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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
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D04567

Distr.
LIMITED

ID/WG.127/14
31 July 1972

ORIGINAL: ENGLISH

United Nations Industrial Development Organization

Meeting for Identification and Development of Fertilizer and Pesticide Industries in the Developing Countries served by ECE

Bucharest, Romania 10-14 July 1972

STATUS OF THE FERTILIZER AND PESTICIDE INDUSTRIES IN POLAND[1]

by

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id.72-7093

1. <u>Introduction</u>

Please forgive me, that at the beginning of this paper I give you a short information about the history of the Polish nitrogen industry, but it is just 55 years ago, when on Polish territory was put into commission the first atmospheric nitrogen fixation plant based on a Polish process and built by Polish workers. It was a nitric acid plant using professor Mościcki's electric arc process.

It was not the first Polish contribution to the development of the nitrogen industry. In the year 1905 the Westregeln factory of the "Gesellschaft für Stickstoffdünger" made the first commercial quantity of calcium cyanamid using an invention of the Polish-born chemist F.L.Polzeniusz.

In the last month the Polish nitrogen industry was celebrating another important anniversary. Fifty years ago, in 1922 was established the first state enterprise " Państwowa Fabryka Związków Azotowych w Chorzowie "/State Factory for Nitrogen Compounds at Chorzów/. This enterprise took over the nitrogen factory located at Chorzów and built by "Bayerische Stickstoffwerke in 1915 - 1917.

As a result of professor Mościcki's initiative there was built in 1927 - 1929 the second state nitrogen factory located at Mościce near Tarnów. At that time this factory has had the largest ammonia production capacity in Europe.

In 1939 the total annual production capacity of the Polish nitrogen industry, including coke ammonium sulphate, was sixty thousand tons of nitrogen. Due to the bad pre-war economic situation of Polish farmers, there was never made a full use of the production capacity, except the period 1929-1932.

During the Second World War, like the whole country, also the Polish nitrogen industry suffered severe losses as well in staff as in plants.

In spite of these losses, the after-war reconstruction of the Polish nitrogen industry was a very quick one. Allready in

1947 the pre-war production level was exceeded. The land reform and a new agrarian policy, realised by the new government immediatly after liberation, brought a fundamental change in the economic situation of the farmers. As a result of this, the demand for fertilizers began to increase quickly. It was therefore necessary to build after the full reconstruction of the Tarnów Nitrogen Works another big one, located at Kędzierzyn in the South - West of Poland. The production, started in 1954, was expanded in 1958 - 1964.

The next step of expansion was reached, when in 1966 the first part and in 1969 the second part of the Nitrogen Works Puławy was put into commission. These works are with a production capacity of 25oo t/day urea and 33oo t/day ammonium nitrate among the largest of the world.

At present there is put into commission the next big factory, the Nitrogen Works Włocławek with a production capacity of 15oo t/day ammonia.

Beside factories producing single component fertilizers, in 197o was put into commission a large factory for NP fertilizers, the Chemical Works Police, located at Police near Szczecin. Later on there will be produced also NPK fertilizers. After the full construction of this factory it will be one of the largest of this kind in Europe.

Designing the location of the above mentioned new works, there was considered not only economical aspects, but also the stimulating moment of industry in districts of hitherto pure agrarian character.

The location of nitrogenous fertilizer plants is shown in figure 1.

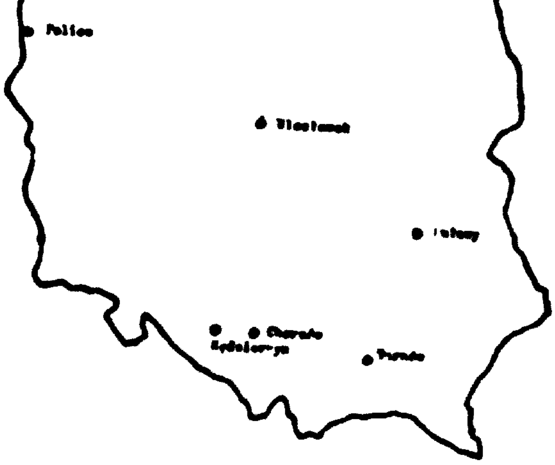

Figure 1.

2. The consumption of nitrogenous fertilizers in Poland.

The consumption of nitrogenous fertilizers /in thousand metric tons of nitrogen/ is shown in table 1. in comparision with the total consumption of fertilizers / in thousand metric tons $N + P_2O_5 + K_2O$/ and the per hectare consumption of fertilizers in total and in nitrogen.

Table 1.

fertilizer year	NPK	annual rate of increase % 1/	N	annual rate of increase % 1/	kg /ha sowed land 2/	
					NPK	N
1949/50	362.5	-	93.7	-	24.1	6.2
1959/60	744.6	-	251.3	-	48.6	16.4
1964/65	1106.7	-	386.5	-	73.1	25.5
1965/66	1302.8	117	433.2	112	86.2	28.7
1966/67	1581.7	121	513.3	118	104.7	34.0
1967/68	1829.0	116	604.8	118	121.2	40.1
1968/69	2141.3	117	701.1	118	142.5	46.7
1969/70	2416.3	112	785.0	111	161.5	52.5
1970/71	2571.7	106	822.4	105	172.2	55.1

1/ foregoing year = 100 %

2/ In order to get the figure per hectare arable land as defined by FAO Production Yearbook multiply by:

$$0.9916 = \frac{14,961,600 \text{ ha sowed land}}{15,087,900 \text{ ha arable land}}$$

Source: GUS /Chief Census Bureau/publications

In table 1. it is to observe, that in a very short period was reduced the distance separating the Polish farming from the most developed countries in the per hectare consumption of NPK and proportionaly of nitrogen. Before 1975 will be reached the 200 kg NPK per hectare limit - the conventional lower limit of very high consumption.

3. The production of nitrogenous fertilizers in Poland.

As mentioned in the introduction, the dynamic increase of farmer's purchasing power led to a quick growing demand for fertilizers, which stimulated the intensification of existing production capacities and also the construction of completely new nitrogen works.

In table 2. is shown the production of nitrogenous fertilizers /in thousand metric tons N/in comparision with the total fertilizer production /in thousand metric tons N + P_2O_5/ and the per capita production of N and NP / in kg N or N + P_2O_5/

Table 2.

year	NP	annual rate of increase % 1/	N	annual rate of increase % 1/	kg per capita NP	kg per capita N
1938	85.9	-	42.9	-	2.5	1.2
1950	160.3	-	77.8	-	6.4	3.1
1960	477	-	270	-	16.0	9.1
1965	738	-	394	-	23.4	12.5
1966	826	112	462	118	26.0	14.5
1967	974	118	594	128	30.2	18.4
1968	1233	126	759	128	38.1	23.4
1969	1472	120	938	124	45.2	28.8
1970	1629	111	1030	110	50.0	31.6
1971	1786	110	1081	105	54.3	32.9

1/foregoing year = 100 %

Source : GUS publications

In table 2.are given only figures for nitrogenous and phosphoric fertilizers,because the whole requirement for potassium fertilizers is covered by import.

Comparing table 2.with table 1.it can be noticed ,that the figures of production are slightly higher than figures of consumption. Also in the future will be kept a certain production surplus in order to make possible some exportation of nitrogenous fertilizers.

Raw material for ammonia synthesis

In Poland allready in the pre-war period was working a natural gas steam reforming plant for ammonia synthesis gas production. Because of small inland natural gas resources and a good developed coal-mining industry, the fundamental raw materials for ammonia synthesis gas production was coke and coke gas. Beginning from the early sixties all new plants are basing on natural gas. In 1975 95 % of ammonia production will be based on natural gas, the remainder will be produced from coke gas and petrochemical tail-gases. The above mentioned changes in raw materials, together with a stepwise replacement of smaller ammonia production units by up-to-date large units will give a substantial decrease of the average cost of production. This decrease will be about 4o %.

4. The assortment of produced nitrogenous fertilizers.

The Polish nitrogen industry is producing the following fertilizers:

- urea
- calcium ammonium nitrate /CAN/
- ammonium nitrate /AN /
- calcium nitrate
- sodium nitrate
- calcium cyanamid
- ammonium sulphate
- aqueous ammonia

U r e a

Prilled fertilizer urea is produced in Poland from 1964 by Toyo-Koatsu process total recycle plants. The main feature of this product is the low biuret content and very good storage properties without any anti-caking treatment.

Calcium ammonium nitrate

Primarily CAN was produced in Poland only with periodic slurry mixing and by pug mill granulation. The nitrogen content was 20.5 % Beginning from 1954 almost the whole CAN production is realised by a continuous prilling tower process. In the late fifties the nitrogen content was increased first to 22.0 % and later to 25.0 %. This nitrogen content is a compromise between the better agrochemical properties of the 20.5 % product and the lower total AN fertilizing costs. But to emphasise, that in spite of the higher price of nitrogen in CAN in comparision to AN, the farmers like to buy CAN considering the doubtless good agrochemical properties.

Ammonium nitrate

In order to reduce the costs of nitrogen production in 1957 a part of plants producing hitherto CAN began to produce AN. In 1969 this production was considerably expanded by putting into commission the AN plant at Puławy. Early this year it was followed by the newest plant at Włocławek. The nitrogen content of the various products is between 33.0 % and 34.8 %. Very good handling properties of the product are secured by the used stabilizing and anti-caking agents.

Calcium nitrate

The calcium nitrate is produced from limestone and nitric acid with an addition of ammonium nitrate, giving a nitrogen content of 15.5 %. In spite of very good agrochemical properties the production tends to decrease because of high costs of production.

Sodium nitrate

Sodium nitrate is produced by alkaline absorption of waste gases from low pressure nitric acid plants.For fertilizing is used only a very small amount.

Calcium cyanamid

Calcium cyanamid was produced in Poland for fertilizing purposes from 1917 in an increasing amount.From 1965 the supply to the fertilizer market was decreasing until 197o when the supply was stopped at all in order to satisfy industrial needs.

Ammonium sulphate

In the pre-war period ammonium sulphate was produced in Poland both from coke gas and synthetic ammonia,after the war only from coke gas.At present is coming an increasing amount of AS as a by-product of caprolactam production.

Aqueous ammonia

The use of aqueous ammonia with 2o.o % N was introduced into fertilizing practice in the early fifties by the nitrogen industry with investing a lot of money in local storage tanks. In spite of the lowest nitrogen price and big organizational efforts of the industry,the demand for this form of nitrogenous fertilizer was not coming up to the expected level.

Other nitrogenous fertilizers

The ammonium phosphate produced at Police is containing 18 % N and 46 % P_2O_5.In the near future will be produced also a NPK fertilizer based on the above mentioned product.

The relative importance of the above mentioned fertilizers and its change as a function of time is shown in table 3./percentage of total nitrogen production/

Table 3.

year	calcium ammonium nitrate	ammonium nitrate	urea	calcium nitrate	sodium nitrate	calcium cyanamid	ammonium sulphate	aqueous ammonia	ammonium phosphate
1960	36.43	35.37	0,15	4,67	0.19	1[illegible].04	9.78	0.37	-
1961	43.38	29.33	0.07	4.08	0.03	12.52	9.96	0.53	-
1962	43.08	30.13	0.65	4.16	0.03	10.19	11.01	0.75	-
1963	45.84	29.54	0.64	3.58	0.15	8.52	10.18	1.55	-
1964	44.85	27.77	1.89	3.37	0.17	9.16	9.36	3.43	-
1965	38.81	23.71	10.86	3.02	0.10	7.54	11.42	4.54	-
1966	37.11	24.70	15.82	1.60	0.06	5.02	11.10	4.59	-
1967	31.04	22.66	28.72	1.68	0.07	3.22	8.91	3.70	-
1968	26.20	32.74	26.95	1.64	0.03	1.85	7.60	2.99	-
1969	21.12	40.98	28.30	1.04	0.01	0.13	6.14	2.28	-
1970	22.10	35.93	34.05	0.69	0.01	0.12	5.76	1.34	-
1971	21.70	33.49	35.28	0.66	0.022	-	5.64	1.01	2.22

In the above table can be seen the very dynamic growth of the urea quota considering the substantial parallel growth of AN production / in absolute figures/.

In the relative importance of nitrogenous fertilizers there will be some changes in the next few years.Allready in this year there will be a noticeable increase in AN production coming from the plant at Włocławek.In the next years also the production of NP fertilizer will stepwise be increased,partly in the form of NPK fertilizers.About 1975 the supply of CAN will increase due to the planed modernization andd intensification of existing plants. The production of other fertilizers will be in principle the same as the present production.Worth mentioning is also the planed stepwise change of CAN-filler from limestone to dolomite.This will give a nitrogen fertilizer with a content of about 5 % MgO,which will at least diminish the magnesium deficit in soil if used continuously.

5. Exports of nitrogenous fertilizers

In the sixties there had been imported to Poland certain complementary amounts of nitrogenous fertilizers,about 15 thousand tons of nitrogen per year.The dynamic growth of domestic production made it possible to start with exports in 1967.In 1971 this exportation reached a figure of 32o thousand tons of nitrogen.The products were going to the Far and the Middle East and also to Western Europe. It is planned to keep the nitrogen fertilizer export on the present level. Into consideration can be taken the export of urea,AN,CAN,ammonium sulphate and a certain amount of ammonium phosphate.CAN can be supplied also with a nitrogen content different from the domestic standard i.e. 25 % if wished by the costomer.

The exported fertilizer is in principle packed like for the domestic market i.e.in plastic bags per 5o kg net.When needed,it can be packed also into additional jute bags.

The transport of fertilizers to European countries is at present realised by train,but in the near future it will be possible also to transport fertilizers by barges in bounds of the European inland navigation system.

6. Domestic prices of nitrogenous fertilizers.

The below shown domestic retail trade prices are given in złoty/1000 kg.

-calcium ammonium nitrate,	25 % N,	PE bags	2350 zł
-ammonium nitrate	33 % N,	PE bags	2820 zł
- " "	34,5% N,	PE bags	2950 zł
-urea	46,3% N,	PE bags	3650 zł
-calcium nitrate	15,5% N,	paper bags	2050 zł
-sodium "	15,5% N,	" "	1900 zł
-ammonium sulphate	20,5% N,	bulk	1300 zł
-aqueous ammonia	20 % N,	barrel	900 zł

When fertilizers are bought outside the fertilizing season, the purchaser is getting a discount of 5 to 13 % depending on the time and the kind of fertilizer.

7. Future development of nitrogenous fertilizer production and consumption.

Below are given the planned production and consumption of nitrogenous fertilizers till 1980 and the forecast for 1990.

- 1975 production 1567 thousand m t N, consumption 1250 th. m t N
- 1980 " 1700 " , " 1500 "
- 1990 " 2200 " , " 2000 "

These consumption figures will give a per hectare consumption of:

- 1975 83,3 kg N /ha arable land
- 1980 100,0 kg N/ "
- 1990 133,3 kg N/ "

For comparision are shown below the figures for P_2O_5 and K_2O in thousand metric tons of P_2O_5 and K_2O.

- 1975	1000 P_2O_5	1550 K_2O
- 1980	1250 "	1750 "
- 1990	1512 "	2200 "

The forecast of total consumption of NPK and the per hectare consumption of NPK will be consequently:

- 1975	3800 thousand t NPK	253,3 kg NPK /ha arable land
- 1980	4500 "	300,0 "
- 1990	5712 "	380,8 "

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Pesticide industry — report from Poland

I have to speak about the achievements in the production of pesticides for colorado beetle (Leptinotarsa decemlineata) control in Poland, but for the information I would like at the beginning to say some words about the pesticides industry in Poland as a whole.

Pesticides production in Poland amounts about 10 % of the fertilizers production value. The pesticides production in Poland is still in the development.

In year 1972 we stop the production of DDT. From the chlorinated hydrocarbons its will be still producted lindan and methoxychlor (DMDT) which you know , has a very low toxicy for mammals. LD 5o amounts about 6ooo mg/kg rat weight. DDT in the mixture with lindan and methoxychlor as the preparation named tritox is being used only in the control of colorado beetle. It is forbidden to use DDT on the others crops. About the details of the colorado beetle control I will speak later.

As the alternative substances for DDT our chemical industry produces the insecticides of the phosphorganic compounds and carbamats such as : trichlorfon, malathion, fenitrothion , dichlorfos, chlorfenvinfos carbaryl and tetradiphon as an acaricide.

In the group of fungicides we produce the copper oxychlorid, colloid sulphur ,thiuram, captan and we are preparing the production of karboxine as a systemic fungicide.

As seed dressing substances we produce mercury organic compounds, thiuram, quintocen, HCB. In the next future the production of organomercury compounds is being limited on behalf in the nonmercury compounds such as thiuram HCB, quitocen, karboxins and its mixtures.

In the herbicides group polish chemical industry produces 2,4-D, MCPA and some mixtures with dicamba and propionic acides for the control of resistance weeds. Our chemical industry prepares the production of urea derivatives such as diuron, linuron, monolinuron. From the growth regulators we produce CCC.

All the mentioned compounds are produced in the form of dusts wetable powder emulsifible concentrates and aerosols.

For the particular design such as fruit threes protection we import pesticides from the west countries in the amount of lo % value of our pesticide production. I would mention that we are an exporter of pesticides in the amount of about 25 % value of our production.

<u>The achievements in the production of pesticides for colorado beetle (Leptinotarea decemlineata Say) control in Poland.</u>

Poland is one of the gratest potato producers in the world. The potatoes are grown there on more than 2.800.000 ha.

Colorado beetle is certainly one of the most serious pests of potatoes not only in Poland but in all Europe. There is observed a constant increase of its population density instead of continuous chemical control.

Colorado beetle feeding on potatoes, especially in June and July, caused the loss of 30 % and in the case of complete defoliation even of the whole yield. Tat is due to its high reproduction ration and high food aptake. Theoretically the progeny of one female laying 500 eggs would destroy in the third generation 100.000 potato plants growing on the average on 2,5 ha.

In our climatic conditions the appearance and injureness of the larvae of the first generation gets its peak in June and July. The larvae are completing their development during 2-4 weeks and the maksimum of beetles of the first generation appear at the end of July and et the beginning of August. Only very seldom the larvae of the second generation complete their development in Poland. It happens only in extremely favourable weather conditions and then the beetles of the second generation appear in September or October.

Until 1971 the colorado beetle was controled in Poland with the use of chlorinated hydrocarbons, mainly DDT in dusts emulsion, wettable powders and aerosoles.

Since several years there was observed the decease of the efectiveness of DDT used against colorado beetle due probably to the development of resistant populations. For better control there were introduced the mixture of DDT and BHC named Ditox and the mixture of DDT, BHC and DMDT named Tritox.

In the Institut of Organic Industry there were caried out the studies on the pesticides alternative (which could replace) for DDT in colorado beetle control.

In years 1966 to 1971 there was evaluated in field experiments the effectiveness of several carbamates and organo-phosphorous compounds. The results are presented in table 1 to 4.

Carbaryl was very effective when applied against colorado beetle larvae but not against beetles themselves. It killed at most 50 % beetles. Its effectiveness depended to much extend on temperature. In our experiments the effectiveness was higher at the temperature above 20°C and lower at the temperature below 20°C As in our climate conditions during maksimum appearance of beetles the temperatures often are quite low, we had to search for other chemicals more effective at low temperature or to produce the mixtures of carbaryl and other chemicals increasing its effectiveness in colorado beetle control.

In the table 4 there are presented the results of 4 years experiments. Basing on these experiments we decided to produce a product named Gamakarbatox. It belongs to the chemicals of the III class of toxity for mammals. LD 5o oral equals 662 mg/kg of rat weight. There is recommended 1 kg of Gamakarbatox per 1 ha. This means 0,5 kg of active substance. The cost is also very low it amounts only 93,50 zl per 1 ha.

There is also prepared the production of the next insecticide named Karbatox extra P in form of the wettable powder 75% LD50 on rats equals 211 mg/kg weight. There is recommended 0,75 - 1,0 kg of Karbatox extra P per 1 ha. The cost equals to about 100-120 zl per 1 ha.

Besides there will be produced the dusts: Gamakarbatox dust and Methoxykarbatox. Both will be applied in the dose 20 kg/h Chlorfenvinphos, the active ingredient of Sapocron/50 % / and Biriane /24% / is highly toxic for mammals, LD 5o oral for rats 30 mg/kg of weight, but at the same time very effective against colorado beetles at the dose of 200-300 g/ha. Basing on several years experiments we decided to produce Sapecron basing on the imported concentrate. Due to its high toxity Sapecron will be aplllied only by the specialistic brigade.

One treatment would cost about 160 zl per ha.

There were obtained very good results in colorado beetle control also with the use of following other chemicals:

<u>IPO - 62</u> experimental substance inform of emulsifieble liquid containing 25% of new active ingredient synthetysized in Poland belonging to enolophosphorous compounds. Its toxity for mammals is 3 -5 times lower than that of chlorfenvinphos. The effective dose of IPO-62 is 200 g/ha (table 4) which would cost less than 150 zl.

<u>IPO - 63</u> experimental substance in form of the emulsifieble liquid containing 25% of new active ingredient synthetysized in Poland, also belonging to enolophosphorous compounds. It belongs to the III class of toxity for mammals and ~~is~~ has ~~characterised by~~ very low dermal toxity. The effective dose of IPO - 63 is 400-500 g/ha in the control of colorado beetles , which would cost about 300 zl/ha.

UNDEN - wettable powder containing 50% of propoxur produced by Bayer, belonging to the II class of toxity for mammals It is a short active insecticide which must be applied on a very exactly established data according to the development of colorado beetles. The effective dose equals to 300-400 g active ingredient per ha.

The results of laboratory abd field experiments showed taht propoxur increases the effectiveness of DMDT and lindane against colorado beetle, and may be a valuable component of mixtures of prolonged activity period for colorado beetle control.

Tab.1.

The activity of Birlane and -Bidrin in the control of colorado beetle/Leptinotarsa decemlineata/ compared to Azotox and Sevin.

Preparation	Dose kg a.s./ha	% of mortality Larvaes L_4	Beetles
Bidrin EM 24	o,5 o,25	94,o 96,8	2o,9 14,o
Birlane EM 24	o,25 o,125	1oo,o 94,o	97,4 81,4
Azotox Z-50	1,2o o,6o	1oo,o 39,4	39,6 26,7
Sevin Z-85 USA	1,2o o,6o	1oo,o 1oo,o	8,3 19,1
Z-75 IPO /karbaryl/	1,2o o,6o	1oo,o 94,o	17,o 2o,9

Tab.2.

The activity of carbamat insecticides in the control of colorado beetle /Leptinotarsa decemlineata Say./

Preparation	Dose kg a.s. / ha	% of mortality	
		Larvaes L_4	Beetles
minacide /Karbamult/ promecarb	3,0 1,50 0,75	100 100 100	86,7 93,7 76,7
metiokarb /Mezurol/	3,00 1,50 0,75	100 100 83,3	83,3 76,6 73,3
Propoxur /Unden/	3,0 1,50 0,75	90,0 93,3 86,7	86,7 83,3 90,0
carbaryl /Sevin/	3,0 1,50 0,75	100,0 100,0 83,3	63,3 33,3 -
Z-60 /carbaryl/	3,0 1,50 0,75	100,0 100,0 96,7	43,3 50,0 33,3

Tab.3.

The activity of the phosphororganic insecticides in the control of colorado beetle /Leptinotarsa decemlineata Say./

Preparation	Dose kg.a.s. /ha	% of mortality Larvaes L_4	Beetles
Birlane /Shell/	o,5 o,25	1oo,o 1oo,o	1oo,o 93,3
Chlorfenvinfos IPO	o,5 o,25	1oo,o 1oo,o	82,2 75,6
Naled /Dibrom/	2,o 1,o	- -	26,7 6,7
Methyl Dimetoat	2,o 1,o	- -	2o,o 13,3
Fenitrothion /Owadofos/	2,o 1,o	- -	36,7 16,7
Vamidothion /Kilval/	2,o 1,o	- -	1o,o 1o,o
Menazon /Sayfos/	2,o 1,o	- -	o,o o,o
Phosalon /Zolone/	1,o o,5	1oo,o 1oo,o	56,7 56,7
Imidan	1,o	1oo,o	6o,o

Tab.4.

List of insecticides for the control of colorado beetle /Leptinotarsa decemlineata Say./ investigated in Institute of Organic Chemistry in Pszczyna /Poland/ in years 1966-1971.

Control of larvaes			Control of beetles		
Preparation	The lowest active dose kg a.s. /ha	Period of investigation /years/	Preparation	The lowest active dose kg.a.s. /ha	Period of investigation /years/
IPO-62	o,1	2	IPO-62	o,2	2
Birlane	o,1	6	Chlorfenwinfos	o,2	1
Chlorfenwinfos	o,1	1	Gammarol Supra	o,2 pre.	1
Despirol	o,15	2	Birlane	o,25	6
Gammarol Supra	o,2 pre.	1	Gusation	o,25	1
Gamakarbatox	o,2	2	IPO-63	o,4	2
Gusation	o,25	1	Sapecron	o,5	1
Sapecron	o,25	1	Gamakarbatox	o,5	2
Thiodan	o,25	1	Thiodan	o,5	1
Tritox extra	o,25	2	Karbatox extra P	o,5	2
Insektizid 66o7	o,25	1	Azotox WP 75%	o,5	1
Padan	o,25	1	Ca 69oo	o,5	2
Propoxur	o,3	2	Insektizid 66o7	o,5	1
Unden	o,3	5	Padan	o,5	1
IPO-63	o,3	2	Bidrin	o,5	2
Karbatox Extra P	o,4	2	Propoxur	o,6	2
Azotox WP 75%	o,5	1	Unden	o,6	5
Ca 69oo	o,5	2	Carbamult	o,75	2
Sevin	o,5	4	Tritox extra	o,75	2
Carbamult	o,6	2	C 8353	1,o	2
C 8353	o,6	2	Sevin	1,o	4
Ultracid	1,o	1	Ultracid	1,o	1
Mesurol	1,o	1	Mesurol	1,5	1

5. 8. 74