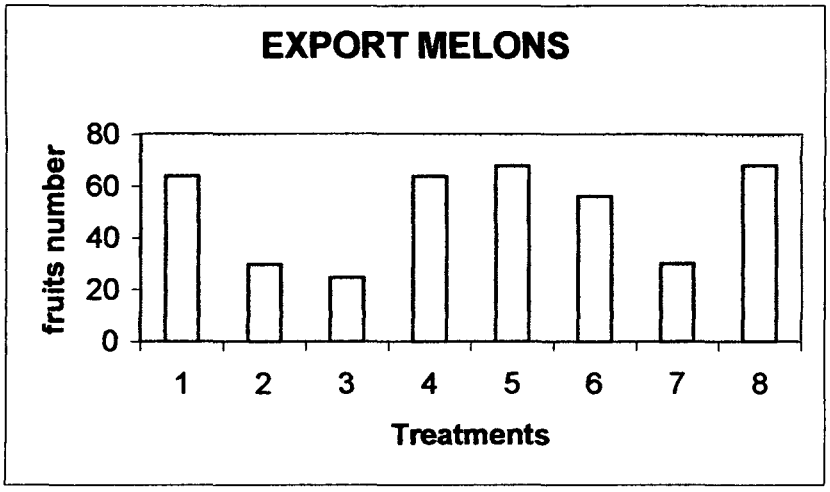
FV	GL	SC	CM	F	P>F
TREATMENTS	7	10047.875000	1435.410767	12.7034 **	0.000
BLOCKS	3	709.125000	236.375000	2.0919	0.131
ERROR	21	2372.875000	112.994049		
TOTAL	31	13129.875000			

C.V. = 21.08%

AVERAGE COMPARISON OF STATISTIC ANÁLISIS IN ORDER TO ACHIEVE SIGNIFICANCE LEVEL AMONG TREATMENTS, USING TUKEY TEST 0.05

TREATMENT	AVERAGE
8	68.0000 A
5	67.7500 A
1	63.7500 A
4	63.7500 A
6	56.0000 A
7	30.0000 B
2	29.7500 B
3	24.5000 B

SIGNIFICANCE LEVEL = **0.05**
TUKEY = 25.2326
TABLES' VALUE (0.05), (0.01) = 4.75, 5.80



RESULTS:

In statistic analysis about number of export melons each treatment, we could observer that there are high significative defferences among them, in treatments 8; dichloropropen, 5; chloropicrin, 1; control, 4; Methyl Bromide and 6; metam sodium were the best. We didn't find significant differences among both, with a significance level 0.05%. Worst treatments were: 7; dazomet, 2; cabbage+solarization and 3; dichloropropen+chloropicrin in second group of significance, without any difference among them.

VARIABLE: **Number of remain melons**

	BLOCKS			
TREAT.	1	2	3	4
1	24.0000	7.0000	28.0000	41.0000
2	51.0000	39.0000	35.0000	34.0000
3	19.0000	24.0000	29.0000	31.0000
4	32.0000	35.0000	21.0000	27.0000
5	13.0000	16.0000	10.0000	11.0000
6	37.0000	28.0000	35.0000	32.0000
7	19.0000	18.0000	14.0000	22.0000
8	19.0000	16.0000	23.0000	35.0000

ANALYSIS OF VARIANCE

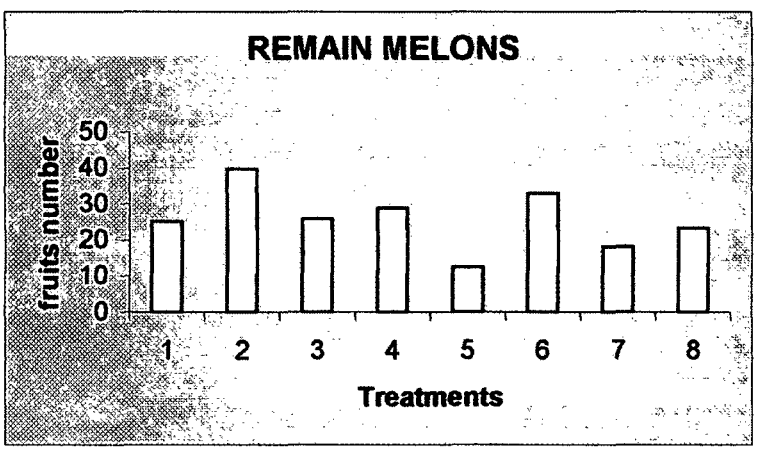
FV	GL	SC	CM	F	P>F
TREATMENTS	7	1984.718750	283.531250	5.4109 **	0.001
BLOCKS	3	180.343750	60.114582	1.1472	0.354
ERROR	21	1100.406250	52.400299		
TOTAL	31	3265.468750			

C.V. = 28.08%

COMPARISON OF STATISTIC ANALYSIS IN ORDER TO OBTAIN SIGNIFICANCE LEVEL AMONG TREATMENTS, USING TUKEY TEST 0.05

TREATMENTS	AVERAGE
2	39.7500 A
6	33.0000 AB
4	28.7500 ABC
3	25.7500 ABC
1	25.0000 ABC
8	23.2500 ABC
7	18.2500 BC
5	12.5000 C

SIGNIFICANCE LEVEL = 0.05
TUKEY = 17.1831



INTERPRETATION OF RESULTS:

Based on achieved results on statistic analysis in remain melon number harvested each treatment we could observe that there are highly significant differences among them. Treatments grouped in 5 groups from mayor to minor remain producer: first place, treatment 2; cabbage+solarization with 39.75 melons average; second place treatments: 6; metam sodium with 33.0 fruits; third place treatments: 4; methyl bromide, 3; dichloropropen+chloropicrin, 1; control and 8; dichloropropen with 28.75, 25.75, 25.0 and 23.25 melons respectively; fourth place was for treatment 7; dazomet, with 18.25 melons and fifth place treatment 5; chloropicrin. This last treatment produces less remain fruits with 12.5 melons.

VARIABLE: Total of melons (Export + Remain)

	BLOCKS			
TREAT.	1	2	3	4
1	80.0000	68.0000	110.0000	97.0000
2	69.0000	71.0000	71.0000	67.0000
3	48.0000	46.0000	56.0000	51.0000
4	115.0000	90.0000	86.0000	79.0000
5	70.0000	78.0000	97.0000	76.0000
6	79.0000	93.0000	93.0000	91.0000
7	55.0000	53.0000	44.0000	41.0000
8	95.0000	98.0000	92.0000	80.0000

ANALYSIS OF VARIANCE

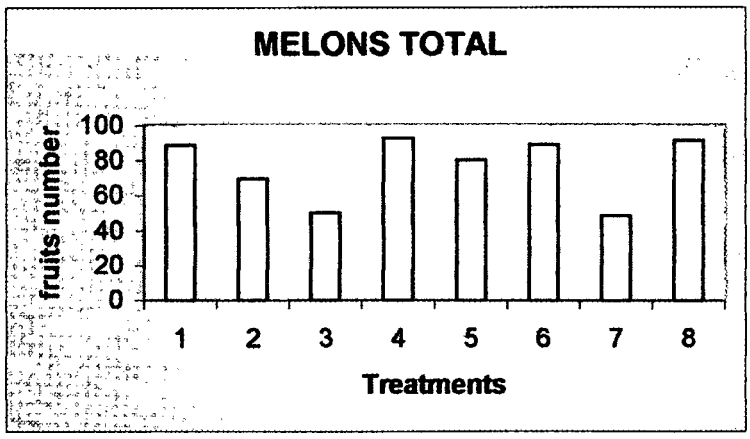
FV	GL	SC	CM	F	P>F
TREATMENTS	7	9317.718750	1331.102661	11.6841 **	0.000
BLOCKS	3	309.343750	103.114586	0.9051	0.543
ERROR	21	2392.406250	113.924110		
TOTAL	31	12019.468750			

C.V. = 14.00%

AVERAGE COMPARISON OF STATISTIC ANÁLISIS IN ORDER TO ACHIEVE SIGNIFICANCE LEVEL AMONG TREATMENTS, USING TUKEY TEST 0.05

TREATMENT	AVERAGE
4	92.5000 A
8	91.2500 A
6	89.0000 A
1	88.7500 A
5	80.2500 A
2	69.5000 AB
3	50.2500 B
7	48.2500 B

SIGNIFICANCE LEVEL = 0.05
TUKEY = 25.3363



INTERPRETATION OF RESULTS:

Based in statistic results total harvested melons each treatment we found high significant differences among them. Treatments were grouped in three groups from Mayor to minor productor of total fruits: first group we can find: 4; methyl bromide, 8; dichloropropen, 6; metam sodium, 1; control and 5 chloropicrin, with 92.50, 91.25, 89.0, 88.75 and 80.25 melons average, respectively; second group are: 2; cabbage+solarization, with 69.5 fruits average; third group: 3; dichloropropen+chloropicrin and 7; dazomet with 50.25 and 48.25 fruits average, respectively.

GENERAL CONCLUSION:

a) It was obtained more export fruits in next treatments: dichloropropen, chloropicrin, methyl bromide, metan sodium and control

b) Treatments with less remain fruits were: chloropicrin, dichloropropen, dichloropropen+chloropicrin, methyl bromide, dazomet and control.

c) Treatmens which produced more total fruits were: methyl bromide, dichloropropen, metam sodium, chloropicrin, cabbage and control.

d) We didn't find significative differences about phytopatologic problems among treatments, even we observed more phytopatogen nematodes of different species in next treatments: 1; control, 2; cabbage+solarization, dazomet and metam-sodium. We can observe this in nematode population graphs.

CONCLUSION:

Based in achieved results in melon tests season 2000-2001 in La Campana, Ranch in La Paz, B.C. we can concluse that the best treatments were: dichloropropen, chloropicrin, methyl bromide, metam sodium, control and dichloropropen+chloropicrin. These treatments will be repeated during season 2001-2002 in third year of tests in melon crops.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTION.

During August, 2001, it was established the third test of project "Alternatives to the use of Methyl Bromide in the cultivation of **melon.** (*Cucumis melo* L.). we started some tests in Ranch "La Campana", La Paz, Baja California, Sur, Mexico, which consisted in the application of different treatments on soil, in order to analyze the control about soil microorganisms and in crops development, comparing Methyl bromide. We apply this substance in alluvial arenaceous land, with region characteristics (flora and fauna) half-dessert. Agricultural activities are based in drip irrigation, using groundwater table in "La Campana" Ranch, this activity is carried out in seven wills which are strategically distributed. The tests site is at ranch south, in an arenaceous land, which has acid PH. We applied agricultural lime in order to obtain the appropriate PH, to the melon seed (PH 6.5). In this land it hadn't taken place any seed three years ago, and the last cultivation in this land was tomato.

Treatments: Based on obtained results during before experiment from agricultural period 2000-2001 we selected 6 (six) treatments:

The applied treatments were:

1) Control (no treatment);
2) Metham Sodium (50 ml/m^2)
3) Methyl Bromide 40 gr/m^2, 80/20
4) 1,3-Dichloropropen (11.2 ml/m^2)
5) 1,3-Dichloropropen (65%) + chloropicrin (35%) (27 ml/m^2)
6) Chloropicrin (33 ml/m^2)

BODY OF REPORT

Land preparation

The activities in cooperative farmer land started in last August, when "Agrodelicias de la Baja Sur" enterprise heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the installment underground pipeline. Afterwards the beds were marked, arised and flattened. And finally they put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in August, 2001. First we marked the block margins using stakes, afterwards, we drew lines using lame in order to define the blocks. In a piece of land with 18 beds; 50 M length, inside the enterprise commercial land. It was traced four blocks 20 m each; we selected 24 experimental plots with 3 beds, which we applied next randomized treatments:

1). Absolute control. In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application on the soil. The soil remained covered with plastic.

2). 1,3-dichloropopren + chloropicrin. These furrows soil were treated using 27 ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment that we used to apply the chloropicrin and the furrows are covered in black/silver plastic nowadays.

3). Methyl Bromide 80/20. In the four rows, It was applied 40 grs M^2 (80% methyl bromide and 20% chloropicrin). Actually the soil remained covered with plastic.

4). Chloropicrin. On this four furrows were applied $33ml/m^2$ chloropicrin using a little drip application equipment. The furrows were covered in black/silver plastic.

5). Metham-sodium. In this four furrows it was applied. We sprinkled this product using a garden watering can; approximately 50 ml/m^2 metham sodium. After the application, the furrows were covered in black/silver plastic.

6). 1,3-dichloropropen. These furrows soil were treated using 11.2 ml/m^2 1,3-dichloropropen. This application was carried out using the equipment therein before. The furrows are covered in black/silver plastic nowadays.

The treatments were applied in damp soil.

Evaluations are taking place in the central furrow in each experimental unit.

Seeding

The seeding was carried out in September 1^{st}, putting a seed on the ground through little holes in plastic each 45 cm.

RESULTS

Germination Percentage

Six days after carry out the seeding. It was estimated the germinated seed percentage in all the treatments. We counted one furrow on central beds holes in plastic of the experimental units; afterwards, it was counted the emerged seedlings and using this records, it was calculated the germination percentage, which is displayed in tables thereinafter:

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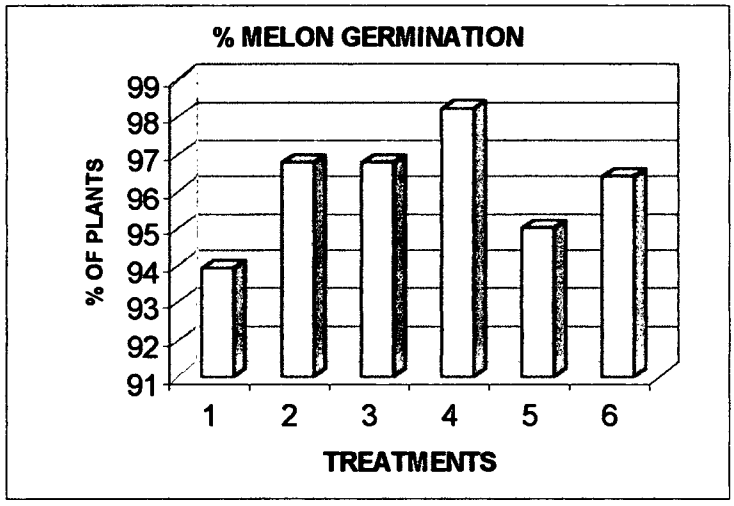
Site: Rancho La Campana, La Paz, B.C.S. **Crop:** Melon

Measurement parameter: Germination's percentage of 70 seeds on 25 lineal m evaluated

Sowing date: December 1st, 2001

Evaluation date: September 7th, 2001

TREATMENT	No. OF MELON EMERGED PLANTS/REPETITION					
	R-I	R-II	R-III	R-IV	TOTAL	%GER.
1. Dichloropropen	67.00	66.00	66.00	64.00	263.00	93.93
2. Chloropicrin	69.00	68.00	66.00	68.00	271.00	96.78
3. Methyl Bromide 40	70.00	68.00	67.00	66.00	271.00	96.78
4. Metam-sodium 50	69.00	69.00	69.00	68.00	275.00	98.21
5. Control	66.00	65.00	67.00	68.00	266.00	95
6. Dichloropropen+Chloropicrin	66.00	67.00	68.00	69.00	270.00	96.42

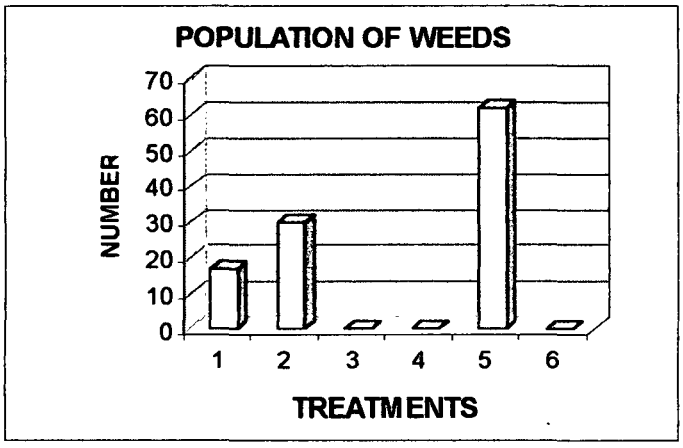


WEEDS POPULATION:

We counted number and species of weeds found in 1 m2 per repetition each treatment.

FACULTAD DE AGRONOMÍA - UNIVERSIDAD AUTONOMA DE SINALOA
Site: Rancho La Campana, La Paz, B.C.S. **Crop:** Melon
Measurement parameter: kind and number of weeds on 1 m2 evaluated
Sowing date: September 1st, 2001
Evaluation date: September 9th, 2001

TREATMENT	NUMBER AND KIND OF WEEDS					TOTAL
	CARDO	ZACATEZ	QUELITES	TOLUACHE	CHUAL	
1. Dichloropropene	0	0	10	2	5	17
2. Chloropicrin	21	7	1	1	0	30
3. Methyl Bromide 40	0	0	0	0	0	0
4. Metam-sodium 50	0	0	0	0	0	0
5. Control	0	0	42	5	15	62
6. Dichloropropen+Chloropicrin	0	0	0	0	0	0



Root disease incidence.- We are carrying out plant observations in order to detect symptoms like yellow leaves, no development, withering or dead, however, nowadays we haven't detected any abnormality.

Nematodes Population. Seven weeks after central furrows transplanting, in each experimental unit, near plant roots, 0-30 cm depth. We took five soil sub sampling, in order to obtain one kg. Sampling. Immediately after that, the soil samplers were processed using sieves 60 and 325 mesh per $Inch^2$. We didn't find nematodes phytoparasites.

We put into a 1,000 ml graduate test tube 400 ml of water, we stirred each soil sample perfectly homogenized. We stirred hard and we put out in a small cask containing 4 liters of water. Afterwards the soil was dissolved in water, allowed to stand for 20 seconds and this water with the soil was passed through a 60 mesh sieves and this soil with water was put into a second small cask. Subsequently it was stirred again allowing to stand for 20 seconds, then it was passed through a 325 sieve mesh. The soil retained in this sieve mesh was taken using a teaspoon and it was passed into a 100 ml flask and it was taken to the Faculty of Agronomy Phytopatology lab in order to carry out nematodes extraction. In lab the soil from the flasks was put on a piece of toilet paper which was on a wire mesh, which was on a plastic funnel. In the funnel extreme it was put a flexible plastic hose which was stopped up using a pincer; the funnel was filled up of water until this touch the sieved soil. After 24 hours, from the bottom extreme hose, we pick up a 10 ml. Sample; it was gauged again using clean water, and after 24 hours again it was taken another water sample with nematodes. This activity was repeated in all 52 samples.

Using a biological microscope we observed the nematodes and we counted which we found in 1 ml. Aliquots. Afterwards we calculated the founded populations in 20 ml of water which we obtained using the sieve funnel method. These samples correspond to the soil 200 ml populations.

PRODUCTION OF FUITS: Yield evaluation took place in November 2001, on 1 central bed 20 lineal meters each repetition per treatment. Fruit were classified sizes and commercial categories 6,9,12,15,18, and 23 and remains. In order to compare results per treatment, we separated exportation fruits per repetition and remain fruits, and we considered total average production per categories and we recorded separately in order to observe differences among treatments. The results are showed on next tables.

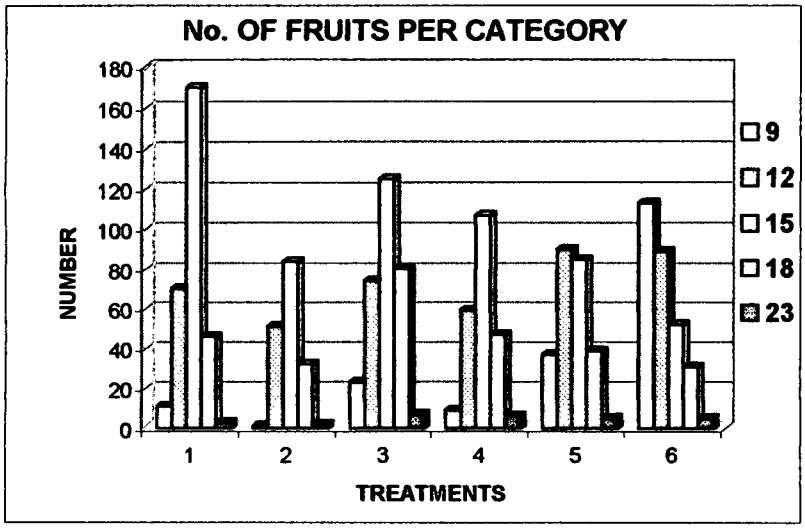
FACULTAD DE AGRONOMÍA - UNIVERSIDAD AUTONOMA DE SINALOA

Site: Rancho La Campana, La Paz, B.C.S. **Croo:** Melon

Measurement parameter: Yield on 20 lineal m evaluated/repetition

Sowing date: September 1st, 2001 Evaluation date: Nov 10th, 2001

TREATMENT	# OF FRUITS PER CATEGORY				
	9	12	15	18	23
1. Dichloropropen	11.00	70.00	170.00	46.00	3.00
2. Chloropicrin	1.00	51.00	84.00	32.00	2.00
3. Methyl Bromide 40	23.00	74.00	125.00	80.00	7.00
4. Metam-sodium 50	9.00	59.00	107.00	47.00	6.00
5. Control	37.00	90.00	85.00	39.00	5.00
6. Dichloropropen+Chloropicrin	113.00	89.00	52.00	31.00	5.00



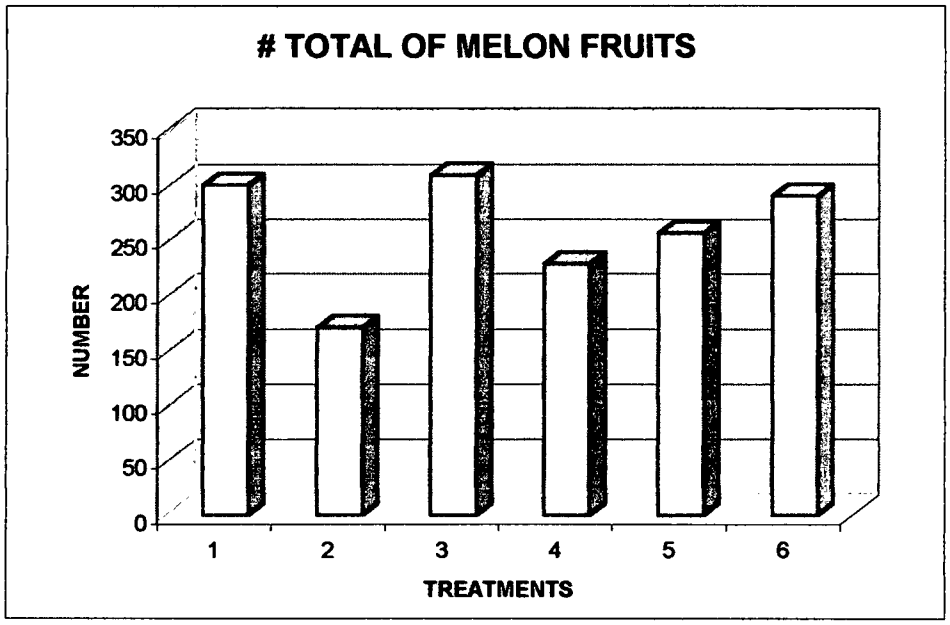
FACULTAD DE AGRONOMÍA - UNIVERSIDAD AUTONOMA DE SINALOA

Site: La Campana Ranch, La Paz, B.C.S. **Crop:** Melon

Measurement parameter: Production on 20 m evaluated lineal/repetition

Sowing date: September 1st, 2001 **Evaluation date**: November 10th, 2001

TREATMENT	# MELON FRUITS				
	R-I	R-II	R-III	R-IV	TOTAL
1. Dichloropropene	76	70	80	74	300
2. Chloropicrin	40	43	36	51	170
3. Methyl Bromide 40	88	57	99	65	309
4. Metam-sodium 50	59	60	55	54	228
5. Control	64	58	69	65	256
6. Dichloropropen+Chloropicrin	77	69	69	75	290



STATISTIC ANALYSIS OF RESULTS OBTAINED IN MELON CROP. LA CAMPANA RANCH. SOWING ON SEPTEMBER 1st, and HARVESTED on November 10th., 2001.

Table 1. Treatments and Number of melons per sizes.

TREATMENTS	SIZES	Rep 1	Rep 2	Rep 3	Rep 4
1. Dichloropropene	9	3	2	2	4
	12	17	15	21	17
	15	46	45	44	35
	18	10	8	13	15
	23	0	0	0	3
2. Chloropicrin	9	0	1	0	0
	12	13	12	10	16
	15	17	23	21	23
	18	10	6	5	11
	23	0	1	0	1
3. Methyl Bromide 40	9	12	2	6	3
	12	20	17	23	14
	15	27	22	42	34
	18	25	14	27	14
	23	4	2	1	0
4. Metam – Sodium 50	9	5	3	0	1
	12	17	16	12	14
	15	21	27	30	29
	18	16	12	10	9
	23	0	2	3	1
5. Control	9	7	6	10	14
	12	25	17	28	20
	15	20	22	22	21
	18	12	13	7	7
	23	0	0	2	3
6. Dichloropropene + Chloropicrin	9	29	28	30	26
	12	21	23	20	25
	15	16	10	12	14
	18	8	8	5	10
	23	3	0	2	0

Table 2. A N A L Y S I S O F V A R I A N C E PER TERTMENTS AND SIZES

FV	GL	SC	CM	F		P>F
REPETITIONES	3	54.423828	18.141275	1.6358	NS	0.186
TREATMENTS	5	701.642578	140.328522	12.6537	**	0.000
SIZES	4	8637.548828	2159.387207	194.7156	**	0.000
TREAT – SIZ.	20	4234.150391	211.707520	19.0900	**	0.000
ERROR	87	964.826172	11.089956			
TOTAL	119	14592.591797				

C.V. = 25.73%

Table 3. AVERAGES OF TREATMENTS

TREATMENTS	AVERAGE
1	15.000000
2	8.500000
3	15.450000
4	11.400000
5	12.800000
6	14.500000

Table 4. AVERAGES OF SIZES

SIZES	AVERAGE
1. 9	8.083333
2. 12	18.041666
3. 15	25.958334
4. 18	11.458333
5. 23	1.166667

Average 5. COMPARISON OF TREATMENT'S AVERAGE

TREATMENT	AVERAGE
3	15.4500 A
1	15.0000 A
6	14.5000 A
5	12.8000 AB
4	11.4000 BC
2	8.5000 C

LEVEL OF SIGNIFICANCE = 0.05
TUKEY = 3.0776
VALUES OF TABLES:
q(0.05) = 4.13 q(0.01) = 4.94

Table 6. COMPARISON OF SIZES' AVERAGES

SIZES	AVERAGE
3. 9	25.9583 A
2. 12	18.0417 B
4. 15	11.4583 C
1. 18	8.0833 D
5. 23	1.1667 E

LEVEL OF SIGNIFICANCE = 0.05
TUKEY = 2.6871
VALUES OF TABLES:
q(0.05) = 3.95 q(0.01) = 4.77

Table 7. COMPARISON OF TREATMENT'S AVERAGE AND MELON'S SIZES

TREATMENTS	Size 9	Size 12	Size 15	Size 18	Size 23	AVERAGE
1. Dichloropropene	2.74 BC	17.50 AB	42.50 A	11.50 B	0.75 A	15.00
2. Chloropicrin	0.25 C	12.75 B	21.00 C	8.00 B	0.50 A	8.50
3. Methyl Bromide 40	5.75 BC	18.50 AB	31.25 B	20.00 A	1.75 A	15.45
4. Metan – Sodium 50	2.25 C	14.75 B	26.75 BC	11.75 B	1.50 A	11.40
5. Control	9.25 B	22.50 A	21.25 C	9.75 B	1.25 A	12.80
6. Dichloropropen + Chloropicrin	28.25 A	22.25 A	13.00 D	7.75 B	1.25 A	14.50
AVERAGE	8.08	18.04	25.96	11.46	1.17	

Value of Tukey = 6.5821 $q_{(0.05)}$ = 3.95 $q_{(0.01)}$ = 4.77

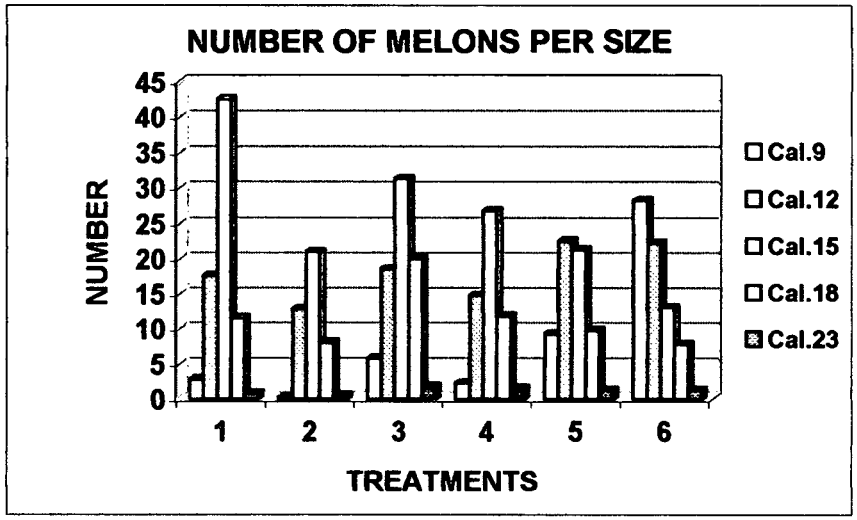


Table 8. VARIABLE: Number of melons per treatment (Sum of all sizes)

TREATMENTS	REPETITIONS 1	2	3	4
1. Dichloropropene	76.0000	70.0000	80.0000	74.0000
2. Chloropicrin	40.0000	43.0000	36.0000	51.0000
3. Methyl Bromide 40	88.0000	57.0000	99.0000	65.0000
4. Metan – Sodium 50	59.0000	60.0000	55.0000	54.0000
5. Control	64.0000	58.0000	69.0000	65.0000
6. Dichlorop + Chlorop	77.0000	69.0000	69.0000	75.0000

Table 9. A N A L Y S I S O F V A R I A N C E O F TREATMENTS (Sum of all sizes)

FV	GL	SC	CM	F	P>F
TREATMENTS	5	3508.210938	701.642212	8.8545 **	0.001
REPETITIONS	3	272.125000	90.708336	1.1447	0.364
ERROR	15	1188.625000	79.241669		
TOTAL	23	4968.960938			

C.V. = 13.76%

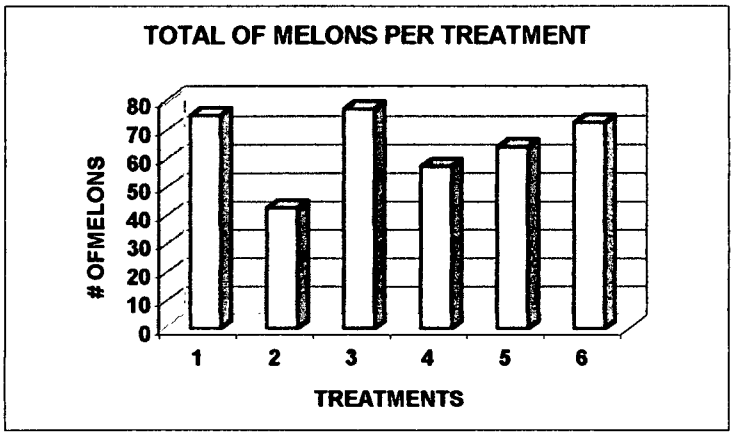
Table 10. A V E R A G E (Sum of all sizes)

TREATMENT	AVERAGE
1	75.000000
2	42.500000
3	77.250000
4	57.000000
5	64.000000
6	72.500000

Table 11. COMPARISON OF A V E R A G E (Sum of all sizes)

TREATMENT	AVERAGE
3	77.2500 A
1	75.0000 A
6	72.5000 A
5	64.0000 A
4	57.0000 AB
2	42.5000 B

LEVEL OF SIGNIFICANCE = 0.05
TUKEY = 20.4741: VALUES OF TABLES (0.05), (0.01) = 4.60, 5.80



INTERPRETATION OF RESULTS:

Analysis of variance resulted highly significant effects for treatments, categories or sizes and treatments-sizes.

Comparison of treatment' averages. It was made three groups of significance. First place of significance in treatments was 3, Methyl Bromide 40, 1; Dichloropropene and 6; Dichloropropene + Chloropicrina, with 15.45, 15.00 and 14.50 melons respectively. Second place are treatments 5; Control and 4; Metam Sodium 50, with 12.80 and 11.40 melons respectively. Last place was treatment 2;Chloropicrin, with 8.50 melons average.

Comparison of sizes' average. All sizes were statistically different. Size 15 was on first place with 25.96 melons average; then it was size 12 with 18.04 melons average; third place was size 18 with 11.46 melons average. Size 9 average was 8.08 melons. Fourth place. The most low average was of 1.17 melons, and was size 23.

FINAL CONCLUSIONS.

In general, and according to the results obtained in melon tests, chemical treatments that in some experiments showed greater total production and per calibers they were: Dichloropropen + chloropicrin and Methyl bromide.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

FINAL PROJECT REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP: Melon (*Cucumis melo* L.)

PROJECT AREAS: Experimental units will be located in "Las Carmelitas" Ranch, Jiquilpan, Colima, Mexico.

Executive Manager: Sr. Felipe de Jesús Michel Ruiz
Field Manager: Ing. David Michel
Enterprise Address: 5 de mayo # 234-2
Colima, Colima.
C.P. 28,000
Tels: (01) (3) 31-20-669, 31-21001, 31-20-286

Culiacan, Sinaloa, March, 2004.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

FINAL PROJECT REPORT: Alternatives to the use of Methyl Bromide in the cultivation of **melon.** (*Cucumis melo* L.). In "Las Carmelitas, Ranch", Colima, Colima, Mexico. Universidad Autónoma de Sinaloa, Agronomy Faculty Responsible: MC. Francisco Javier Estrada Ramirez, Project Coordinator, and MC. Sostenes Montoya Angulo, Agronomist, in the tests implementation. QFB. María de la Luz Acosta Pineda y MC. Carlos Morales Cazarez, Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

INTRODUCTION

During June, 2001, we started some tests in Colima, Colima, Mexico, which consisted in the application of different treatments on soil, in order to analyze the control about soil microorganisms and in crops development, comparing Methyl bromide. We apply this substance in alluvial land. Agricultural activities are based in drip irrigation.

Treatments: we selected 9 (nine) treatments:

The applied treatments were:

1) Control (no treatment);
2) Metham Sodium (50 ml/m^2)
3) Methyl Bromide 40 gr/m^2, 80/20
4) Methyl Bromide 15 gr/m^2, 80/20
5) Metham Sodium (25 ml/m^2) + solarization
6) 5 kg/m2 Corn remain plants + Nitrogen fertilizer (1 kg/M2) + solarization
7) 5 kg/M2 Melon remain plants + 1 kg/M2 bovine cattle manure + solarization
8) 1,3-Dichloropropen (65%) + chloropicrin (35%) (27 ml/m^2)
9) Chloropicrin (33 ml/m^2)

BODY OF REPORT

Land preparation

The activities in cooperative farmer land started in last June, when "Las Carmelitas, ranch" heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the installment underground pipeline. Afterwards the beds were

marked, arised and flattened. And finally they put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in June, 2001. First we marked the block margins using stakes, afterwards, we drew lines using lame in order to define the blocks. In a piece of land with 27 beds; 50 M length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 36 experimental plots with 3 beds, which we applied next randomized treatments:

1). Absolute control. In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application on the soil. The soil remained covered with plastic.

2). 1,3-dichloropopren + chloropicrin. These furrows soil were treated using 27 ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment that we used to apply the chloropicrin and the furrows are covered in black/silver plastic nowadays.

3). Methyl Bromide 80/20. In the four rows, It was applied 40 grs M^2 (80% methyl bromide and 20% chloropicrin). Actually the soil remained covered with plastic.

4). Methyl Bromide 80/20. In the four rows, It was applied 15 grs M^2 (80% methyl bromide and 20% chloropicrin). Actually the soil remained covered with plastic.

5). Chloropicrin. On this four furrows were applied $33ml/m^2$ chloropicrin using a little drip aplication equipment. The furrows were covered in black/silver plastic.

6). Metham-sodium. In this four furrows it was applied. We sprinkled this product using a garden watering can; approximately 50 ml/m^2 metham sodium. After the application, the furrows were covered in black/silver plastic.

7). Metham-sodium. In this four furrows it was applied. We sprinkled this product using a garden watering can; approximately 25 ml/m^2 metham sodium. After the application, plus solarization.

8). 5 kg/m2 Corn remain plants + Nitrogen fertilizer (1 kg/M2) + solarization

9). 5 kg/M2 Melon remain plants + 1 kg/M2 bovine cattle manure + solarization

The treatments were applied in damp soil. Evaluations are taking place in the central furrow in each experimental unit.

Planting

Planting was carried out in November. Plants were sowing 30 cm. Separated among each.

RESULTS.

MELON EXPERIMENT RESULTS IN COLIMA

Yield results weren't significant, because we just took a representative sampling each treatment. Farm Engineer just observed yield on 5 lineal meters per treatment, which isn't reliable. In order to reinforce results explanation on February 23rd, 2002, we took place an visual analysis. We can appreciate behavior that different treatments developed in the farm. We took photographs which we can observe the crops when harvested. We observed an infection by Fusarium oxysporum f.sp. meloni, with next results and conclusions.

PHOTOGRAPH 1. CONTROL. It displayed 100% dead plants. Notice that in order to fill the empty space it was sowed cucumbers.

PHOTOGRAPH 2. METAM – SODIUM 50. It behaved same way than control. It displayed 100% dead plants, and cucumbers were sowed.

PHOTOGRAPH 3. METHYL BROMIDE 40. It was conserved 100% of plants, which showed more vigor and yield than the rest of treatments.

PHOTOGRAPH 4. METHYL BROMIDE 15. You can observe that plants' vigor is minor than Methyl Bromide 40. It showed diseased or dry plants, but with acceptable yield.

PHOTOGRAPH 5. METAM – SODIUM 25 + SOLARIZATION. Noticed that 100% of plants are dead, which remained until yield, and most of fruits didn't ripen.

PHOTOGRAPH 6. CORN STUBBLE + SOLARIZATION. It showed similar results than control. All plants died and produced melons weren't harvested.

PHOTOGRAPH 7. MELON STUBBLE + SOLARIZATION. This treatment was similar than metam-sodium + solarization. Most of the plants remained until yield, but finally they died and fruits didn't ripen.

PHOTOGRAPH 8. DICHLOROPROPEN + CHLOROPICRIN. Its behavior was similar than Methyl Bromide 15. It didn't show differences in plants vigor and yield. It showed diseased or dried plants same proportion.

PHOTOGRAPH 9. CHLOROPICRIN. We could observe more quantity of dead plants. This treatment was lower than Methyl Bromide 15 and dichloropropene + chloropicrin, but it's better than the other treatments. Methyl Bromide 40 was the best.

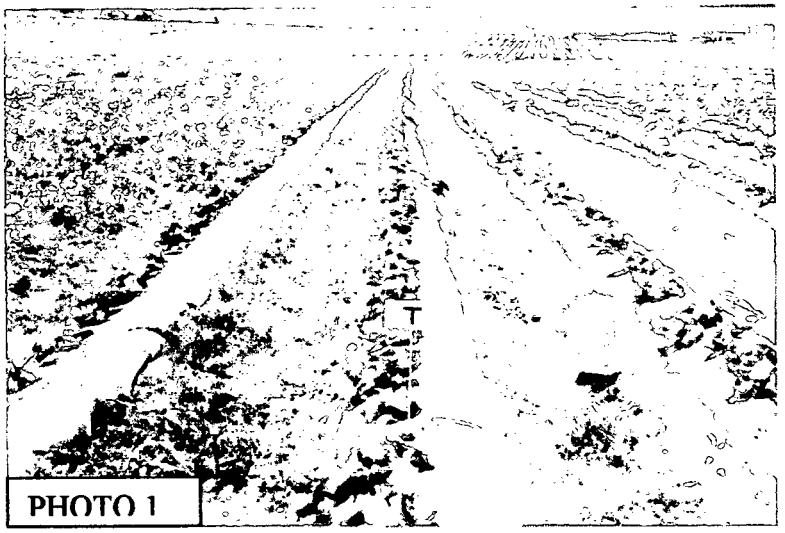


PHOTO 1

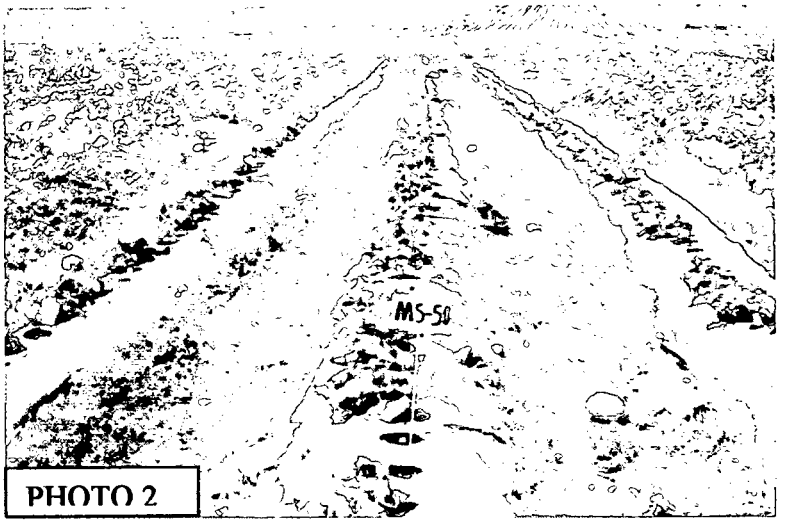
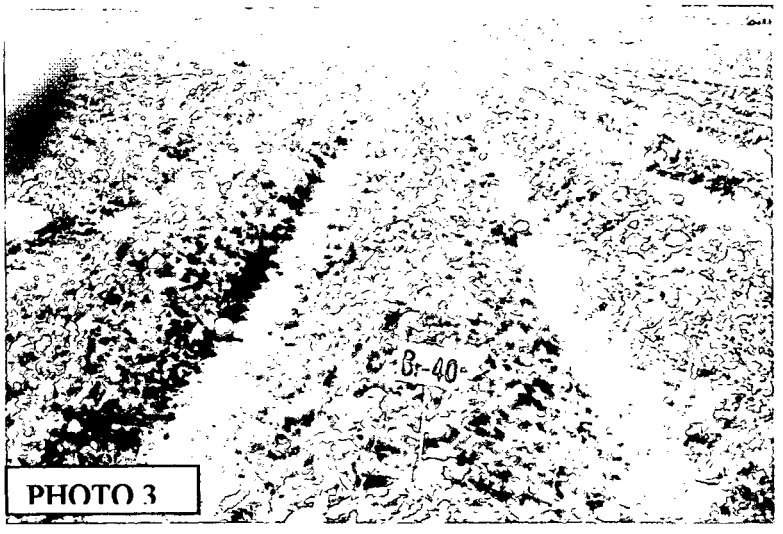


PHOTO 2



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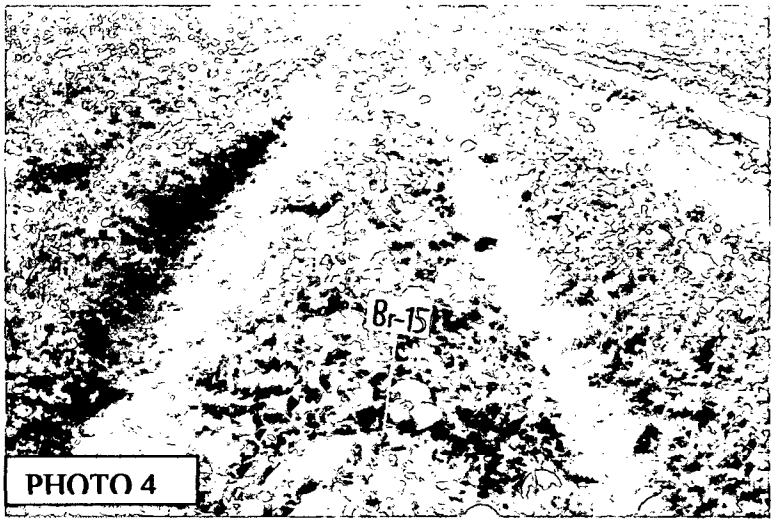

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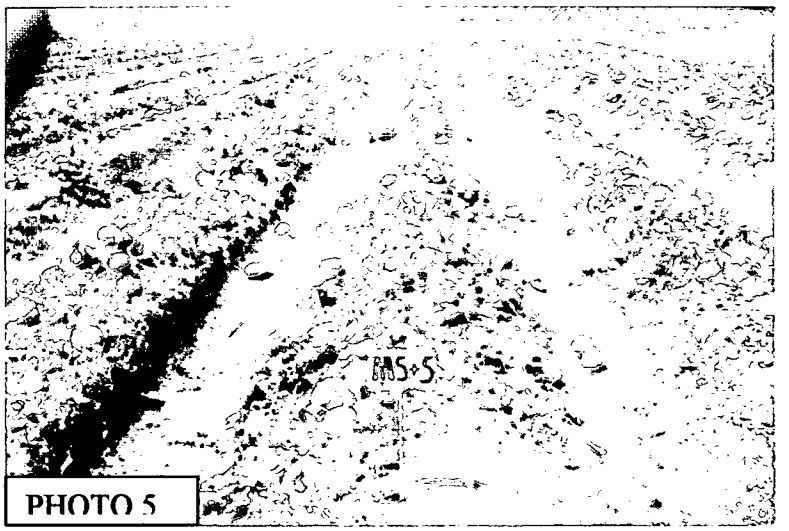


PHOTO 5

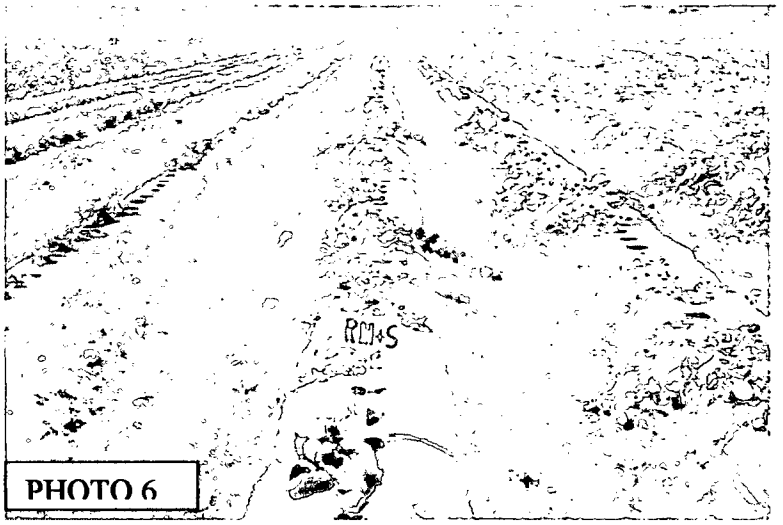


PHOTO 6

PHOTO 7

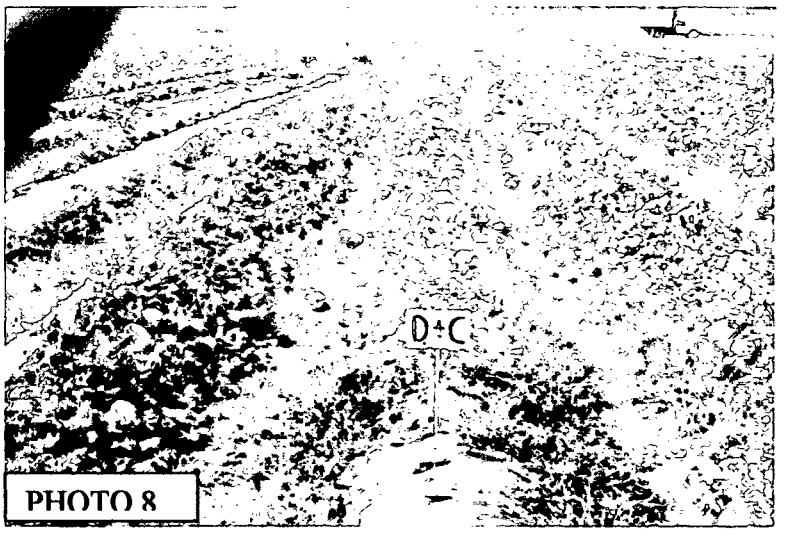


PHOTO 8

PHOTO 9

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTION.

During November, 2002, it was established the second test of project "Alternatives to the use of Methyl Bromide in the cultivation of **melon.** (*Cucumis melo* L.). we started some tests in "Las Carmelitas, Ranch", Colima, Colima, Mexico, which consisted in the application of different treatments on soil, in order to analyze the control about soil microorganisms and crops development, comparing Methyl bromide. We apply this substance in alluvial land. Agricultural activities are based on drip irrigation.

Treatments: Based on before obtained results during last season 2000-2001 we selected 4 (four) treatments.

The applied treatments were:

1) Control (no treatment);
2) Methyl Bromide 40 gr/m^2, 80/20
3) 1,3-Dichloropropen (65%) + chloropicrin (35%) (27 ml/m^2)
4) Chloropicrin (33 ml/m^2)

BODY OF REPORT

Land preparation

The activities in cooperative farmer land started in last November, when "Las Carmelitas, ranch" heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the installment underground pipeline. Afterwards the beds were marked, arised and flattened. And finally they put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

Experiment Design

The treatment designs were carried out in November, 2002. First we marked the block margins using stakes, afterwards, we drew lines using lame in order to define the blocks. In a piece of land with 12 beds; 100 M length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 36 experimental plots with 3 beds, which we applied next randomized treatments:

1). **Absolute control.** In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application on the soil. The soil remained covered with plastic.

2). **1,3-dichloropopren + chloropicrin.** These furrows soil were treated using 27 ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment that we used to apply the chloropicrin and the furrows are covered in black/silver plastic nowadays.

3). **Methyl Bromide** 80/20. In the four rows, It was applied 40 grs M^2 (80% methyl bromide and 20% chloropicrin). Actually the soil remained covered with plastic.

4). Chloropicrin. On this four furrows were applied $33ml/m^2$ chloropicrin using a little drip aplication equipment. The furrows were covered in black/silver plastic.

The treatments were applied in damp soil.

Evaluations are taking place in the central furrow in each experimental unit.

Planting

Planting was carried out in December. Plants were sowing 30 cm. Separated among each.

YIELD RESULTS

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

Site: El Bajio ranch, Colima, Colima **Crop**: Melon cv. Pacstart
Evaluation parameter: Yield on 20 m. lineal/repetition/treatment
Planting date: December 7th, 2002
Evaluation date: February 10th, 2003
METHYL BROMIDE 40

REPETITION	NUMBER OF FRUITS/CATEGORY/REPETITION							
	6	9	12	15	18	23	TOTAL	REMAIN
I	0	8	13	16	13	5	55	5
II	1	10	18	8	18	3	58	2
III	1	12	17	21	19	3	73	1
IV	0	8	23	13	19	3	66	2
Total	**2**	**38.00**	**71.00**	**58.00**	**69.00**	**14.00**		**10.00**
Average	**0.50**	**9.50**	**17.75**	**14.50**	**17.25**	**3.50**		**2.50**

CHLOROPICRIN

REPETITION	NUMBER OF FRUITS/CATEGORY/REPETITION							
	6	9	12	15	18	23	TOTAL	REMAIN
I	0	9	15	16	19	3	62	2
II	1	12	21	15	13	7	69	4
III	2	15	25	10	25	7	84	1
IV	0	7	20	16	22	4	69	2
Total	**3**	**43.00**	**81.00**	**57.00**	**79.00**	**21.00**		**9.00**
Average	**0.75**	**10.75**	**20.25**	**14.25**	**19.75**	**5.25**		**2.25**

DICHLOROPROPEN + CHLOROPICRIN

REPETITION	NUMBER OF FRUITS/CATEGORY/REPETITION							
	6	9	12	15	18	23	TOTAL	REMAIN
I	0	5	15	14	18	10	62	3
II	1	13	17	17	17	9	74	1
III	0	12	20	27	25	3	87	1
IV	0	6	16	20	24	2	68	2
Total	**1**	**36.00**	**68.00**	**78.00**	**84.00**	**24.00**		**7.00**
Average	**0.25**	**9.00**	**17.00**	**19.50**	**21.00**	**6.00**		**1.75**

BIOTROL

REPETITION	NUMBER OF FRUITS/CATEGORY/REPETITION							
	6	9	12	15	18	23	TOTAL	REMAIN
I	2	10	13	14	15	5	59	6
II	1	15	17	13	10	2	58	2
III	0	11	27	17	9	3	67	2
IV	1	15	21	17	10	3	67	2
Total	**4**	**51.00**	**78.00**	**61.00**	**44.00**	**13.00**		**12.00**
Average	**1.00**	**12.75**	**19.50**	**15.25**	**11.00**	**3.25**		**3.00**

CONTROL

REPETITION	NUMBER OF FRUITS/CATEGORY/REPETITION							
	6	9	12	15	18	23	TOTAL	REMAIN
I	0	5	9	15	24	9	62	0
II	0	16	13	19	37	3	88	1
III	1	8	17	17	30	2	75	1
IV	0	16	13	10	18	6	63	2
Total	**1**	**45.00**	**52.00**	**61.00**	**109.00**	**20.00**		**4.00**
Average	**0.25**	**11.25**	**13.00**	**15.25**	**27.25**	**5.00**		**1.00**

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

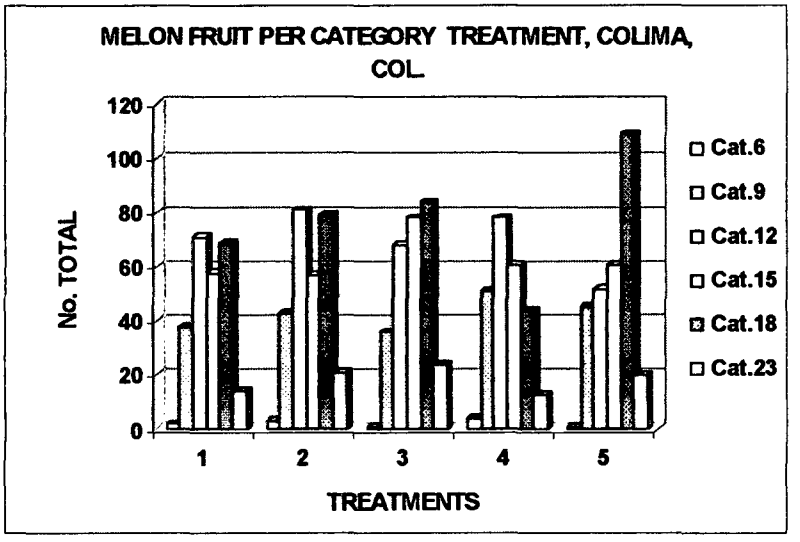
Site: El Bajio ranch, Colima, Colima **Crop: Melon cv. Pacstart**

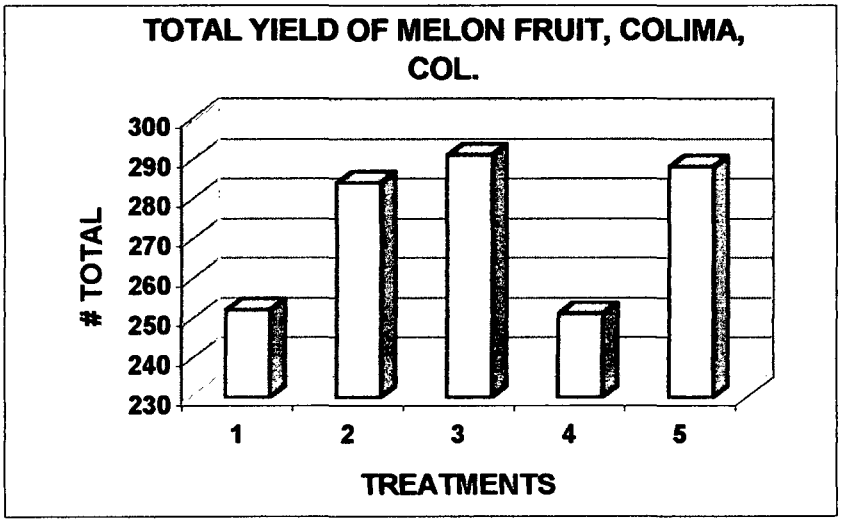
Evalution parameter: Yield on 80 m. lineal/treatment

Planting date: December 7th, 2002

Evaluation parameter: February 10th, 2003

TREATMENTS	NUMBER OF FRUITS/CATEGORY/TREATMENT						
	6	9	12	15	18	23	TOTAL
1. Methyl Bromide 40	2	38	71	58	69	14	**252**
2. Chloropicrin	3	43	81	57	79	21	**284**
3. Dichloropropen+Chloropicrin	1	36	68	78	84	24	**291**
4. Biotrol	4	51	78	61	44	13	**251**
5. Control	1	45	52	61	109	20	**288**





FINAL CONCLUSION. In general, and according to the results obtained in melon tests, chemical treatments that in some experiments showed greater total production and per calibers they were: Dichloropropen + chloropicrin and single chloropicrin, but they are deficient when *Fusarium oxysporum f. sp meloni* or Virus of the Sifting of the melon (MNSV), are present, reason why is not justified as alternative in the melon culture.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA
UNIVERSIDAD AUTONOMA DE SINALOA

FINAL PROJECT REPORT: DEMONSTRATION PROJECT: "Alternatives to the use of Methyl Bromide in cultivation of melons, tomatoes, flowers, strawberries, raspberries and tobacco seedlings in Mexico"

RESPONSIBLES: MC. Francisco Javier Estrada Ramirez
MC. Sostenes Montoya Angulo
Facultad de Agronomia UAS.

CROP: Flowers (*Lilium casablanca*), variety being used by the grower, and harvest will be flowers.

PROJECT AREAS: : Experimental plots will be located in "Villaguerrero" , Estado de México, Mexico.

Enterprise: Cosmoflor, S.A. de C.V.

Enterprise address: 64.5 Km. Toluca-Ixtapa de la Sal Road,

51760 Villaguerrero, México

Tels.: (01714) 1460799 and 98

Fax: (01714) 460577

E-mail: jcalvarez@cosmoflorgrowers.com.mx

Ing. José Carmen Alvarez García

Culiacan, Sinaloa, March, 2004.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

FINAL PROJECT REPORT. Demonstration Project of Alternatives to the use of Methyl Bromide in the cultivation of Flowers (*Lilium Casablanca*). The development in Villaguerrero, estado de México. In this field have been working MC. Francisco Javier Estrada Ramirez, coordinator in this project. And MC. Sostenes Montoya Angulo, agronomist who is implementing the tests. QFB. María de la Luz Acosta Pineda y MC. Carlos Morales Cazarez Colaboradores.

In this month, March 2004, we are reporting performed activities from 1999 to 2004.

INTRODUCTION

Last September, 2002, in Villaguerrero, Mexico, we started taking some tests. We apply different treatments in soil, in order to analyze the control about soil microorganisms and in crops development also, comparing Methyl bromide. We apply this substance in muddy type soil.

Treatments: we applied 10 (ten) treatments:

1. Dichloropropen + chloropicrin 16 ml/m2.
2. Control
3. Methyl bromide 75/25, 40 gr/m2
4. Methyl Bromide 75/25, 20 gr/m2
5. Metam-sodium 50 ml/m2
6. Chloropicrin 33ml/m2
7. Five kg of chicken manure incorporated into soil, plus four weeks of solarization.
8. Five kg of fresh broccoli residue (or other cruciferous plant) incorporated into soil, plus four weeks of solarization.
9. 25 ml/m^2 of metam-sodium (N, methyl sodium ditiocarbamate) plus six weeks of solarization.
10. Five kg of lilium and gervera incorporated into soil, plus four weeks of Solarization

BODY OF THE REPORT

Land preparation

The activities in cooperative farmer land started in last September, when "Villaguerrero" heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil seven beds, after that, they made the installment underground pipeline. Afterwards the beds were marked, arised and flattened. The bed marks were marked 1 m between each one.

Experiment Design

The treatment designs were carried out in September, 2002. In a piece of land with 5 beds, 50 m length, inside the enterprise commercial land. It was traced four blocks 10 m each; we selected 40 experimental plots with 1 beds, which we applied next randomized treatments:

1). 1,3-dichloropopren + chloropicrin. These furrows soil were treated using 27ml/m^2 mixture 1,3-dichloropropeno (65%) chloropicrin (35%). We applied this product using the same equipment used to apply the methyl-bromide, and the furrows were covered in black/silver plastic during 20 days.

2). Absolute control. In this experimental unit consist on 4 rows, 10 M. length, and we didn't realized any fungicide or organic matter application.

3). Methyl Bromide 80/20. In the four rows, It was injected 40 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

4). Methyl Bromide 80/20. In the four rows, It was injected 20 grs M^2 (80% methyl bromide and 20% chloropicrin).The application was approximately 25-30 cm depth.

5). Metham-sodium. In this four furrows it was applied 50 ml/m^2 metham sodium. The furrows were covered in black/silver plastic during 20 days.

6). Chloropicrin. On this four furrows were applied 33ml/m^2 chloropicrin using the same equipment which we applied methyl-bromide. The furrows were covered in black/silver plastic during 20 days.

The treatments were applied on damp soil.

Evaluations are going to take place in the 5 M^2 each repetition.

Planting.

Flower plants will be direct sowing on soil. Four rows 10 cm separated.

Crop Management

Irrigation and fertilization will take place using drip irrigation, and they will be controlled directly by enterprise field manager. Same people will take the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

YIELD RESULTS:

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

SITE: Cosmoflor S.A de C.V. Villa Guerrero Edo. de México
PLANTING DATE: October 17th, 2002 **CROP:** Flower; Lilium casablanca
Evaluation parameter: Plants high cm.
EVALUATION DATE: January 18th, 2003

TREATMENTS	Heigh on Cm. 10 Lilium plants per repetition/treatment																				
	REPETITION I										AVERAG	REPETITION II										AVERAG
1. Control	86	81	83	94	85	92	87	81	80	88	**85.7**	87	85	93	82	88	84	82	84	90	84	**85.9**
2. Methil Bromide 20	95	83	82	78	78	79	83	83	81	77	**81.9**	83	91	90	89	84	92	85	89	85	83	**87.1**
3. Methil Bromide 40	93	95	102	93	90	95	95	92	94	93	**94.2**	90	80	85	97	94	95	91	90	97	97	**91.6**
4. Dichlor+Chloropicrin	90	101	97	93	100	96	98	97	95	94	**96.1**	101	100	101	94	103	95	102	90	95	95	**97.6**
5. Chloropicrin	89	101	94	94	90	103	95	95	98	93	**95.2**	98	97	94	98	96	85	91	93	99	89	**94**
6. Metam sodium 50	87	87	80	80	86	78	85	83	85	85	**83.6**	95	86	86	88	94	88	94	87	89	84	**89.1**
7. Metam sodium 25+sol.	90	85	98	86	92	90	94	92	97	98	**92.2**	87	90	89	84	96	95	94	85	91	102	**91.3**
8. Cabbage+solarization	81	79	78	89	85	80	82	87	88	89	**83.8**	87	90	90	92	89	95	98	105	97	100	**94.3**
9. Hen manure+solarization	92	85	84	97	96	96	88	86	84	77	**88.5**	85	83	88	82	85	92	86	92	86	88	**86.7**
10.Lilium and Gerbera+sol.	81	90	85	85	85	88	85	78	85	90	**85.2**	93	95	93	90	89	92	90	85	75	86	**88.8**

TREATMENTS	Heigh on Cm. 10 Lilium plants per repetition/treatment																				
	REPETITION III										AVERAG	REPETITION IV										AVERAG
1. Control	97	92	86	92	85	90	80	83	84	78	**86.7**	84	85	92	78	87	74	82	89	72	84	**82.7**
2. Methil Bromide 20	83	83	85	95	88	97	82	94	97	96	**90**	87	90	95	92	86	91	95	91	80	87	**89.4**
3. Methil Bromide 40	90	92	91	96	95	90	98	81	86	91	**91**	90	83	85	91	90	90	88	82	92	75	**86.6**
4. Dichlor+Chloropicrin	93	94	95	99	97	92	97	98	83	96	**94.4**	94	93	84	86	80	91	85	87	90	87	**87.7**
5. Chloropicrin	92	90	99	92	90	97	95	93	87	84	**91.9**	99	90	87	95	87	95	94	88	84	90	**90.9**
6. Metam sodium 50	93	90	91	90	80	83	88	95	85	90	**88.5**	97	91	90	90	88	93	90	88	92	93	**91.2**
7. Metam sodium 25+sol.	101	95	90	96	81	80	100	100	93	91	**92.7**	98	98	85	94	104	90	89	102	93	94	**94.7**
8. Cabbage+solarization	106	94	99	100	95	94	97	90	89	91	**95.5**	90	93	81	92	97	101	99	92	86	96	**92.7**
9. Hen manure+solarization	95	85	83	82	80	80	97	95	88	83	**86.8**	88	82	83	82	80	87	75	92	75	81	**82.5**
10.Lilium and Gerbera+sol.	84	82	92	94	82	90	85	85	88	87	**86.9**	82	89	76	80	89	87	91	89	90	95	**86.8**

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

SITE: Cosmoflor S.A de C.V. Villa Guerrero Edo. de México

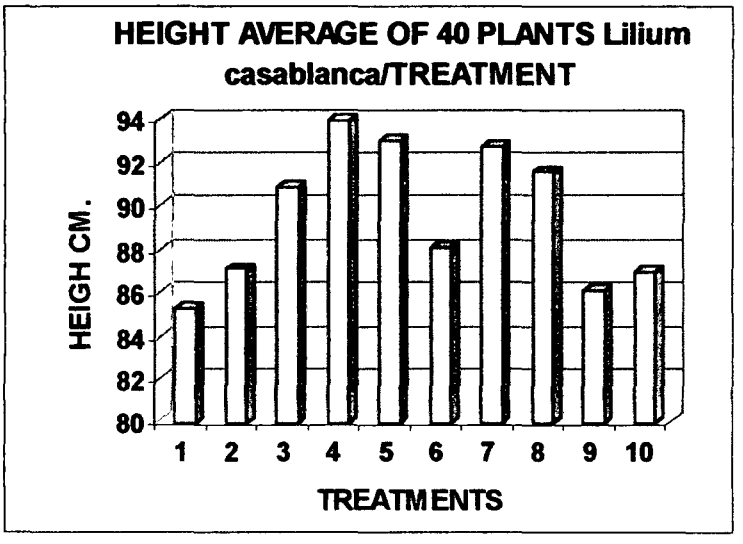
PLANTING DATE: October 17th, 2002

CROP: Flower Lilium casablanca var.

Evaluation parameter: Height on cm. of 10 plants/repetition/treatment

EVALUATION DATE: January 18th, 2003

TREATMENTS	HEIGHT AVERAGE/REPETITION/TREATMENT					
	I	II	III	IV	TOTAL	AVERAGE
1. Control	85.7	85.9	86.7	82.7	341	**85.25**
2. Methil Bromide 20	81.9	87.1	90	89.4	348.4	**87.1**
3. Methil Bromide 40	94.2	91.6	91	86.6	363.4	**90.85**
4. Dichlor+Chloropicrin	96.1	97.6	94.4	87.7	375.8	**93.95**
5. Chloropicrin	95.2	94	91.9	90.9	372	**93**
6. Metam sodium 50	83.6	89.1	88.5	91.2	352.4	**88.1**
7. Metam sodium 25+sol.	92.2	91.3	92.7	94.7	370.9	**92.725**
8. Cabbage+solarization	83.8	94.3	95.5	92.7	366.3	**91.575**
9. Hen manure+solarization	88.5	86.7	86.8	82.5	344.5	**86.125**
10.Lilium and Gerbera+sol.	85.2	88.8	86.9	86.8	347.7	**86.925**



FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

SITE: Cosmoflor S.A de C.V. Villa Guerrero Edo. de México

PLANTING DATE: October 17th, 2002 **CROP**: Flower var.Lilium casablanca

Evaluation parameter: Lenght on cm. 10 flower bud/repetition

EVALUATION: February 21th, 2003

TREATMENTS	Lenght on cm. 10 flower bud/repetition/treatment											
	REPETITION I										TOTAL	AVERAGE
1. Control	11.6	9.5	10.4	9.6	10.4	10.3	10.4	10	9.8	10.8	**102.8**	**10.28**
2. Methil Bromide 20	10	9.7	10.4	10.7	10.4	9.7	10.3	10.5	10.5	12.5	**104.7**	**10.47**
3. Methil Bromide 40	11.9	11.4	10.8	10.5	10	10	10.2	10.6	10.1	11.3	**106.8**	**10.68**
4. Dichlor+Chloropicrin	11.2	10.9	10.1	11.1	10.3	12.3	11	11.2	10.9	10.9	**109.9**	**10.99**
5. Chloropicrin	11.3	10.7	11.4	11.2	11.3	11	11.7	10.9	11.7	11.9	**113.1**	**11.31**
6. Metam sodium 50	11.9	9.5	10	10.5	10	10.5	10.2	9.1	10.6	9.5	**101.8**	**10.18**
7. Metam sodium 25+sol.	11.1	10.3	10.5	10.8	11	12.2	10	10	10	11.5	**107.4**	**10.74**
8. Cabbage+solarization	9.1	9.3	10.5	10.3	10.7	9.7	10.1	11	11.3	10.3	**102.3**	**10.23**
9. Hen manure+solarization	10.4	10.2	10.3	10.9	9.2	10.1	10	9.9	10.5	9.3	**100.8**	**10.08**
10.Lilium and Gerbera+sol.	10.9	10.2	10.1	9.9	9.7	10.3	10.4	10.1	10.5	9.7	**101.8**	**10.18**

TREATMENTS	Lenght on cm. 10 flower bud/repetition/treatment											
	REPETICIÓN II										TOTAL	AVERAGE
1. Control	9.6	8.3	10.1	10.4	10	9.5	9.4	9.9	10.8	10.3	**98.3**	**9.83**
2. Methil Bromide 20	9.6	10.7	10.7	11.2	8.6	8.1	10.4	11.2	11.4	11.5	**103.4**	**10.34**
3. Methil Bromide 40	10.1	9.1	10.2	10.4	9.8	11.5	10	10.5	9.8	11.3	**102.7**	**10.27**
4. Dichlor+Chloropicrin	11.2	12.3	10.9	10.1	10.6	10.7	10.6	10.9	12	11.2	**110.5**	**11.05**
5. Chloropicrin	9.7	11.7	9.8	9.8	10	11.6	9.2	10.6	10	10.4	**102.8**	**10.28**
6. Metam sodium 50	9.2	9.4	10.1	10.3	11.3	10.2	10.8	10.5	10.3	11	**103.1**	**10.31**
7. Metam sodium 25+sol.	8.9	10	9.8	10.7	10.8	10.8	10	10.1	10.2	10.7	**102**	**10.2**
8. Cabbage+solarization	10.2	8.8	10.2	11.4	10	10.4	10.2	10.4	10	10.5	**102.1**	**10.21**
9. Hen manure+solarization	10.4	9.8	10.8	8.7	9.8	10.1	10.6	10.2	10.1	11	**101.5**	**10.15**
10.Lilium and Gerbera+sol.	8.2	9.9	10.1	10.6	9.2	9.8	10	10.5	10.5	9.8	**98.6**	**9.86**

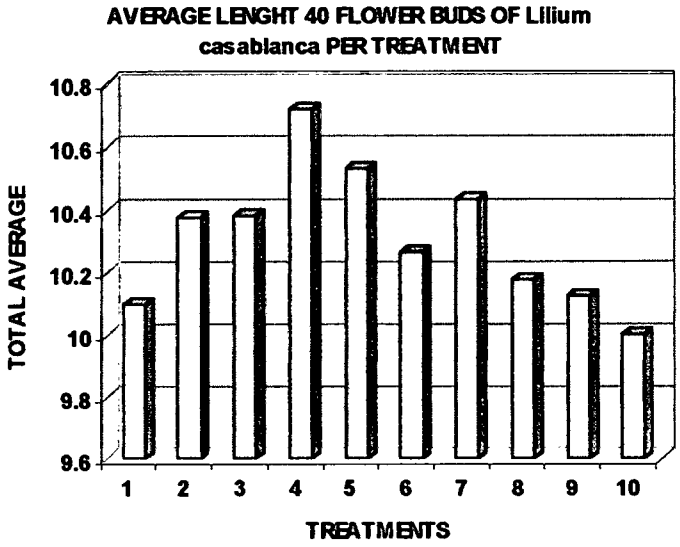
TREATMENTS	Lenght on cm. 10 flower bud/repetition/treatment											
	REPETICIÓN III										TOTAL	AVERAGE
1. Control	9.2	10.2	10.8	10.5	10.3	10.8	10.3	10.1	10.5	10.5	**103.2**	**10.32**
2. Methil Bromide 20	11	10	9.5	9.7	9.9	9.6	10.6	10.5	9.9	11.1	**101.8**	**10.18**
3. Methil Bromide 40	10.5	10.6	10.9	10.6	10.3	10.5	11	9.5	8.6	10.2	**102.7**	**10.27**
4. Dichlor+Chloropicrin	10.1	10.7	11.8	10.3	9.8	9.5	10.7	11.5	11.2	11.3	**106.9**	**10.69**
5. Chloropicrin	11.8	8.7	12	11.2	9.8	9.5	10.7	11.5	11.2	11.3	**107.7**	**10.77**
6. Metam sodium 50	11.1	10.8	9.6	10.8	9.4	9.4	10.6	10.1	10.2	10.3	**102.3**	**10.23**
7. Metam sodium 25+sol.	9.8	10.5	12.1	9.4	10.3	10.2	10.6	11	9.8	11.5	**105.2**	**10.52**
8. Cabbage+solarization	10.1	10.5	10.6	9.5	9.2	10.2	10.5	9.9	10.4	11	**101.9**	**10.19**
9. Hen manure+solarization	9.2	11	10.2	10.1	9.9	10.5	10	10.7	10.7	9.9	**102.2**	**10.22**
10.Lilium and Gerbera+sol.	9.7	9.9	8.3	9.9	11.1	9.1	10.2	10.5	10.2	10.5	**99.4**	**9.94**

TREATMENTS	Lenght on cm. 10 flower bud/repetition/treatment											
	REPETICIÓN IV										TOTAL	AVERAGE
1. Control	10.2	10.2	10	11.3	8.9	10	9.4	9.3	9.5	11	**99.8**	**9.98**
2. Methil Bromide 20	10.4	10	10.9	9.6	11.3	10.2	9.7	11.5	10.9	10.7	**105.2**	**10.52**
3. Methil Bromide 40	11.2	10.1	11.5	10.8	10.9	9	9.1	9.6	10.3	10.7	**103.2**	**10.32**
4. Dichlor+Chloropicrin	10.1	11	10.1	10.6	10.1	9.9	10.6	9.3	9.1	10.7	**101.5**	**10.15**
5. Chloropicrin	10.6	9.2	8.8	9.3	8.6	9.2	10.5	9.5	11.2	10.7	**97.6**	**9.76**
6. Metam sodium 50	11.1	11.4	10.6	10	9.5	10.9	10.1	8.4	10.8	10.8	**103.6**	**10.36**
7. Metam sodium 25+sol.	10.2	9.8	9.5	10.9	11	10.5	9.9	10.4	10.8	9.8	**102.8**	**10.28**
8. Cabbage+solarization	9	9.4	10.3	10.5	11	10	10.6	9.5	9.9	10.7	**100.9**	**10.09**
9. Hen manure+solarization	10.1	10.9	11	9	9.3	10.1	9.8	9.9	9.9	10.6	**100.6**	**10.06**
10.Lilium and Gerbera+sol.	10.5	9.9	10.6	9.2	10.3	9.9	9.6	10	9.2	11.2	**100.4**	**10.04**

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

SITE: Cosmoflor S.A de C.V. Villa Guerrero Edo. de México
PLANTING DATE: October 17th, 2002
Evaluation parameter: Lenght on cm. 10 flower bottom/repetition
EVALUATION: February 21th, 2003
CROP: Flower var.Lilium casablanca

TREATMENTS	LENGHT AVERAGE AT BUD/REPETITION					
	I	II	III	IV	TOTAL	AVERAGE
1. Control	10.28	9.83	10.32	9.98	40.41	**10.1025**
2. Methil Bromide 20	10.47	10.34	10.18	10.52	41.51	**10.3775**
3. Methil Bromide 40	10.68	10.27	10.27	10.32	41.54	**10.385**
4. Dichlor+Chloropicrin	10.99	11.05	10.69	10.15	42.88	**10.72**
5. Chloropicrin	11.31	10.28	10.77	9.76	42.12	**10.53**
6. Metam sodium 50	10.18	10.31	10.23	10.36	41.08	**10.27**
7. Metam sodium 25+sol.	10.74	10.2	10.52	10.28	41.74	**10.435**
8. Cabbage+solarization	10.23	10.21	10.19	10.09	40.72	**10.18**
9. Hen manure+solarization	10.08	10.15	10.22	10.06	40.51	**10.1275**
10.Lilium and Gerbera+sol.	10.18	9.86	9.94	10.04	40.02	**10.005**



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SITE: Cosmoflor S.A de C.V. Villa Guerrero Edo. de México

PLANTING DATE: October 17th, 2002

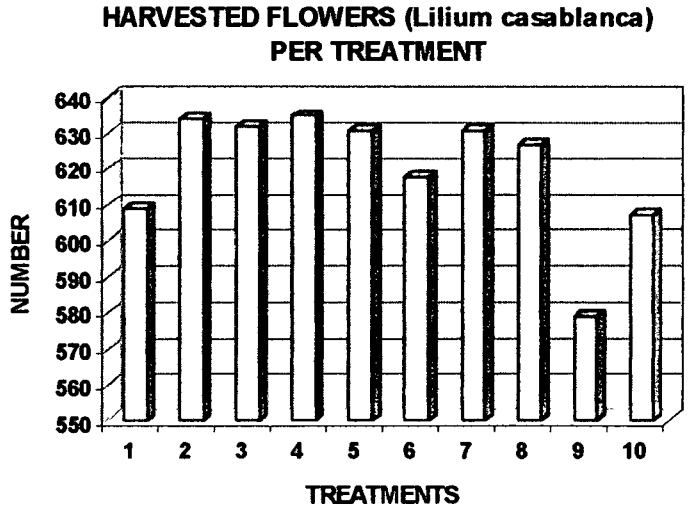
CROP: Flower var.Lilium casablanca

Evaluation parameter: Number of useful plants on 4 m lineal/repetition

EVALUATION DATE: February 21th, 2003

40 bulbs/m. lineal=160 Bulbs.

TREATMENTS	NUMBER OF HARVESTED PLANTS/REPETITION					
	I	II	III	IV	TOTAL	AVERAGE
1. Control	156	154	150	149	609	152.25
2. Methil Bromide 20	159	158	159	158	634	158.5
3. Methil Bromide 40	156	159	157	160	632	158
4. Dichlor+Chloropicrin	158	160	159	158	635	158.75
5. Chloropicrin	158	158	158	157	631	157.75
6. Metam sodium 50	155	156	152	155	618	154.5
7. Metam sodium 25+sol.	157	158	159	157	631	157.75
8. Cabbage+solarization	155	159	158	155	627	156.75
9. Hen manure+solarization	148	149	137	145	579	144.75
10.Lilium and Gerbera+sol.	144	151	159	153	607	151.75



Final conclusion. With based on the yield average of flowers, taking as parameter the number of harvested plants and the length of evaluated floral buds, in Graphs it can be observed the behavior of treatments, where Dichloropropen+chloropicrin, Chloropicrin, Metam sodium+solarization and methyl Bromide are over the rest of the treatments. The flower production is very complicated since a great diversity of species is cultivated, therefore are affected by a range of pathogens of the ground that sometimes are difficult to control. In order to take care of the phytosanitary problems of the ground, we have to give continuity to the test flowers by means of the implementation of a treatment with steam by means of a boiler, since we considered that he is control method more appropriated and mainly respectful with the environment.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

TITLE: Use of *Cucurbita maximaXmoschata* y *Cucumis melo* materials grafting-holder resistant to viruses of sieving (MNSV) as alternative to the use of Methyl Bromide in melon crop. (*Cucumis melo* L.).

RESEARCHERS: Dr. Julio César Tello Marquina
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MC. Carlos Morales Cazarez
QFB. María de la Luz Acosta Pineda
Universidad Autónoma de Sinaloa, México.

RESEARCH SITE: Experiment plots will be in "Las Carmelitas", Ranch, Jiquilpan, Colima, México.(a 26 Km. De Colima).

CROP, VARIETY AND YIELD TO HARVEST: Melon (***Cucumis melo*** L.), any variety that farmer prefers. Variety Pacstart and the harvest will be fruits.

INTRODUCTIÓN.

On November, 2001 in Colima, Colima, Mexico, it started the experiment of melon grafting. They used different materials grafting holder of pumpkin (*Cucurbita maximaXmoschata)* and melon, with genetic resistance to virus of sieving mosaic of melon (MNSV) and soil pathogens like *Fusarium oxysporum, Rhizoctonia* and nematodes. This technique of grafting was used as alternative to the use of Methyl Bromide, which is used by farmers on soil fumigations in order to control pathogens and weeds in some crops.

TREATMENTS. During agricultural cycle 2001-2002 it was applied 7 treatments, which were organized next way:

GRAFTING HOLDER MATERIAL TO USE

We will use two different groups as grafting holder material:

Group A: Hybrid of *Cucurbita maximaXmoschata*:

Crop:	**Enterprise:**
RS841	(Royal Sluis),
PATRÓN F1	(Tezier ibérica)
ULISES	(Ramiro Arnedo)

Group B: Crops of *Cucumis melo* with genetic resistance to mosaic virus of sieved (MNSV).

Crop:	**Enterprise:**
CLX 2705	(Seed Clause)
PRIMAL	(S&G NOVARTIS-ROGERS)

It was used two controls.

1. Sowing (to sow with normal cavity)
2. Repicado (to insert the cavity in other grafting)

BODY OF REPORT.

Land preparation.- The activities in cooperative farmer land started in last June, when "Las Carmelitas, ranch" heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the installment underground pipeline. Afterwards the beds were marked, arisen and flattened. And finally they put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

MATERIALS AND METHODES OF GRAFTING.

In order to carry out grafting, we sowed grafting holder material and commercial melon in trays of 200 cavities. Seeds of *Cucumis melo that* is resistance to sieved virus will be sowed same date than cantaloupe melon. Any seed the farmer choose. *Cucurbita maximaXmoschata* seeds (pumpkin) will be sowed five days after. We want both plants melon and pumpkin have same developed at the date to make grafting. At this time plants will have first two leaves. Which is the optima developed in order to carry out grafting process. The technique used is approximation. This process took place on November 17th, 2001.

After plants have been grafted, they put them in trays of bigger cavity (7x7 cm) and lately they were maintained on high relative humidity under for 72 hours under a taking root chamber In order to be sure that de grafting take root. Then plants were maintained under a shadow-mesh 60 % during 15 or 17 days. Three days before plants were taken to the farm, we cut off the root from grafting in order to check out their taken root.

EXPERIMENTAL DESIGÑ.

Implementation of treatments on land was took carried out on December 8, 2001. We used the blocks design completely randomized, with repetitions. We used 7 treatments; 5 grafting-holder materials and 2 controls, which sum 28 plots or experimental units (u.e.), each experimental units were formed from 4 furrows, 4.5 m length with 30 plants/plot, and evaluations were carried out on two central furrows. All this tasks on a surface of 1000 m^2.

PLANTING.

Plants of grafting melon were planted on beds covered with black plastic, separated 1.80 m and among plants 60 cm. A control without grafting was planted from 30 cm separated. Farmer make this tasks during normal sowings.

Crop Management

Irrigation and fertilization took place using drip irrigation, and they are controlled directly by enterprise field manager. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

RESULTS

DISEASED.

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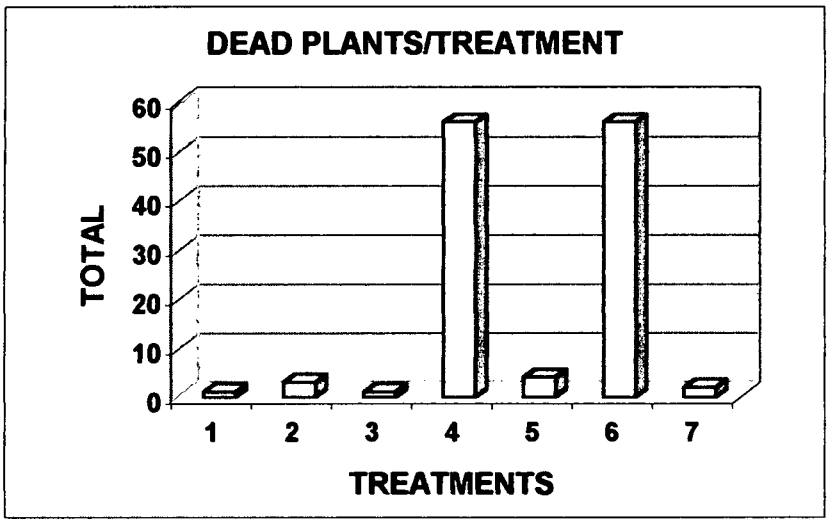
Site: Rancho Las Carmelitas, Colima, Colima
Planting date: December 8th, 2001
Plants per repetition: 14 **Crop:** Melon
Evaluation parameter: Dead plants on two central furrows
Evaluation date: January 3rd, 2002

TREATMENT	REPETITIONS				
	I	II	III	IV	TOTAL
1. Ulises	1	0	0	0	**1**
2. Primal	1	0	0	2	**3**
3. Patron	0	0	0	1	**1**
4. Control 1	14	14	14	14	**56**
5. RS841	2	1	0	1	**4**
6. Control 2	14	14	14	14	**56**
7. CLX 2705	1	0	1	0	**2**



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Site: Rancho Las Carmelitas, Colima, Colima

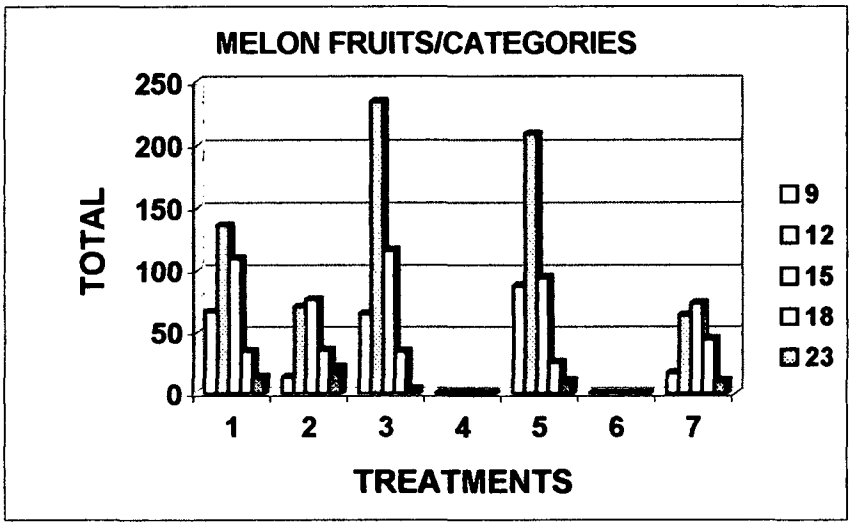
Crop: Melon

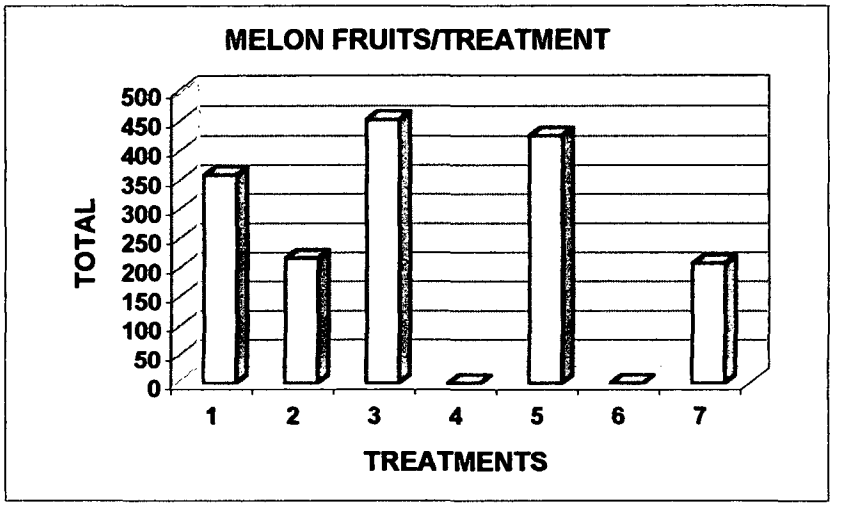
Planting date: December 8th, 2001

evaluation parameter: Total yield of fruits per treatment

Evaluation date: from February 6th, to March 6th, 2002

TREATMENT	SIZES OR CATEGORIES						
	9	12	15	18	23	TOTAL	REMAIN
1. Ulises	66	136	109	34	13	**358**	8
2. Primal	13	70	76	35	21	**215**	4
3. Patron	64	235	116	34	3	**452**	0
4. Control 1	0	0	0	0	0	**0**	0
5. RS841	87	209	94	25	10	**425**	3
6. Control 2	0	0	0	0	0	**0**	0
7. CLX 2705	16	63	73	44	10	**206**	1





CONCLUSION. The results show a greater commercial production in all the grafted melon plants on those of melon not grafted (control), which had zero production, this is because 30 days after transplant all the plants of the control died by attack of *Fusarium oxysporum f. sp. meloni.* Graft holders Patron and RS841 were superior as much in total production as in sizes, followed by Ulises and very underneath are Primal and CLX2705 (graftholder melons). The test was made on ground infested by *Fusarium.*

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

INTRODUCTIÓN.

On October, 2002, in "El bajio", Ranch Colima, Colima, Mexico, it started the experiment of melon grafting. They used different materials grafting holder of pumpkin (*Cucurbita maximaXmoschata)* with genetic resistance to virus of sieving mosaic of melon (MNSV) and soil pathogens like *Fusarium oxysporum, Rhizoctonia* and nematodes. This technique of grafting was used as alternative to the use of Methyl Bromide, which is used by farmers on soil fumigations in order to control pathogens and weeds in some crops.

TREATMENTS. During agricultural cycle 2002-2003 it was applied 5 treatments, which were organized next way:

1.- Grafting. (30 cm among plants)
2.- Grafting (60 cm among plants)
3.- Grafting (90 cm among plants)
4.- Grafting (1.20 m among plants)
5.- Control (30 cm among plants)

GRAFTING HOLDER MATERIAL TO USE

Grafting holder material:
Hybrid RS841 of *Cucurbita maximaXmoschata*:

CROP, VARIETY AND YIELD TO HARVEST: Melon (***Cucumis melo*** L.), any variety that farmer prefers. Variety Pacstart and the harvest will be fruits.

BODY OF REPORT.

Land preparation.- The activities in cooperative farmer land started in last September, when "El Bajio, ranch" heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the installment underground pipeline. Afterwards the beds were marked, arisen and flattened. And finally they put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

MATERIALS AND METHODES OF GRAFTING.

In order to carry out grafting, we sowed grafting holder material and commercial melon in trays of 200 cavities. Any seed the farmer choose. *Cucurbita maximaXmoschata* seeds (pumpkin) sowed five days after. We want both plants melon and pumpkin have same developed at the date to make grafting. At this time plants will have first two leaves. Which is the optima developed in order to carry out grafting process. The technique used is approximation. This process took place on October, 2002.

After plants have been grafted, they put them in trays of bigger cavity (7x7 cm) and lately they were maintained on high relative humidity under for 72 hours under a taking root chamber In order to be sure that de grafting take root. Then plants were maintained under a shadow-mesh 60 % during 15 or 17 days. Three days before plants were taken to the farm, we cut off the root from grafting in order to check out their taken root.

EXPERIMENTAL DESIG:

Implementation of treatments on land was took carried out on November 22, 2002. We used the blocks design completely randomized, with repetitions. We used 5 treatments; 4 grafting-holder materials and 1 control, which sum 20 plots or experimental units (u.e.), each experimental units were formed from 4 furrows, 10 m length and evaluations were carried out on two central furrows. All this tasks on a surface of 1800 m^2.

PLANTING.

Plants of grafting melon were planted on beds covered with black plastic, separated 1.80 m and we will use planting density thereinbefore. Farmer make this tasks during normal sowings.

Crop Management

Irrigation and fertilization took place using drip irrigation, and they are controlled directly by enterprise field manager. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

YIELD RESULTS:

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

Site: El Bajio Ranch, Colima, Colima.
Crop: Grafting of melon **Graft holder material**: Gourd RS 841
Measurement parameter: Yield on 80 m lineal/treatment
Planting date: November 22th, 2002
Evaluation date: January 24th, to February 3th, 2003 **(5 cuttings)**

January 24th, 2003

TREATMENT	NUMBER OF FRUITS/CATEGORY/TREATMENT					
Distance/plants	6	9	12	15	18	23
RS 841 - 0.30 m	0	0	0	2	6	2
RS 841 - 0.60 m	0	0	1	6	5	2
RS 841 - 0.90 m	0	0	1	6	2	0
RS 841 - 1.20 m	0	0	0	3	0	0
Control - 0.30 m	0	0	0	0	1	0

January 27th, 2003

TREATMENT	NUMBER OF FRUITS/CATEGORY/TREATMENT					
Distance/plants	6	9	12	15	18	23
RS 841 - 0.30 m	0	0	0	1	3	1
RS 841 - 0.60 m	0	0	1	6	9	0
RS 841 - 0.90 m	0	0	3	3	4	0
RS 841 - 1.20 m	0	0	2	3	2	0
Control - 0.30 m	0	2	1	0	5	0

January 29th, 2003

TREATMENT	NUMBER OF FRUITS/CATEGORY/TREATMENT					
Distance/plants	6	9	12	15	18	23
RS 841 - 0.30 m	0	0	0	4	9	2
RS 841 - 0.60 m	0	0	2	6	7	0
RS 841 - 0.90 m	0	0	3	8	5	0
RS 841 - 1.20 m	0	1	0	2	3	0
Control - 0.30 m	0	2	3	8	11	3

January 31th, 2003

TREATMENT	NUMBER OF FRUITS/CATEGORY/TREATMENT					
Distance/plants	6	9	12	15	18	23
RS 841 - 0.30 m	0	0	2	3	17	3
RS 841 - 0.60 m	0	0	1	2	7	5
RS 841 - 0.90 m	0	1	9	7	8	0
RS 841 - 1.20 m	0	0	0	3	3	0
Control - 0.30 m	1	10	17	22	37	5

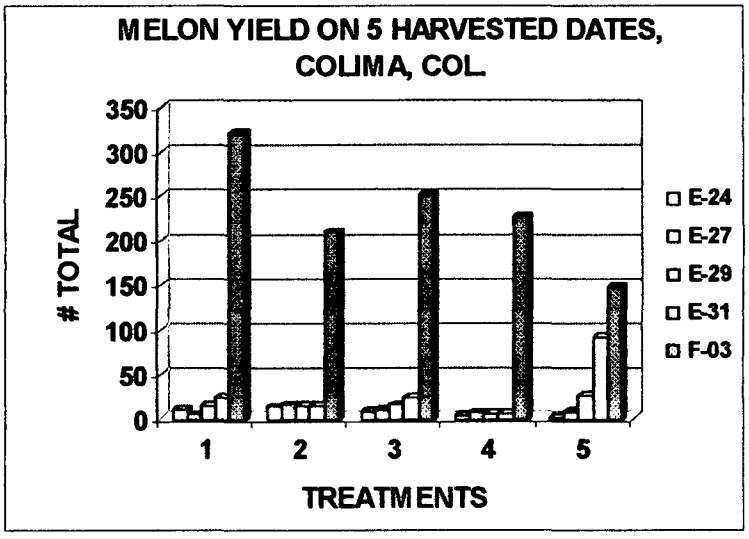
February 3th, 2003

TREATMENT	NUMBER OF FRUITS/CATEGORY/TREATMENT					
Distance/plants	6	9	12	15	18	23
RS 841 - 0.30 m	0	74	114	101	24	9
RS 841 - 0.60 m	2	54	82	49	12	11
RS 841 - 0.90 m	5	85	101	48	13	0
RS 841 - 1.20 m	1	74	101	47	3	0
Control - 0.30 m	0	30	29	29	47	12

FACULTAD DE AGRONOMIA - UNIVERSIDAD AUTONOMA DE SINALOA

Site: El Bajio ranch, Colima, Colima.
Crop: Grafting of melon
Graft older material:Gourd RS 841
Measurement parameter: Yield on 80 m lineal/treatment
Planting date: November 22th, 2002
Evaluation parameter: January 24th, to February 3th, 2003 **(5cuttings)**

TREATMENTS	NUMBER OF FRUITS/HARVESTED DATE/TREATMENT				
Distance/plants	24/01/03	27/01/03	29/01/03	31/01/03	03/02/03
1. RS 841 - 0.30 m	10	5	15	25	322
2. RS 841 - 0.60 m	14	16	15	15	210
3. RS 841 - 0.90 m	9	10	16	25	252
4. RS 841 - 1.20 m	3	7	6	6	226
Control - 0.30 m	1	8	27	92	147



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Site: El Bajio ranch, Colima, Colima.

Site: El Bajio ranch, Colima, Colima.

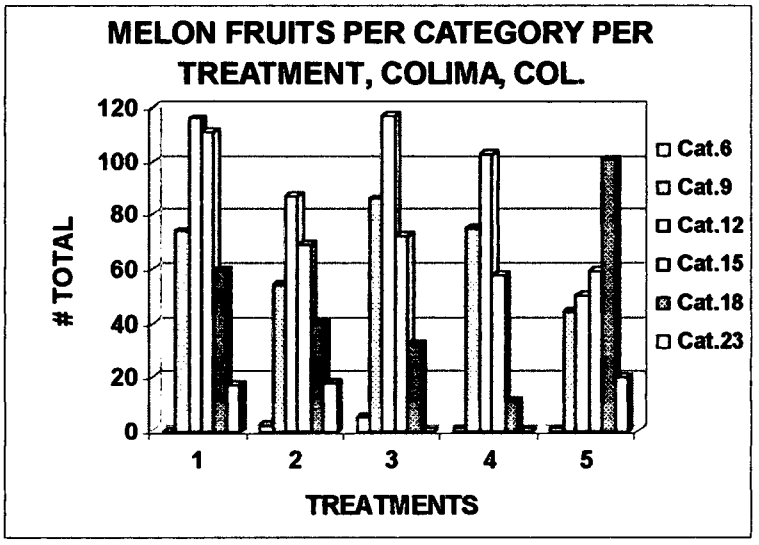
Graft holder material:Gourd RS 841

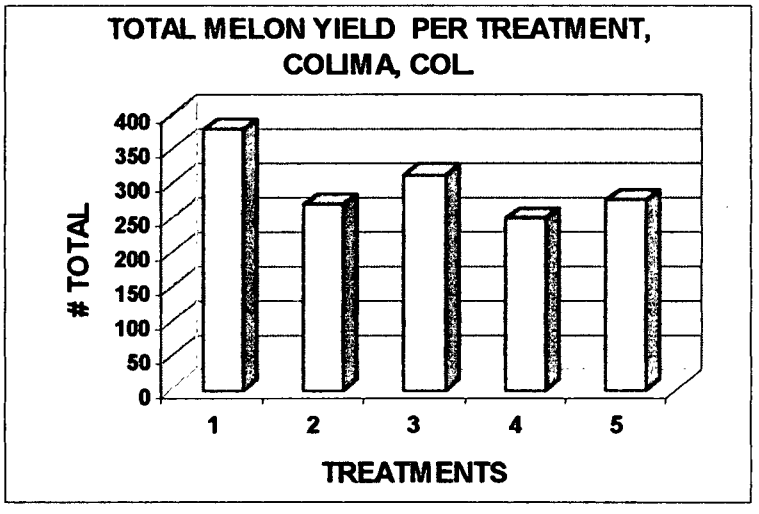
Measurement parameter: Yield on 80 m lineal/treatment

Planting date: November 22th, 2002

Evaluation parameter: January 24th, to February 3th, 2003 (5cuttings)

TREATMENTS	NUMBER OF FRUITS/CATEGORY/TREATMENT						
Distance/plants	6	9	12	15	18	23	TOTAL
RS 841 - 0.30 m	0	74	116	111	59	17	**377**
RS 841 - 0.60 m	2	54	87	69	40	18	**270**
RS 841 - 0.90 m	5	86	117	72	32	0	**312**
RS 841 - 1.20 m	1	75	103	58	11	0	**248**
Control - 0.30 m	1	44	50	59	101	20	**275**





Final conclusion. The melon grafts on graft holder materials of pumpkin, also turn out to be a no chemical more appropriate alternative since it does not contaminate and it offers total resistance to the ***Fusarium fungus oxysporum f. sp. meloni***, like ***Olpidium radicale*** that transmit the Virus of the Sifting of the melon **(MNSV)**, which cannot be fought by any fumigant of ground, including methyl bromide, besides the use of grafts elevates the production of quality of melon. This makes of the melon grafts a profitable and mainly respectful alternative with the environment to the use of methyl bromide.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
FACULTAD DE AGRONOMIA - UAS

TITLE: Use of *Cucurbita maximaXmoschata* y *Cucumis melo* materials grafting-holder resistant to viruses of sieving (MNSV) as alternative to the use of Methyl Bromide in melon crop. (*Cucumis melo* L.).

RESEARCHERS: Dr. Julio César Tello Marquina
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Universidad de Almería, España.

MC. Francisco Javier Estrada Ramírez
MC. Sostenes Montoya Angulo
MC. Carlos Morales Cazarez
QFB. María de la Luz Acosta Pineda
Universidad Autónoma de Sinaloa, México.

RESEARCH SITE: Experiment plots will be Rancho "La Campana", ubicado a 45 km. De La Paz, Todos Santos Road, La Paz, Baja California, Sur.

CROP, VARIETY AND YIELD TO HARVEST: Melon (***Cucumis melo*** L.), any variety that farmer prefers. Variety Pacstart and the harvest will be fruits.

INTRODUCTION.

On August, 2002 in Colima, Colima, Mexico, it started the experiment of melon grafting. They used different materials grafting holder of pumpkin (*Cucurbita maximaXmoschata)* with genetic resistance to virus of sieving mosaic of melon (MNSV) and soil pathogens like *Fusarium oxysporum, Rhizoctonia* and nematodes. This technique of grafting was used as alternative to the use of Methyl Bromide, which is used by farmers on soil fumigations in order to control pathogens and weeds in some crops.

TREATMENTS. During agricultural cycle 2002-2003 it was applied 5 treatments each grafting holder material, which were organized next way:

1.- Grafting. (30 cm among plants)
2.- Grafting (60 cm among plants)
3.- Grafting (90 cm among plants)
4.- Grafting (1.20 m among plants)
5.- Control (30 cm among plants)

GRAFTING HOLDER MATERIAL TO USE

Grafting holder material:
Hybrid RS841 of *Cucurbita maximaXmoschata*:
Hybrid Patron of *Cucurbita maximaXmoschata*

BODY OF REPORT.

Land preparation.- The activities in cooperative farmer land started in last October, when Agronomia Faculty's heavy machinery carried out double subsoil in land. They opened the soil 50 cm depth. Then they raked the soil in three rows, after that, they carried out the installment underground pipeline. Afterwards the beds were marked, arisen and flattened. And finally they put the padded with black-silver plastic (silver side up). The bed marks were marked 1.80 m between each one.

MATERIALS AND METHODES OF GRAFTING.

In order to carry out grafting, we sowed grafting holder material and commercial melon in trays of 200 cavities. Any seed the farmer choose. *Cucurbita maximaXmoschata* seeds (pumpkin) sowed five days after. We want both plants melon and pumpkin have same developed at the date to make grafting. At this time plants will have first two leaves. Which is the optima developed in order to carry out grafting process. The technique used is approximation. This process took place on August, 2002.

After plants have been grafted, they put them in trays of bigger cavity (7x7 cm) and lately they were maintained on high relative humidity under for 72 hours under a taking root chamber In order to be sure that de grafting take root. Then plants were maintained under a shadow-mesh 60 % during 15 or 17 days. Three days before plants were taken to the farm, we cut off the root from grafting in order to check out their taken root.

EXPERIMENTAL DESIG: Implementation of treatments on land was took carried out on August 29, 2002. We used the blocks design completely randomized, with repetitions. We used 5 treatments; 3 repetitions each, 4 grafting-holder materials and 1 control, which sum 30 plots or experimental units (u.e.), each experimental units were formed from 1 furrow, 15 m length and evaluations were carried out on furrow. All this tasks on a surface of 1000 m^2.

PLANTING.

Plants of grafting melon were planted on beds covered with black plastic, separated 1.80 m and we will use planting density thereinbefore. Farmer make this tasks during normal sowings.

Crop Management

Irrigation and fertilization took place using drip irrigation, and they are controlled directly by enterprise field manager. Same people took the records about the handworks like pruning, cutting, spinning, tied the plants, diseases control and foliage pests, etc.

YIELD RESULTS:

FACULTAD DE AGRONOMÍA UNIVERSIDAD AUTONOMA DE SINALOA
Site: La Campana, Ranch, La Paz, B.C.S.
Crop: Grafting of melon
Measurement parameter: Yield on 15m lineal evaluated/repetition
Planting date: September 14th, 2002
Evaluation: November 22nd, 2002

Grafting holder (Patron) 40 cm/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	38	22	11	7	0
II	42	28	7	1	1
III	36	23	21	6	0
Total	**116.00**	**73.00**	**39.00**	**14.00**	**1.00**
Average	**38.67**	**24.33**	**13.00**	**4.67**	**0.33**

Grafting holder (Patron) 60 cm/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	33	27	24	1	0
II	44	10	4	0	0
III	45	24	0	0	0
Total	**122.00**	**61.00**	**28.00**	**1.00**	**0.00**
Average	**40.67**	**20.33**	**9.33**	**0.33**	**0.00**

GRAFTING HOLDER (Patron) 80 cm/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	41	15	7	2	0
II	39	20	7	0	0
III	49	13	1	1	0
Total	**129.00**	**48.00**	**15.00**	**3.00**	**0.00**
Average	**43.00**	**16.00**	**5.00**	**1.00**	**0.00**

GRAFTING HOLDER (Patron) 1.0 m/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	21	17	7	0	0
II	42	2	4	0	0
III	35	4	3	1	0
Total	**98.00**	**23.00**	**14.00**	**1.00**	**0.00**
Average	**32.67**	**7.67**	**4.67**	**0.33**	**0.00**

GRAFTING HOLDER (RS-841) 40 cm/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	32	17	19	3	0
II	42	20	5	3	0
III	34	26	19	2	0
Total	**108.00**	**63.00**	**43.00**	**8.00**	**0.00**
Average	**36.00**	**21.00**	**14.33**	**2.67**	**0.00**

GRAFTING HOLDER (RS-841) 60 cm/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	37	17	9	2	0
II	44	13	2	1	0
III	42	12	5	1	0
Total	**123.00**	**42.00**	**16.00**	**4.00**	**0.00**
Average	**41.00**	**14.00**	**5.33**	**1.33**	**0.00**

GRAFTING HOLDER (RS-841) 80 cm/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	28	27	2	0	0
II	34	26	4	0	0
III	46	17	1	0	0
Total	**108.00**	**70.00**	**7.00**	**0.00**	**0.00**
Average	**36.00**	**23.33**	**2.33**	**0.00**	**0.00**

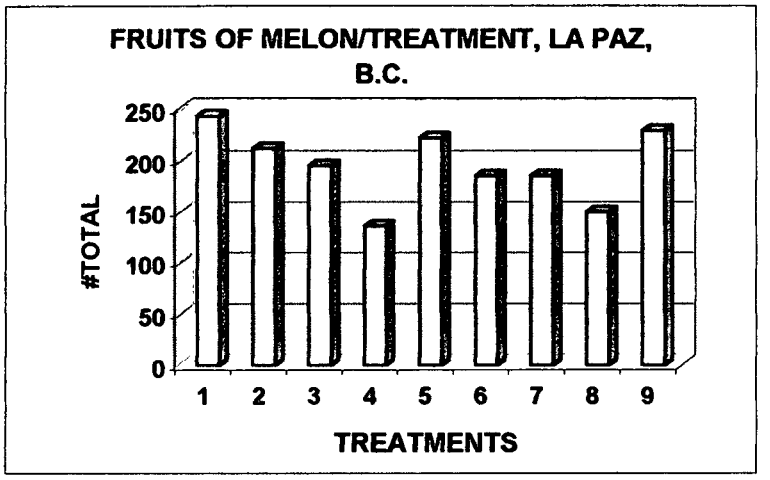
GRAFTING HOLDER (RS-841) 1.0 m/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	23	13	6	0	0
II	49	12	0	0	0
III	34	10	3	0	0
Total	**106.00**	**35.00**	**9.00**	**0.00**	**0.00**
Average	**35.33**	**11.67**	**3.00**	**0.00**	**0.00**

CONTROL 40 cm/plants					
	NUMBER OF FRUITS PER CATEGORY				
REPETITION	9	12	15	18	23
I	7	30	30	3	0
II	6	35	29	10	0
III	4	33	31	11	0
Total	**17.00**	**98.00**	**90.00**	**24.00**	**0.00**
Average	**5.67**	**32.67**	**30.00**	**8.00**	**0.00**

FACULTAD DE AGRONOMÍA UNIVERSIDAD AUTONOMA DE SINALOA

Site: La Campana, Ranch, La Paz, B.C.S.
Crop: Grafting of melon
Measurement parameter: Yield on 15m lineal evaluated/repetition
Planting date: September 14th, 2002
Evaluation: November 22nd, 2002

TREATMENTS	NUMBER OF FRUITS/TREATMENT			
	R-I	R-II	R-III	TOTAL
1. Patron 40 cm	78	79	86	**243**
2. Patron 60 cm	85	58	69	**212**
3. Patron 80 cm	65	66	64	**195**
4. Patron 100 cm	45	48	43	**136**
5. RS-841 40 cm	71	70	81	**222**
6. RS-841 60 cm	65	60	60	**185**
7. RS-841 80 cm	57	64	64	**185**
8. RS-841 100 cm	42	61	47	**150**
9. Control 40 cm	70	80	79	**229**



FACULTAD DE AGRONOMÍA UNIVERSIDAD AUTONOMA DE SINALOA

Site: La Campana, Ranch, La Paz, B.C.S.

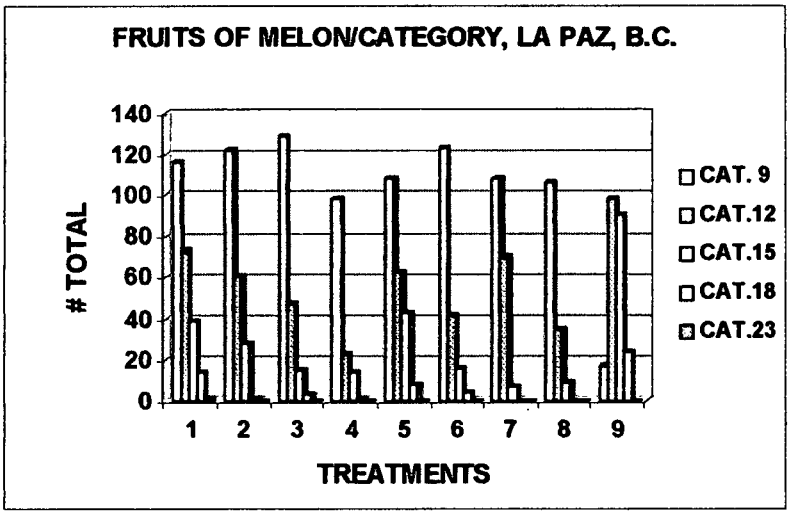
Crop: Grafting of melon

Measurement parameter: Yield on 15m lineal evaluated/repetition

Planting date: September 14th, 2002

Evaluation: November 22nd, 2002

TREATMENTS	NUMBER OF FRUITS/TREATMENT/CATEGORY				
	9	12	15	18	23
1. Patron 40 cm	116.00	73.00	39.00	14.00	1.00
2. Patron 60 cm	122.00	61.00	28.00	1.00	0.00
3. Patron 80 cm	129.00	48.00	15.00	3.00	0.00
4. Patron 100 cm	98.00	23.00	14.00	1.00	0.00
5. RS-841 40 cm	108.00	63.00	43.00	8.00	0.00
6. RS-841 60 cm	123.00	42.00	16.00	4.00	0.00
7. RS-841 80 cm	108.00	70.00	7.00	0.00	0.00
8. RS-841 100 cm	106.00	35.00	9.00	0.00	0.00
9. Control 40 cm	17.00	98.00	90.00	24.00	0.00



Final conclusion. The melon grafts on graft holder materials of pumpkin, also turn out to be a no chemical more appropriate alternative since it does not contaminate and it offers total resistance to the ***Fusarium fungus oxysporum f. sp. meloni***, like ***Olpidium radicale*** that transmit the Virus of the Sifting of the melon **(MNSV)**, which cannot be fought by any fumigant of ground, including methyl bromide, besides the use of grafts elevates the production of quality of melon. This makes of the melon grafts a profitable and mainly respectful alternative with the environment to the use of methyl bromide. The production results show the same tendency that the test of Colima.

COSTS DETERMINATION OF FUMIGANTS APPLICATION (METHYL BROMIDE, METAM-SODIUM AND DICHLOROPROPEN + CHLOROPICRIN) IMPLANTS OF TOMATO, MELON, STRAWBERRY AND MELON GRAFTING, CARRIED OUT IN OPEN FIELD, IN MEXICO.

1. Introduction.
The restrictions to the use of methyl bromide, derived of the Protocol of Montreal, to contribute to the protection of the layer of ozone, it has generated the necessity to develop alternative of products and procedures substitutes to the use of methyl bromide like agricultural fumigant applied directly to the floor and liki fumigant to storage structures.

The methyl bromide like agricultural fumigant are used with more emphasis in the control of some floor pathogens that attack to horticultural cultivations as the tomato, chili and some fruit-bearing ones herbaceous as the strawberry, melon, raspberry and blackberry.

2. Objectives.
The objective of this work is to compare the costs of fumigants application in tomato cultivation to open field, in Mexico. The products used as fumigants were the following ones: Methyl bromide, Metam-sodium and Dichloropropen + chloropicrin.

3. Methodology.
To determine the costs of fumigants application, we proceeded to inventory the inputs and activities that are applied to the cultivation, according to the product used as fumigant. The costs included in this work represent the average of different cultivation regions. The inputs are expressed in units by hectare and the costs are in Mexican pesos by hectare.

3.1. Identification of inputs.
They were identified each one of the inputs that were used in the tomato cultivation to open field as: plastics, hoses, fumigants, fuels and labor. Some costs that are applied later to the cultivation like the environmental handling of the residual plastics, in that costs of transport and recycling are included which are not made inside the agricultural company.

As some of these inputs they can only be obtained in commercial volumes, as the plastics and the hoses; we proceeded to estimate the proportional quantities that are used in a hectare of cultivation.

3.2. Identification of activities
We proceeded to identify and to discover each one of the activities:
Floor preparation that includes the formation of beds or furrows; the placement of plastics, the placement of hoses, the fumigant and waterings application, the retirement of plastics and their handling.

3.3. Environmental costs.
This concept only includes the cost of the handling of the plastics, padded and hoses. This cost is related with the retirement of plastic, bale formation, transport and transformation of plastic, recycling or incineration of the same one.

4. Description of activities.

4.1. Formation of beds or furrows to 1.80 m of separation.

This activity is carried out with tractor, with yield of 5 hectares per day.

Costs
Tractor driver $135.00
Diesel 180.00

4.2. Placement of padded for application.
This activity only applies when it is used Metam-sodium like fumigant; this is carried out with a tractor with team of application of plastics and bromide, and labor of a tractor driver and three assistants

Costs.
The work is carried out with a maximum of 4 hectares per day
Tractor driver $135.00
Diesel 120.00
Peons 90 x 3 270.00
Plastic: roll of 1,200 m. to 1,500.00 pesos, it covers 24 tracts of 50 m. we need in a hectare 55 tracts of 100 m. that is to say 4.6 roll per hectare, total demanded 4.6 rolls for 1,500.00 pesos c/u. 6,944.44 pesos.

Hose 55 tracts for rolls of 100 m c/u, to $120.00 c/u: $6,600.00 per hectare.

4.3. Withdrawal of plastic.
When it is used Metam-sodium and solarización this activity is carried out twice.

Costs
Cost of the withdrawal 14 furrows of 100 m. for peon; that is to say 4 peons per hectare, to 90.00 pesos c/u; 360.00 pesos per hectare.

A tractor with tow can assist 5 at 7 hectares. in the day, depending on the distance of the plastics deposit area. The final destination of the plastic also depends if it is for to be reused. It will be roll up correctly and with cleaning. If it is for waste it will be deposited in some place for their burnt one.

Tractor driver $135.00
Fuel 125.00

4.4. Environmental manage of plastics.
Once gathered they will be remitted to a storing center, where bale or rolls will be elaborated that facilitate their transport until a disposition center. (Incineration or recycled).

The bale formation will be carried out with a peon. $90.00
Materials for bale include metal strip 35.00
Transport until disposition place 2.50 for kg. 1,437.50
Recycling cost 3.50 for kg. 2,012.50

4.5. Refining of beds.
It is generally made with a tractor passing to refine the borders of the furrows, of 15 at 20 has. for day.

A tractor driver $135.00
Diesel 150.00
Total of 18 to 20 pesos per hectare.

4.6. Placement of plastic for padded of cultivation.
They are the same activities that the step No. 2 with the difference of costs in the plastic material, this it costs 1,000 pesos the roll of 1.20 m for 1,200 m of long, this material can be perforated or without perforation; making a total of (4.6 rolls per hectare.) 4,600 pesos per hectare.

4.7. Perforation of plastics.
If plastic is placed without being perforated we will add the labor activities for equivalent perforation to 4 peons per hectare.

4 peons for 90.00 pesos c/u. total of 360.00 pesos per hectare.

5. dose of fumigant application and cost per hectare.

Methyl bromide: 400 lbs/ha to 2 dollars the pound.
400 x 2 x 11 = 8,800.00 pesos / hectare.

Metam-sodium: 150 lts/ha to 17.00 pesos / liter
17 x 150 = 2,250.00 pesos / hectare.

Dichloropropen + Chloropicrin: 150 lts/ha to 7.5 dollars liter
150 x 7.5 x 11 = 12,375.00 weight / hectare.

6. Number of plants of melon grafting per hectare.

14,000 plants per hectare
Cost per plants $ 2.40 pesos
The costs to seeds of pumpkin and melon for grafting per hectare $ 2,750.00 pesos.

7. Table, summary of costs per crop.

TABLE. SUMMARY OF TOMATOES COSTS

7.1. CULTIVATION OF TOMATO CARRIED OUT IN OPEN FIELD WITH TREATMENT OF METHYL BROMIDE								
		COST PER HECTARE - APPLICATION IN BEDS						
ACTIVITIES	FUEL DIESEL	TRACTOR DRIVER	PEONS	HOSE GOTEO	FUMIGANT M. BROMIDE	PADDED OF CULTIVATION	COST ENVIRONMENTAL	TOTAL
PREPARACIÓN DEL SUELO, 3 RASTREROS	$ 245.00	$ 180.00						$ 425.00
NIVELACION	$ 75.00	$ 60.00						$ 135.00
FORMACIÓN DE CAMA	$ 36.00	$ 27.00						$ 63.00
COLOCAR ACOLCHADO Y MANGUERA DE RIEGO	$ 36.00	$ 34.00	$ 68.00	$ 6,600.00	$ 8,800.00	$ 4,600.00		$ 20,138.00
PERFORAR PLASTICO			$ 360.00					$ 360.00
RETIRAR PLASTICO	$ 25.00	$ 27.00	$ 360.00					$ 412.00
FORMACION DE PACAS							$ 90.00	$ 90.00
EQUIPO Y MATERIALES							$ 35.00	$ 35.00
TRANSPORTE							$ 1,437.50	$ 1,437.50
RECICLAJE							$ 2,012.50	$ 2,012.50
TOTAL	$ 417.00	$ 328.00	$ 788.00	$ 6,600.00	$ 8,800.00	$ 4,600.00	$ 3,575.00	$ 25,108.00
							DOLLARS.	$ 2, 282.54

7.2. CULTIVIVATION OF TOMATO CARRIED OUT IN OPEN FIELD WITH TREATMENT OF METAM - SODIO + SOLARIZACION

			COST PER HECTARE - APPLICATION IN BEDS							
ACTIVITIES	FUEL DIESEL	TRACTOR DRIVER	PEONS	PLASTIC FOR SOLARIZATION	HOSE GOTEO	IRRIGATION	FUMIGANT M.SODIO	PADDED OF CULTIVATION	COST ENVIRONMENT	TOTAL
PREPARACIÓN DEL SUELO, 3 RASTREROS	$ 245.00	$ 180.00								**$ 425.00**
NIVELACION	$ 75.00	$ 60.00								**$ 135.00**
FORMACIÓN DE CAMA	$ 36.00	$ 27.00								**$ 63.00**
PLASTICO/SOLARIZAR Y MANGUERA DE RIEGO	$ 36.00	$ 34.00	$ 68.00	$ 6,944.44	$ 6,600.00	$ 300.00	$ 2,250.00			**$ 16,232.44**
RETIRO DE PLASTICO	$ 25.00	$ 27.00	$ 360.00							**$ 412.00**
AFINACION DE CAMA	$ 9.00	$ 10.00								**$ 19.00**
ACOLCHADO PLASTICO PARA CULTIVO	$ 36.00	$ 34.00	$ 68.00					$ 4,600.00		**$ 4,738.00**
PERFORACION DE PLASTICO			$ 360.00							**$ 360.00**
RETIRO DE PLASTICO	$ 25.00	$ 27.00	$ 360.00							**$ 412.00**
FORMACION DE PACAS									$ 180.00	**$ 180.00**
EQUIPO Y MATERIALES									$ 70.00	**$ 70.00**
TRANSPORTE									$ 2,875.00	**$ 2,875.00**
RECICLAJE									$ 4,025.00	**$ 4,025.00**
TOTAL	**$ 487.00**	**$ 399.00**	**$ 1,216.00**	**$ 6,944.44**	**$ 6,600.00**	**$ 300.00**	**$ 2,250.00**	**$ 4,600.00**	**$ 7,150.00**	**$ 29,946.44**
									DOLLARS.	**$ 2, 722.40**

7.3. CULTIVATION OF TOMATO CARRIED OUT IN OPEN FIELD WITH TREATMENT OF DICLOROPROPENO + CLOROPICRINA								
		COST PER HECTARE - APPLICATION IN BEDS						
ACTIVITIES	FUEL DIESEL	TRACTOR DRIVER	PEONS	HOSE GOTEO	FUMIGANT M. BROMIDE	PADDED OF CULTIVATION	COST ENVIRONMENTAL	TOTAL
PREPARACION DEL SUELO, 3 RASTREOS	$ 245.00	$ 180.00						**$ 425.00**
NIVELACION	$ 75.00	$ 60.00						**$ 135.00**
FORMAR CAMA	$ 36.00	$ 27.00						**$ 63.00**
COLOCAR ACOLCHADO Y MANGUERA DE RIEGO	$ 36.00	$ 34.00	$ 68.00	$ 6,600.00	$ 12,375.00	$ 4,600.00		**$ 23,713.00**
PERFORAR PLASTICO			$ 360.00					**$ 360.00**
RETIRO DE PLASTICO	$ 25.00	$ 27.00	$ 360.00					**$ 412.00**
FORMACION DE PACAS							$ 90.00	**$ 90.00**
EQUIPO Y MATERIALES							$ 35.00	**$ 35.00**
TRANSPORTE							$ 1,437.50	**$ 1,437.50**
RECICLAJE							$ 2,012.50	**$ 2,012.50**
TOTAL	**$ 417.00**	**$ 328.00**	**$ 788.00**	**$ 6,600.00**	**$ 12,375.00**	**$ 4,600.00**	**$ 3,575.00**	**$ 28,683.00**
							DOLLARS.	**$ 2, 607.54**

TABLE. SUMMARY OF STRAWBERRY COSTS

7.4 CULTIVATION OF STRAWBERRY CARRIED OUT IN OPEN FIELD WITH TREATMENT OF METHYL BROMIDE									
		COST PER HECTARE - APPLICATION TOTAL							
ACTIVITIES	FUEL DIESEL	TRACTOR DRIVER	PEONS	PLASTIC FOR FUMIGANT	HOSE GOTEO	FUMIGANT M. BROMIDE	PADDED OF CULTIVATION	COST ENVIRONMENTAL	TOTAL
PREPARACIÓN DEL SUELO, 3 RASTREOS	$ 245.00	$ 180.00							$ 425.00
NIVELACION	$ 75.00	$ 60.00							$ 135.00
RIEGO			$ 360.00						$ 360.00
COLOCAR PLÁSTICO PARA BROMURO	$ 75.00	$ 45.00	$ 90.00	$ 8,662.50		$ 15,400.00			$ 24,272.50
RETIRAR PLASTICO PARA BROMUR0	$ 75.00	$ 45.00	$ 360.00						$ 480.00
FORMAR CAMAS	$ 50.00	$ 35.00							$ 85.00
COLOCAR ACOLCHADO Y MANGUERA/RIEGO	$ 75.00	$ 45.00	$ 480.00		$ 6,600.00		$ 4,600.00		$ 11,800.00
PERFORAR PLASTICO			$ 360.00						$ 360.00
RETIRAR PLASTICO	$ 75.00	$ 45.00	$ 360.00						
FORMACIÓN DE PACAS								$ 180.00	$ 180.00
EQUIPOS Y MATERIALES								$ 70.00	$ 70.00
TRANSPORTE								$ 2,875.00	$ 2,875.00
RECICLAJE								$ 4,025.00	$ 4,025.00
TOTAL	$ 670.00	$ 455.00	$ 2,010.00	$ 8,662.50	$ 6,600.00	$ 15,400.00	$ 4,600.00	$ 7,150.00	$ 45,067.50
								DOLLARS.	**$ 4, 097.04**

7.5 CULTIVATION OF STRAWBERRY CARRIED OUT IN OPEN FIELD WITH TREATMENT OF DICLOROPROPENO + CLOROPICRINA									
		COST PER HECTARE - APLICATION TOTAL							
ACTIVITIES	FUEL DIESEL	TRACTOR DRIVER	PEONS	PLASTIC FOR FUMIGANT	HOSE GOTEO	FUMIGANT C - 35	PADDED OF CULTIVATION	COST ENVIRONMENTAL	TOTAL
PREPARACIÓN DEL SUELO RASTRERO 3	$ 245.00	$ 180.00							$ 425.00
RIEGO			$ 360.00						$ 360.00
COLOCAR Y RETIRAR LINEAS			$ 480.00						$ 480.00
NIVELACION	$ 75.00	$ 60.00							$ 135.00
COLOCAR PLÁSTICO PARA APLICACIÓN	$ 75.00	$ 45.00	$ 480.00	$ 8,662.50		$ 12,375.00			$ 21,637.50
RETIRAR PLASTICO	$ 75.00	$ 45.00	$ 360.00						$ 480.00
FORMAR CAMAS	$ 50.00	$ 35.00							$ 85.00
COLOCAR ACOLCHADO Y MANGUERA/GOTEO	$ 75.00	$ 45.00	$ 480.00		$ 6,600.00		$ 4,600.00		$ 11,800.00
PERFORAR PLASTICO			$ 360.00						$ 360.00
RETIRAR PLASTICO	$ 75.00	$ 45.00	$ 360.00						$ 480.00
FORMACIÓN DE PACAS								$ 180.00	$ 180.00
EQUIPO Y MATERIALES								$ 70.00	$ 70.00
TRANSPORTE								$ 2,875.00	$ 2,875.00
RECICLAJE								$ 4,025.00	$ 4,025.00
TOTAL	$ 670.00	$ 455.00	$ 2,880.00	$ 8,662.50	$ 6,600.00	$ 12,375.00	$ 4,600.00	$ 7,150.00	$ 43,392.50
								DOLLARS.	**$ 3, 944.77**

TABLE. SUMMARY OF MELON COSTS

7.6 CULTIVATION OF MELON CARRIED OUT IN OPEN FIELD WITH TREATMENT OF METHYL BROMIDE								
		COST PER HECTARE - APPLICATION IN BEDS						
ACTIVITIES	FUEL DIESEL	TRACTOR DRIVER	PEONS	HOSE GOTEO	FUMIGANT M. BROMIDE	PADDED OF CULTIVATION	COST ENVIRONMENTAL	TOTAL
PREPARACIÓN DEL SUELO, 3 RASTREROS	$ 245.00	$ 180.00						**$ 425.00**
NIVELACION	$ 75.00	$ 60.00						**$ 135.00**
FORMAR CAMAS	$ 36.00	$ 27.00						**$ 63.00**
COLOCAR ACOLCHADO Y MANGUERA DE RIEGO	$ 36.00	$ 34.00	$ 68.00	$ 6,600.00	$ 8,800.00	$ 4,600.00		**$ 20,138.00**
PERFORAR PLASTICO			$ 360.00					**$ 360.00**
RETIRAR PLASTICO	$ 25.00	$ 27.00	$ 360.00					**$ 412.00**
FORMACIÓN DE PACAS							$ 90.00	**$ 90.00**
EQUIPO Y MATERIALES							$ 35.00	**$ 35.00**
TRANSPORTE							$ 1,437.50	**$ 1,437.50**
RECICLAJE							$ 2,012.50	**$ 2,012.50**
TOTAL	**$ 417.00**	**$ 328.00**	**$ 788.00**	**$ 6,600.00**	**$ 8,800.00**	**$ 4,600.00**	**$ 3,575.00**	**$ 25,108.00**
							DOLLARS.	**$ 2, 282.54**

7.7. CULTIVIVATION OF MELON CARRIED OUT IN OPEN FIELD WITH TREATMENT OF DICLOROPROPENO + CLOROPICRINA								
		COST PER HECTARE - APPLICATION IN BEDS						
ACTIVITIES	FUEL DIESEL	TRACTOR DRIVER	PEONS	HOSE GOTEO	FUMIGANT C - 35	PADDED OF CULTIVATION	COST ENVIRONMENTAL	TOTAL
PREPARACIÓN DEL SUELO 3 RASTREROS	$ 245.00	$ 180.00						$ 425.00
NIVELACION	$ 75.00	$ 60.00						$ 135.00
FORMAR CAMAS	$ 50.00	$ 35.00						$ 85.00
COLOCAR ACOLCHADO Y MANGUERA DE RIEGO	$ 75.00	$ 45.00	$ 90.00	$ 6,600.00	$ 12,375.00	$ 4,600.00		$ 23,785.00
RIEGO			$ 120.00					$ 120.00
PERFORAR PLASTICO			$ 360.00					$ 360.00
RETIRAR PLASTICOS	$ 75.00	$ 45.00	$ 360.00					$ 480.00
FORMACIÓN DE PACAS							$ 90.00	$ 90.00
EQUIPO Y MATERIALES							$ 35.00	$ 35.00
TRANSPORTE							$ 1,437.50	$ 1,437.50
RECICLAJE							$ 2,012.50	$ 2,012.50
TOTAL	$ 520.00	$ 365.00	$ 930.00	$ 6,600.00	$ 12,375.00	$ 4,600.00	$ 3,575.00	$ 28,965.00
							DOLLARS.	**$ 2, 633.18**

7.8. CULTIVATION OF MELON CARRIED OUT IN OPEN FIELD WITH GRAFTING ON PUMPKIN

	COST PER HECTARE								
ACTIVITIES	FUEL DIESEL	TRACTOR DRIVER	PEONS	HOSE GOTEO	SEDDS (MELON AND PUMPKIN)	PLANT GRAFTING	PADDED OF CULTIVATION	COST ENVIRONMENTAL	TOTAL
PREPARACIÓN DEL SUELO 3 RASTREROS	$ 245.00	$ 180.00							$ 425.00
NIVELACION	$ 75.00	$ 60.00							$ 135.00
FORMAR CAMAS	$ 50.00	$ 35.00							$ 85.00
COLOCAR ACOLCHADO Y MANGUERA DE RIEGO	$ 75.00	$ 45.00	$ 90.00	$ 6,600.00			$ 4,600.00		$ 11,410.00
RIEGO			$ 120.00						$ 120.00
PERFORAR PLASTICO			$ 360.00						$ 360.00
FORMACION DE PLANTA					$ 2,750.00	$ 33,600.00			$ 36,350.00
RETIRAR PLASTICOS	$ 75.00	$ 45.00	$ 360.00						$ 480.00
FORMACIÓN DE PACAS								$ 90.00	$ 90.00
EQUIPO Y MATERIALES								$ 35.00	$ 35.00
TRANSPORTE								$ 1,437.50	$ 1,437.50
RECICLAJE								$ 2,012.50	$ 2,012.50
TOTAL	$ 520.00	$ 365.00	$ 930.00	$ 6,600.00	$ 2,750.00	$ 33,600.00	$ 4,600.00	$ 3,575.00	$ 52,940.00
								DOLLARS.	$ 4, 812.72