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PLASTIC SHEET FOR  
GREEN HOUSE AND MULCH

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PLASTIC SHEET FOR GREENHOUSE  
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I. INTRODUCTION

The introduction and the use of new techniques have been all the time considered as an important means aiming at improving and intensifying our agricultural products.

In this way, it was introduced in 1969 for the first time the use of plastic sheet to cover small and large tunnels used to crop vegetables.

The small tunnels ( 1,10m width and 0,30m high ) after reaching a top of 950 ha in 1972/73 were quickly abandoned by farmers in favour of the large ones.

This preference was justified by the financial and technical results acquired by the farmers from these large tunnels.

In effect the out-put obtained from these greenhouses was very high for some species reaching often two to four times the production obtained outdoors.

Also the price offered by the market was interesting and did motivate farmers to extend the greenhouse programme this is in comparison with the regression trend of the small tunnel which did not have a significant effect neither on productivity nor in precocity (20 to 50% gained in productivity and 2 to 3 weeks gained in precocity in comparison with the outdoors production).

II. PRESENT SITUATION

1°) greenhouse 's evolution ( table 1 )

YEAR	1969/70	1979/80	1984/85	1987/88	1988/89	1989/90
area in ha	0,02	164,5	3602	3900	4451	4850

The data above, show that in spite of the benefit gained from the use of these new techniques , the extension was fairly moderate until 1980 and since 1981 up to 1990 the extension was rapid.

This rapid progression was the consequence of a wise programme those aims were the introduction, the adaptation and the use of new appropriate techniques through an experimental within the institue of vegetable development. And, as we were dealing with new techniques unknown in the country we were therefore obliged to set up an educational and an extension programme towards engineers, technicians and some qualified workers.

The rapid progression of area reserved to greenhouse is mainly motivated by

a) the need for the country to increase its vegetable production in order to satisfy demand those increase is continuous.

b) the difficulties to extend area because of shortage of water and appropriate land.

c) the possible contribution of our heavy and petro-chemical industries by the production of metal tube and plastic sheet.

By the end it is important to say that thanks to credits allowed by the government and thanks to the new cooperatives which were set up especially for that purpose that this programme had been realised.

2°) Surfaces distribution by climatic - zone

Up to 1980, the coastal plains were the only zone where greenhouses were used, and by the end of 1989, we can say that greenhouses become widely used throughout the country as shown in the table n°2 below ,

Table n°2 : area distribution by zone

<u>Zone</u> <u>Area</u>	<u>Coastal</u> <u>Plains</u>	<u>Inland</u>	<u>Southern</u>	<u>Total</u>
in ha	3414,10	904,53	132,47	4451,10
in %	76,70	20,32	2,98	100

From the above , the analysis would show that the coastal plains, remain the main zone for greenhouse, that's because of its vocation (i.e climat and soils) and the nearness of cities which create an opportunity for farmers to market easily their productions and intensify by the same time their cropping system.

In inland the implantation of greenhouses is situated near cities and urban agglomeration.

The species cropped under greenhouses are mainly :

tomatoes, pepper, and other species as cucumbers, egg-plant, melon, water melon, lettuce, green-beans.

These latter species occupy a small surface in comparison with tomatoes and pepper. For lettuce is mainly cropped between rows of tomatoes or pepper.

Recently we introduced new species such as bananas and flowers and new greenhouses models were conceived (bananas occupies 50 ha throughout the country).

### III. AVAILABILITY OF PLASTIC - SHEET

It is often difficult for farmers to have their plastic to cover their greenhouse in time. Also others headaches for farmers are qualities and price.

#### 1°) plastic used

There is no choice, the local manufacturer<sup>s</sup> produce just one quality, it is a polyethylene sheet, 4,4m width, low density and 200 micron thickness. To facilitate aeration, sheets are put in transversal way and their ends are buried. Also to prevent wind and heavy rains from damaging crops and infrastructure, sheets are overlapped and when aeration is needed in hot season, we just push - aside the overlappings ends.

To cover one hectare we need about 4 T.

Concerning sheet-quality, we can say that it has a great nocturnal radiation permeability. This permeability leads to a loss of heat gained and stored during the day. The amount of these radiations may often cause frost under greenhouse especially in winter in inland.

In coastal plains, this quality did not affect very much crops, especially when farmers did respect and follow the time table recommended by the agricultural advisory service. Here, in coastal zone, the lowest temperature does not go below 8°C under greenhouse.

Nevertheless it is important to say that <sup>if</sup> we had at our disposal other better quality plastic sheet like L.V.A and P.V.C our precocity and our productivity would be better. This is mainly in inland where polyethylene sheet seems<sup>S</sup> inefficient to stop <sup>nocturnal</sup> radiation. This situation obliges farmers to postpone their cropping to avoid late frost which most of the time caused important damage obliging farmers to replace frozen little plants two to three times for a season. In southern part of the country, the situation is completely different, there, the limiting factor is hot weather which starts from march to september, period during which it is almost impossible to crop or to maintain greenhouse covered.

## 2°) Plastic Sheet Qualities

The plastic sheet used to cover greenhouse has several drawback such weak mechanic resistance due to manufacturing defaults and the absence of anti-U.V ingredients.

As a consequence of these deficiencies; farmers often face in field practical problems ( i.e. ~~fall~~'s tear , wind damage, storms ).

As a result, crops are therefore covered just 4 to 5 months obliging often farmers to replace yearly their plastic and even in certain cases to replace two to three times the greenhouse cover within a season.

Trials undertaken from 1981 to 1984 with stabilized polyethylene sheet were beneficial for both institute and E.N.P.C ( national entreprise for plastic and rubber ). E.N.P.C knowing our requirements had improved the quality of its production while the private sector continues to produce the same quality of sheet.

Concerning polyethylene thermo-stabilized sheet, it is produced since 1967 after being tested during ~~the~~ **years**.

But, if the quality had been up graded in order to meet farmers' requirements headaches and bottlenecks still remain about imports, availability in time of inputs and prices.

3°) Prices For 1 kg

Table n°3 below indicates prices' evolution for differents films from 1986 to 1988.

unit: Dinar (DA)

10 u.s = 8 D.A

Year Sheet Type	1986	1987	Jan-July 1988	August-Décembre 1988
PE Neutral	10,2	14,18	19,39	26,63
PE Stabilized	11,55	15,75	20,97	28,25
PE Stabilized thermique	-	-	21,39	28,66

Source : ONAPSA

The data above show how serious is the financial aspect for the promotion and development of green house in the country. This also explains how it is difficult to main tain at least the present potentiel.

The cost to cover an hectare is as fellow

- 106.520 DA for polyethylene neutral

- 113.000 DA for polyethylene stabilized

- 114.640 DA for polyethylene thermo stabilized  
So respectively 39%, 41,6%, 42,3% of the cost production of tomato.

Concerning PE stabilized its qualities allow us to use it for at least for two seasons, that's mean that we can hal<sup>cost</sup> easily the /if farmers avoid throwing the cover after the har vest.

In this order we are assisting farmers to help them save their plastic. The spread use of stabilized PE is still limited because of the low production capacities of our plants.

The adoption of this kind of plastic will certainly improve the technical and the financial aspects of greenhouse crops in the country.



IV. PLASTIC SHEET PRODUCTION AND NEEDS

1°) Production capacities

- The public sector has three plants with a total production capacities of 11.000 T/Year. These plants are located within the main agricultural zones.
- The private sector has four units with a capacity of 9.400 T/Year.

2°) Comparison between needs and local production ( table n°5 )

unit: T

Year	1987 - 88		1988-89		1989-90	
Needs	Sheet	Quantity	Sheet	Quantity	Sheet	Quantity
		PE	16.888	PE	18.100	PE
Production	PE neutral	6.625	PE Neutral	10.556	PE Neu.	6. 656
	PE Stabilized	2.719	PE Sta.	-	PE Stabi.	-
	PE Stabilized thermique	7544	PE Sta. thermique	6544	PE Stabi. thermique	10.400

The deficit is satisfied through importation from Tunisia, Spain, Italy. In principle the local capacities are sufficient to satisfy demand but because of difficulties to <sup>acquire</sup> raw materials, spare parts, <sup>that is why</sup> still import large quantities.

If the stabilized P.E is widely adopted and used for at least two seasons that will certainly ease the pressure on the market and reduce by the same time the overall demand and reduce the production's cost

## V. MULCH

Owing to its advantage mulch practices have to be widely adapted and researched

### 1°) Experimentations

#### a) On Vegetable crops

Since 1971 different samples of mulch sheet had been introduced and tested. The results <sup>obtain</sup> in different stations <sup>show</sup> the adaptation of this technique to our climate and crops systems. The practice of mulching leads to a better quality and a higher productivity. The green and black sheet did help combat weed and reduce water losses. But this mulch becomes inefficient if it is uncorrectly laid down. For the transparent and grey mulch, they are efficient when they are applied in winter by <sup>enhancing</sup> the heating of the soil.

#### b) on Vineyard

Considering the encouraging results obtained previously, by ~~EDCM~~ the I.V.V. (Institut<sup>e</sup> of vine and wine) launched since 1981 a series of trials. The results were as follows :

- The straking rate gained up to 24 %
- A rapid development of new plantation.
- A larger diameter for stocks and shoots

### 2°) Mulching technique

#### a) On vegetable crops

In spite the encouraging results of trials the adoption of this technique by farmers remains limited.

In 1987, an extension programme had been carried out with the assistance of cooperatives, but it was fruitless.

In effect the main obstacles met by farmers to adopt this technique were the small size of their plots and the network of their irrigation scheme, another limiting factor maybe/<sup>also</sup> the price (19.012 DA/ha) of the plastic. The sheet used for mulching is usually black, 1.10m width, 80 micron thickness. For an hectare we use 0,7T. The area concerned with this technique does not exceed 20 ha.

b) On Vineyard

Unlike on vegetable crops sector, on vineyard this technique had gained rapidly a large area among the new plantations :

- 150 ha in 1986/87
- 1000ha in 1987/88
- 2000 ha in 1988/89

In near futur, it is probable that mulch will concern annually 2000 to 2500 ha.

The sole limiting factor will be the price which passed within two years (1986/88) from 11,09 DA/kg to 27,16 DA/kg.

For vineyard we use the same mulch as for vegetable crops, but the rate per hectare is lesser: 0,3T/ha.

method

- Lay - down/in vineyard

The mulch is laid down once plantation achieved.

The top soil must be smooth and leveled. It was distributed in 1988 more than a hundred of machines to facilitate this operation.

## VII. CONCLUSION

The growth of crops under greenhouses during the period of 1980-90 was very quick. From 1980 to 1985 this growth was quicker than from 1985 to 1990.

Farmers were very satisfied of the use of greenhouses the main reason was the financial advantage in comparison to field crops. Two other reasons can be mentioned : the interesting prices in freemarket and the cost of factors of production which was relatively low. Unfortunately these two reasons are becoming less and less interesting <sup>during</sup> these last years. An important increase was noticed in cost of labour and plastic sheet.

From 1988, lands were organised in an other political system. Farmers became free to produce any crops in any way. This change implied less investissements from state organisms.

Actually we consider the area of greenhouses is saturated. We should now study the technic and économic consequences.

Technically, the plastic sheets have to be qualitatively better and farmers should use better cultural technics at less maintain a permanent relationship with the institutes.

These implied more works in extention from the institutes as well.

Economically, it is necessar to increase the production and think about regulation to encourage producer toward export. This can also in crease the use of greenhouse crops.