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MAIN FACTORS DETERMINING THE DEVELOPMENT AND
TRENDS OF PESTICIDES PRODUCTION IN ROMANIA 1/

by

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I. Development and present status of pesticides
production in Romania

1. Before the Second World War Romania was a country with a poorly developed industrial sector, where the light industry was predominant.
2. More than 70 per cent of the country's population was engaged in agriculture, of which productivity was low due to the reduced degree of mechanization and to the lack of mineral fertilizers.
3. During that period the application of pesticides was limited to extremely reduced surfaces, with the exception of Bordeaux mixture, which was extensively used in grape growing for the control of downy mildew of grape (*Plasmopara viticola*). The copper sulphate was in fact the only pesticide manufactured in Romania. Besides this, reduced quantities of inorganic and botanical insecticides were imported and formulated in rudimentary workshops.
4. After 1945, within the undertaken actions of removing the war consequences and further on of developing the national economy, the increase of the productivity of agricultural crops represented one of the major objectives of our country in view of assuring the increasing domestic demands of food and of producing excess for export. To meet this goal, the extension of plant protection by using, first of all, the organic pesticides, represented a main preoccupation.

5. Before presenting the evolution of pesticide production in Romania, a short description of some characteristic conditions in our country and of our agriculture, which influence the application and implicitly the production of pesticides is useful. Romania has about 21 million inhabitants and 237,500 km² surface. It is situated between the latitude of 43°37' and 48°15' North, and between longitude 20°15' and 29°41' East. The climate is extremely continental, generally characterized by dry summers and by cold winters with heavy snow falls.

6. An important characteristic is the presence of various forms of relief with the respective differentiated climatic conditions from one region to the other.

7. The differentiated conditions of relief, climate and pedology determine the existence of a big diversity of agricultural crops (see annex I) and of pests too, those having an economic importance being mentioned in annex II.

8. Finally, the high organic content soil in many areas of the country and especially in the South-East area requires in most cases the application of higher rates of pesticides as compared with other countries.

x

x x

9. In Romania the production of organic pesticides started in 1946, and the reduced quantities of BHC so obtained were especially used in the hygienic sector. Then a period follows which ends in 1960 and to which we can refer as the beginning of DDT production (in 1956) with a capacity of 500 t/y (technical product with minimum 70 per cent isomer p,p') and of 2,4-D herbicide (delivered as a sodium salt) expressed in acid equivalent (1956) in a 100 t/y plant. The same year the production of ANTU rodenticide (40 t/y) and of enriched BHC containing 28-35 per cent gamma isomer started.

10. In addition, the chemical industry supplied important quantities of copper sulphate (3000-5000 t/y) and mineral oil (3000 t/y) to the agriculture. These last two pesticides were the only ones used on a large scale in that period.

11. After 1960, a tendency of quantitatively increasing the pesticide production and of diversifying the range of active ingredient is recorded. This tendency is stressed after 1965, the total production increasing from 3,990 t/y in 1960 to 9,755 t/y in 1965, to 13,299 t/y in 1970 and to 16,111 t/y in 1972 (expressed in active ingredient); the range of active ingredients increased from 5 in 1960 to 7 in 1965 and then to 14 in 1970 (see annex III).

12. As it can be seen from annex III, the pesticide production was initially directed to obtain DDT and BHC, cheap insecticides having a large biological action spectrum and not requiring sophisticated and expensive equipment. Further on, other active substances were introduced in production and they were also applied in numerous agricultural crops. Thus agriculture had the possibility to control numerous species of insects with a relatively reduced range of products.

13. The intensification of pesticide production noted in the period 1960-1970 was not by far casual, but generated by the following important factors:

14. (a) Intensive development of the chemical industry. Within the high rate increment of the global industrial production (see annex IV) a rapid development of the chemical and petrochemical industry took place. This development was extremely intensified in the period 1960-1970 (see table I):

Table I

Development of chemical industry
in Romania

						1938 = 100	
<u>1948</u>	<u>1950</u>	<u>1955</u>	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1971</u>	
101	171	502	1100	3500	9200	10600	

15. On this basis the range of raw materials and intermediates necessary for the production of pesticides insistently demanded by agriculture (chlorine, sulphuric acid, hydrochloric acid, sodium hydroxide, sodium carbonate, acetic acid, nitric acid, methanol, benzene, phenol, toluen, xylene, chlorobenzene, chloral, chloracetic acid, methyl-amine, dimethyl-amine, maleic anhydride, butanol, cyanuril chloride, ammonium thiocyanate, alfa-naphtyl-amine, as well as various tensio-active substances) at suitable prices was enlarged.

16. The setting up of important industrial chemical and petrochemical units allowed the location of pesticides plants following the technological process of obtaining the raw materials and intermediates with favourable economic effects. This orientation is, of course, further on applied in all possible cases.

17. Consequently the development of the chemical and petrochemical industry based on the existence of rich resources of raw materials (crude oil, methane gas and salt) constituted and will also constitute in the future the basic factor for the increase and diversification of pesticides production under advantageous economic conditions in Romania. For the same reason, the solution chosen in this field consisted in synthesizing the active ingredients in our country in view of satisfying to a larger extent the pesticides demand of our customers (among which agriculture is the most important) from our domestic production.

18. (b) Intense mechanization of agriculture. As shown in the graph of annex V a substantial increase of the number of tractors used in agriculture took place in the period 1960-1970. As a result, in parallel with the increase of the mechanization degree of the agricultural works, the possibilities of mechanizing the treatments for plant protection increased too, fact which renders an increased interest in pesticide application.

19. (c) Organization of large and very large farms. In the period 1960-1962 the organization of large and very large farms was completed; consequently at present there exist about 200 state agricultural enterprises each having an average of 8,000 hectares farming area and about 4,600 production agricultural cooperatives, the average farming surface being of 1560 hectares.

20. The existence of these farms with large areas, have allowed, of course, pesticide treatments at reduced prices and stimulated the increase of pesticides demand starting with 1960-1962.

21. (d) Growth of fertilizers consumption. As a consequence of the chemical industry development, in the period 1960-1970 a series of big fertilizer manufacturing factories started their production, a fact which determined an important increase of their consumption (see annex VI) in agriculture. Due to this fact and to others as well (introduction of species of cereals with high productivity, application of modern agro-technical methods), a steady and continuous increase of the agricultural production per hectare for the majority of important crops is recorded (annex VII). As a result the agriculture interest in pesticides is increasing in order to maintain the high production which has been recorded since 1960.

22. From annex III it is noticed that the organic chlorinated insecticides represented the major part of the quantity produced in 1960-1972; a higher percentage reduction of these products is recorded only in 1972, due to the increase of other pesticide production (although in absolute weight, organic chlorinated insecticide production continues to increase, due to some increased demands from clients abroad):

Table II

The volume of organic chlorinated insecticides as compared with the total production of pesticides

	Tons			
	1960	1965	1970	1972
Total production ¹⁾	990	6755	9299	13611
of which:				
Organic chlorinated insecticides	850	6000	7728	9460
Percentage	86	89	83	69

¹⁾ Mineral oil and copper sulphate are not included.

23. As shown further on the volume of organic chlorinated insecticides will continue to register an accentuated decrease.

24. In the period 1960-1970 the preponderance of organic chlorinated insecticides is explained by the necessity to meet to a larger extent the demands of agriculture, without too big investments based on the raw materials available in the country.

25. It can be observed that the herbicide production is still low, even at the level of 1972, if we consider the surface and the variety of the agricultural crops in Romania (see annex I). As regards the fungicides, the only product is the mercury ethyl chloride, which assures the wheat seeds treatment against bunt smut.

26. As formulation forms the emulsifiable concentrates and the dusting powders prevail.

27. Due to the relative short distances between the pesticide producing factories and the agricultural consuming areas (200-400 kms) the formulation is done, in most cases, within the factories which produce the active ingredient.

28. The research performed to elaborate technologies for pesticide production and formulation is carried out in the Chemical Research Institute ICECHIM, in the research departments of the big chemical complexes as well as in some research institutes belonging to the high education. All the research activity is co-ordinated by the Central Institute of Chemical Research of the Ministry of Chemical Industry.

29. In our country the registration of pesticides is done by an interdepartmental committee which functions within the Ministry of Agriculture and is composed of representatives of this ministry, of the Ministry of Chemical Industry and of the Ministry of Health. This committee registers both the pesticides produced in the country and those imported. The registration is granted based ^{on} the analysis of the physico-chemical characteristics of the formulated product and on testing its biological action towards pests for which control it is proposed. These determinations and tests are carried out in the plant production laboratories of the Research Institutes of the Ministry of Agriculture including the Research Institute for Plant Protection, which co-ordinates ^{the} whole activity in this field.

II. Trends in the use, application and formulation of pesticides in Romania

30. Within the national economy of Romania agriculture will continue to hold an important role. Although a relative decrease of the agriculture weight is noted in comparison with the industry, the absolute value of the agriculture production is steadily rising as a consequence of the higher yields per hectare achieved with the main crops (see annex VII). Nevertheless, the losses incurred by the crops due to the action of agricultural pests raise to an important value in our country; according to estimates that can be considered as prudent, these

losses amount to 25 billion lei per year at least.

31. At the same time new pests (diseases and insects) are added to the known ones requiring the elaboration of new methods and especially of new pesticides capable to control them.

32. Therefore a further development is forecast for the production of pesticides both in quantity and in variety, the last requirement being determined by the necessity of controlling some pests for which at present we do not produce the necessary products and in order to meet the resistance phenomenon of some insecticides and to meet the predominance of resistant weeds in crops continuously treated with the same herbicides for several years (assurance of pesticide rotation).

33. At present, the following more important trends are noticed in the use and application of pesticides in our country:

34. (a) Orientation towards products with as much reduced acute toxicity as possible, having at the same time a low remanence, which should render a favourable aspect from the residues standpoint in the food products obtained from treated crops. This is the most important orientation in selecting the new products that are going to be manufactured and used in the following years. Obviously, the trend refers firstly to insecticides of which the organic chlorinated ones will register real decrease in production as a result of the applied restrictions which will be more severe in a short period of time. As an example, we can mention that the use of DDT and Lindane was stopped in zootechny and in meadows since several years.

35. (b) The achievement of a higher economic efficiency in the production and use of pesticides. This imperative requires the use of economic formulations (granules, microgranules, LV and ULV solutions by air application) of pesticide mixtures (insecticide plus insecticide, insecticide plus fungicide, fungicide plus fungicide, herbicide plus herbicide); it requires intensification of treatments by air application and, of course, the application of active ingredients having an as low cost price as possible and an high biological activity- thus all ^{at} low rates per hectare.

36. (c) The application of pesticide treatments on irrigated crops, the surface of which is forecast to be continuously extended.

Contemplated developments in pesticide production

37. For the following seven years a further increase and diversification of the pesticide production is forecast; as a consequence of the above mentioned trends, this will present the following more important characteristics:

38. Important reduction of the organic chlorinated insecticide production. As a consequence of the restrictions imposed by the Ministry of Health (restrictions which will be extended in a short period of time) the use and thus the production of organic chlorinated insecticides will be considerably reduced. Products like DDT and BHC will be affected, while Lindane and Pinetox (polychloropinene) will be maintained.

39. Substantial increase of the OP insecticide production. Concurrently with the strong reduction of the production of organic chlorinated insecticides, the range and quantity of OP insecticides, products with advantageous and well known properties (strong biological action, reduced acute toxicity and low remanence) will be increased. As shown in annex VIII the production expressed in active ingredient will increase about seven times in 1972-1975, from 810 t to 5750 t. Besides the quantitative increase of dimethoate and malathion production, others new products with a low toxicity towards mammalia will

added to the existing ones until 1975.

40. Development of carbamate insecticides. In the following period we shall try to promote the production and use of carbamate insecticides to complete the assortment of existing insecticides.
41. Important increase of organic and inorganic fungicide production. In the following two years the fungicide production will considerably increase, filling thus a gap existing at present. Copper oxychloride, wettable sulphur, dust sulphur as inorganic fungicides and captan, folpet, thiuram, ziram, mercury phenyl acetate a.s.o. as organic ones will be manufactured. The quantities produced will further increase in 1976-1980 and the range will also extend.
42. Increase of herbicide production. The phenomenon characteristic to these countries which strongly develop their industry, namely the increase of urban population and the decrease of available labour for agriculture, starts to be felt in Romania too. Consequently, a steady and strong demand of herbicides for important crops exist; in order to satisfy it, their production will substantially increase, first of all that of the six-triazine derivatives.
43. Extension of economical formulation forms. A special attention will be laid on the production of granulated and microgranulated insecticides; the volume of concentrated solutions of low volume (LV) and ultra-low volume (ULV) for air application will also increase. The production of pesticide mixtures will be extended and the production of dusting powder insecticides will be reduced. As mentioned before, the formulation of pesticides will be made, in the large majority of cases, in the factories which produce the respective active ingredients.
44. A convenient price for pesticides. The production of pesticides at a convenient price both for manufacturers and for buyers is one of the main objectives of the Ministry of Chemical Industry, under the conditions in which the orientation is

directed towards the elaboration and application of our own technologies for the major part of the new pesticides to be manufactured in the following years.

45. Therefore the production of pesticides will continue to develop to the extent to which the chemical industry will be ready for the production of the necessary raw materials and intermediates at convenient prices. Some of the raw materials shall be imported even in the future for instance the necessary phosphorous for OP insecticides.

46. In view of obtaining a better economic efficiency the principle of producing the raw materials, intermediates and the respective pesticide (pesticides) including the formulation in the same chemical unit will be applied whenever possible. A typical example is the production of sim-triazine herbicides; the resulted cyanhydric acid as a by-product from the acrylonitril production from propene and ammonium is entirely used for the cyanuril chloride synthesis and this one to the production of atrazine (in the future also of other herbicides of the triazine type). The development of the herbicides production on sim-triazine basis will also be done from this residual cyanhydric acid which will be available in larger quantities.

47. A way of reducing the investments is the setting up of flexible units capable to alternatively produce two-three distinct active ingredients with similar chemical structure. Thus the malathion, dimethoate and ethion insecticides are produced in a single flexible unit. This trend shall be further on promoted in the future; this way the costly depreciation determined in some cases by the "short life" of some pesticides shall be avoided. We mention that all OP insecticides on a dithiophosphate basis in the following years should be manufactured in the same units.

48. In case of pesticides for which the domestic demand is lower than the minimum economic capacity under the conditions of our country but for which we have (or will have) cheap raw materials and suitable technologies available we shall try to export the surplus eventually on a co-operation basis with other countries.

49. The development of pesticides production forecast for 1975 and 1980 is shown in annexes VIII - IX; the figures for 1980 are informative.

x

x x

50. The main objectives of the pesticides production development in our country for the following seven years are:

- complete covering of domestic demands for controlling the major pests in the basic crops;
- reduction to minimum of undesirable secondary effects due to pesticides application;
- export availabilities.

III. Problems

51. A series of pesticides necessary for agricultural crops in Romania can not be synthesized under economic conditions due to the lack of raw materials or to the domestic demands which are below the economic production capacity. In such circumstances we consider that the most adequate solution is the co-operation with other countries or with specialized companies by formulating the imported active ingredients in our country or by setting up industrial units which should meet the demands of 2-3 countries. We consider that there are co-operation possibilities on this line, but other ways are not excluded.

1.7. General survey

(a) The importance and variety of agricultural crops in our country require the use of a large range of pesticides.

(b) The development of pesticides production was based on the strong development of the chemical and petrochemical industry and was stimulated by:

- intensive mechanization of agriculture;
- organization of large farms units;
- increase of fertilizer consumption.

(c) Until 1970 the organic chlorinated insecticides and especially DDT and BHC represented over 80 per cent from the total production of organic pesticides, their volume beginning to decrease in the period 1970-1972.

(d) The following orientation in the use of pesticides in Romania is noticed:

- use of products with low acute toxicity and short remanence;
- achievement of a much higher economic efficiency in the use and production of pesticides;
- pesticide treatments on irrigated crops the surface of which will considerably increase.

(e) Objectives. For the period to be ended in 1980 the following major objectives of the pesticides production development were established:

- covering to a larger extent the internal demand;
- assurance of a higher economic efficiency in production and use;
- reduction to minimum of the undesirable secondary effects.

The following trends are forecast:

- orientation towards OP and carbamate insecticides and considerable reduction of DDT and BHC;
- Substantial increase of fungicides and herbicides production;
- development of economic formulations and of mixed products.

(f) Co-operation for the synthesis and formulation of pesticides under advantageous economic conditions.

ANNEX I

THE STRUCTURE OF THE CULTIVATED AREA OF
ROMANIA GIVEN ON CROPS AND GROUPS OF CROPS (1971)

C r o p	Surface 1,000 hectares
Cereals for grains - total	6167.4
of which:	
- wheat	2500.9
- rye	47.6
- barley	330.2
- oat	128.2
- maize	3131.4
- rice	27.5
Vegetables for grains - total	307.9
of which:	
- pea	96.1
- bean	62.0
- soja	146.7
Technical plants - total	963.1
of which:	
- Textile plants - total	65.8
of which:	
- flax for flax bundle	40.3
- hemp for hemp bundle	25.5
- Oleaginous plants - total	659.2
of which:	
- sunflower	548.4
- castor oil plant	16.2
- pimpernel	6.2
- mustard	3.5
Plants for other industrial applications - total	226.0
of which:	
- sugar beet	178.0
- tobacco	32.9
- chicory	0.9
Medicinal and aromatic herbs	12.1
Potatoes, vegetables and melons - total	531.7
a) Potatoes	290.3
b) Vegetables	226.9
of which:	
- onion	43.0
- cabbage	24.7
- tomatoes	55.1
- green pepper	20.9
- garlic	3.9
- edible roots	13.6
c) Melons and water melons	14.5

C r o p	Surface 1,000 hectares
Forage plants - total	1449.1
a) Old and new perennials;	
- for hay - total	767.2
of which:	
- alfalfa	425.0
- clover	191.9
b) Annuals for hay - total	165.4
of which:	
- winter fodder	125.7
c) Annuals for green fodder	240.1
d) Plants for ensiling	250.1
of which:	
- maize	236.7
e) Fodder roots - total	26.3
Interpolated plants:	
- bean	1012.3
- pumpkin	209.1
- potatoes	16.4
Orchards	360.0
Vineyards - total	298.6
of which:	
- grafted and indigenous vineyards	177.8
- hybrid vineyards	120.8

Note: To these, a forest area is to be added having
6313 thousand hectares

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ANNEX II

PESTS HAVING AN ECONOMIC IMPORTANCE
ENCOUNTERED IN ROMANIA'S CROPS AND FORESTRY

C r o p	<u>P e s t s</u>
	diseases, in- sects, weeds
<u>1</u>	<u>2</u>
Wheat-rye	Tilletia tritici
	Tilletia nanifica
	Ustilago tritici
	Zabrus tenebrio- ides
	Eurygaster sp.
	Aphids
	Dicots
	Monocots
Barley	Ustilago hordei
Rice	Weeds
Maize	Seed diseases
	Soil insects
	Tanymecus dilla- ticolis
	Pyrausta nubila- lis
	Dicots
	Monocots + dicots

1	2
	<p>Monocots (especially Echinochloa crusgalli) and dicots</p> <p>Cruciferous weeds</p>
<p>Sunflower</p>	<p>Sclerotinia sclerotiorum</p> <p>Soil insects</p> <p>Tanymecus dilaticellus</p> <p>Monocots + dicots</p> <p>Dicots</p>
<p>Sugar beet</p>	<p>Pythium debarganum</p> <p>Cercospora beticola</p> <p>Betynoderes punctiventris</p> <p>Tanymecus palliatus</p> <p>Aphididae</p> <p>Phterimaea ocellatella</p> <p>Monocots + dicots</p> <p>Defoliation</p>
<p>Potatoes</p>	<p>Tubercles diseases</p> <p>Virotic diseases vectors:</p> <ul style="list-style-type: none">- insects- haulms destruction <p>Phytophthora infestans</p> <p>Leptinotarsa decemlineata</p> <p>Weeds</p>

1	2
Flax	Septoria lini, Colletrichum li- nicolum Monocots + dicots
Soja	Seed diseases Peronospora sojae Insects Acarinae Monocots + dicots Cruciferous weeds Defoliation
Bean	Bacterial di- seases Insects Acarinae Monocots and dicots Cruciferous weeds
Pea	Seed diseases Brudius pisorum Monocots and dicots Cruciferous weeds
Tobacco	Peronospora tabacina Thrips tabaci
Alfalfa and clover	Insects Dicots

1	2
Tomatoes	Phytophthora infestans. Septeria lycopersici. Bacterial diseases Colletotrichum phomeides Aphididae Menecetes
Cucumbers	Diseases
Onion and garlic	Peronospora schleideni
Greenhouse tomatoes	Soil diseases Cladosporium fulvum, Phytophthora infestans, Alternaria tomato
Greenhouse cucumbers	Soil diseases
Orchards	
Apples and pears	Endestigma inaequalis, Endestigma pyrina - before flourishing - after flourishing
	Podospaera leucotricha
	Quadrascidiotus perniciosus - winter treatments
	- summer treatments
	Anthonomus pomorum
	Hoplocampa testudinea

1	2
---	---

	Carpocapsa pomonella
	Monocots and dicots
	o
Plums	Monilia sp., Polystigma rubrum
	Quadraspidiotus perniciosus
	- winter treatments
	Hoplocampa minuta
	Acarinae
	Monocots and dicots
Apricots - peaches	Clasterosporium carpophilum
	- winter treatments
	- summer treatments
	Taphrina deformans.
	Monilia laxa
	Sphaerotheca pannosa var. persicae

1

2

**Quadraspidiotus
perniciosus**

- winter treat-
ments

- summer treat-
ments plus

**Anarsia linea-
tella**

Acarinae

**Sweet and
sour cherries**

**Monilia sp.,
Polystigma rubrum**

Rhagoletis cerasi

Acarinae

Vineyards

**Plasmopara vi-
ticola,
Botryotinia
fuckeliana**

Uncinula necator

**Polychrosis bo-
trana**

Acarinae

**Monocots and
dicots**

1	2
Forestry	Microsphaera abbreviata
	Tertrix viridana
	Geometridae sp.,
	Malacosema neus- tria,
	Lymantria dispar,
	Lymantria monacha

ANNEX III

THE PESTICIDE PRODUCTION IN ROMANIA
(AS ACTIVE INGREDIENT)

- tons -

Name	1960	1965	1970	1972	Formulation
A. INSECTICIDES					
a) <u>Organic chlorinated compounds</u>					
1. DDT (as p-p' isomer)	500	4500	4911	5260	Dusting powders 5 and 10 per cent; EC-25%
2. BHC (as gamma isomer)x)	350	1500	2045	2800	Dusting powders 1,5 and 3%(based on gamma isomer)
3. Lindane	-	-	605	750	Dusting powder 3%;EC-20%.
4. Pinctox (polychloropinene)	-	-	72	650	Dusting powders 10 and 20%;EC-50 and 65%; 30% solution for LV application
b) <u>OP compounds</u>					
1. Fosfotox (dimethoate)	-	-	135	510	EC-50%
2. Carbetox (malathion)	-	-	200	300	EC-50%; solution 3%
3. Ethion	-	-	60	50	EC-50%.
c) <u>Other insecticides</u>					
1. Dibutox (dinoseb)	-	500	532	520	EC-25%
2. Mineral oil- for winter sprays	3000	3000	3000	2500	EC

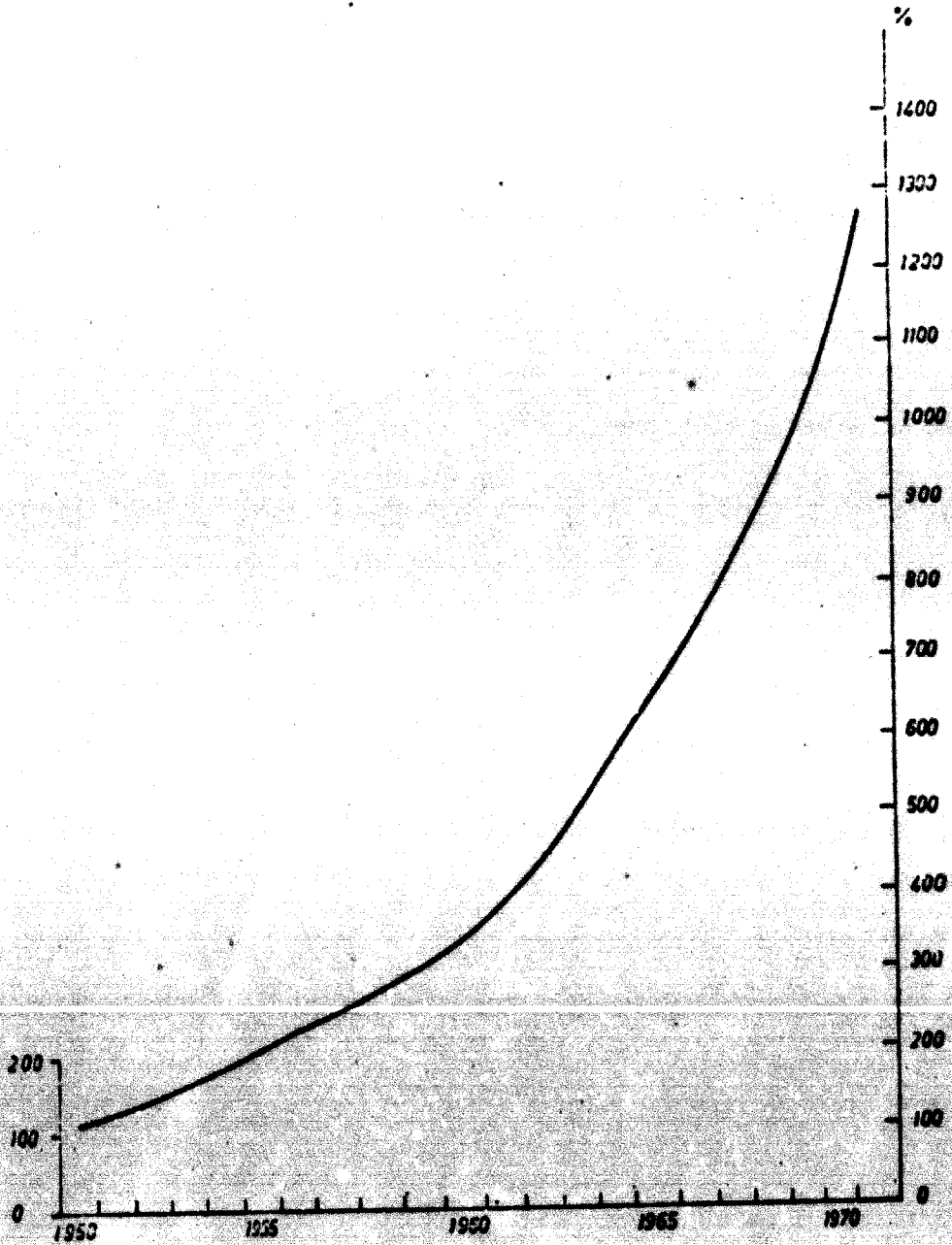
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	1972	1973	1974	1975	
B. FUNGICIDES					
(Copper sulphate not included)					
1. Mercury ethyl-chloride	-	25	30	26	Dusting powder 2% for seed treatment
C. HERBICIDES					
1. 2,4-D (acid equivalent)	100	150	480	785	Dimethyl-amine salt and esters
2. Alagesine (atrazine)	-	-	50	1900	Wettable powder 50%
D. Other products					
1. Antan (alfa-naphtyl-thio-reea)	40	80	24	50	Dusting powder 40%
2. Methyl bromide	-	-	10	10	-

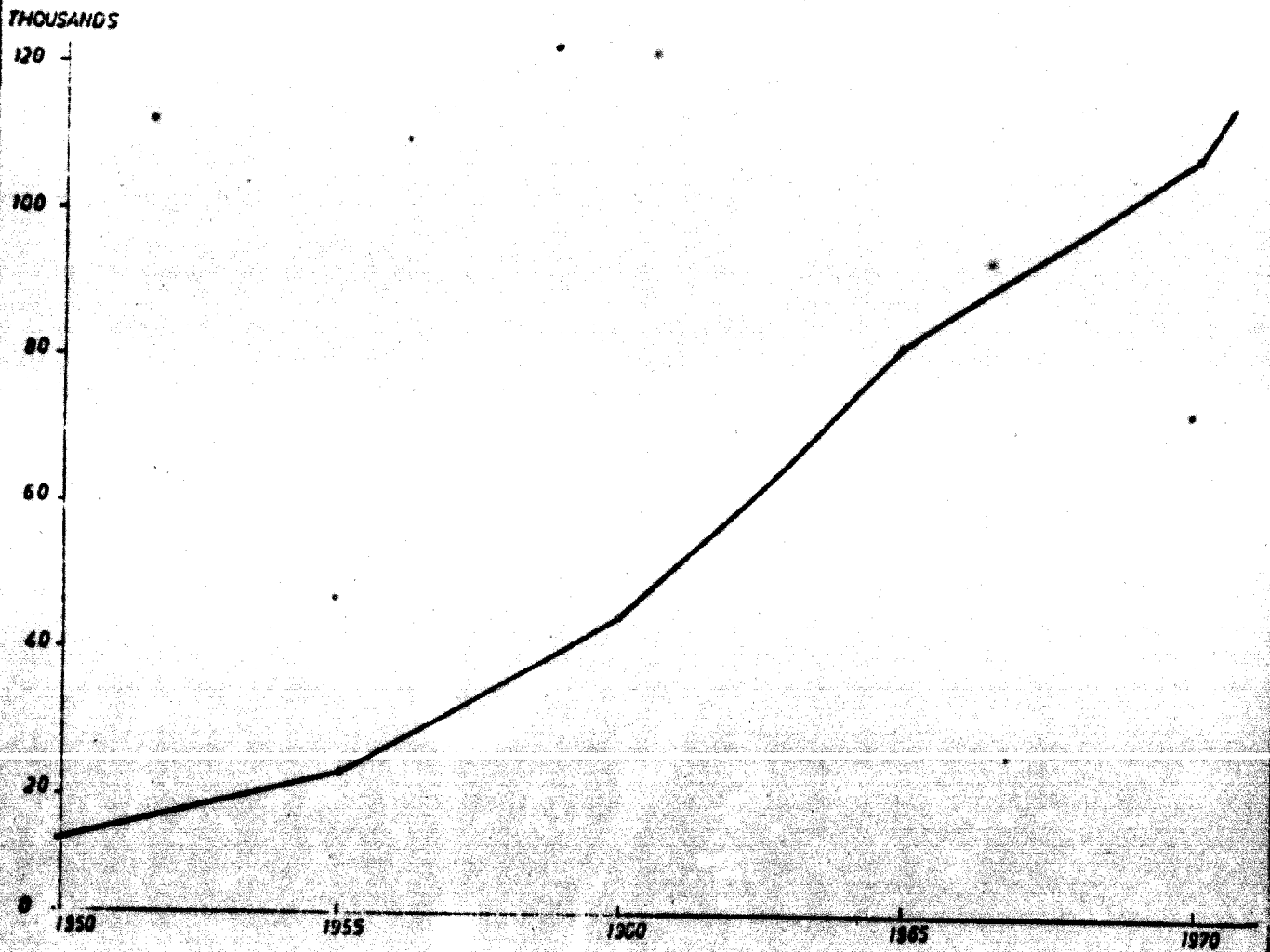
*) BHC for Lindane production not included

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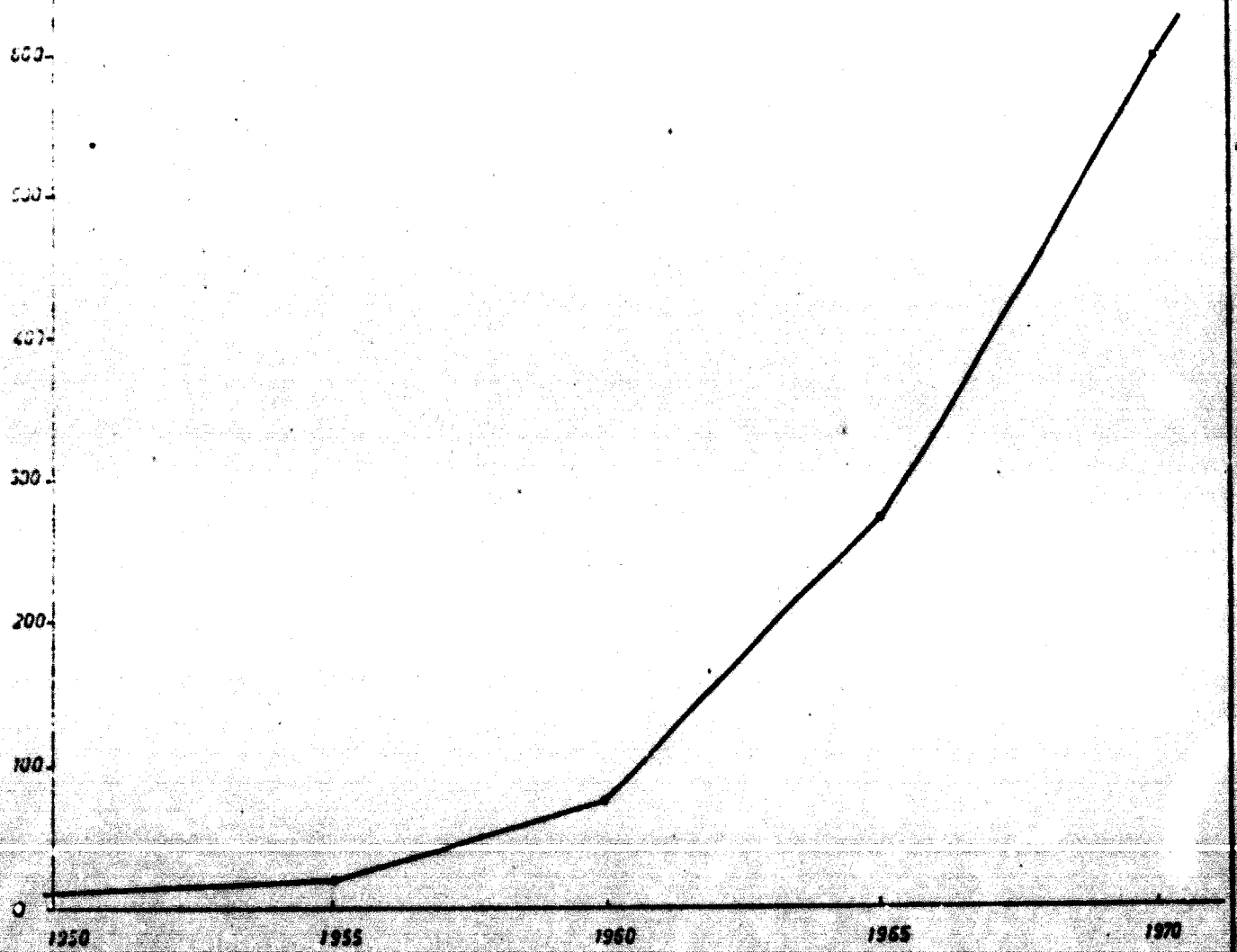
DEVELOPMENT OF SOCIAL INDUSTRIAL PRODUCTION IN ROMANIA
1950 = 100



TRACTORS WORKING IN AGRICULTURE



FERTILIZERS USED IN AGRICULTURE
- ACTIVE INGREDIENT -



STATISTICAL YIELDS PER HECTARE
OF MOST IMPORTANT CROPS IN ROMANIA

- in quintals -

C r o p	1958- 1959	1956- 1960	1961- 1965	1966 1970	1971	1972 ¹⁾
Wheat	11.4	11.3	14.6	16.9	22.2	23.4
Barley	10.5	12.9	17.5	18.1	22)	22)
Oats	12.9	13.9	17.7	22.3	25.0	29.0
Sunflower	7.4	9.1	11.1	14.0	15.4	15.1
Sugar beet	126.8	149.3	161.9	209.1	223.3	278.9
Potatoes	94.6	105.3	85.1	93.2	113.3	108.1
Orchards - total in 1000 tons -	590.0	813.2	905.4	1293.6	2)	2)
Grapes - in 1000 tons	793.1	895.3	907.8	996.1	2)	2)

1) The 1972 figures are approximately.

2) The author had not the respective figures at his disposal.

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ANNEX VIII

THE DEVELOPMENT OF PESTICIDE
PRODUCTION IN ROMANIA

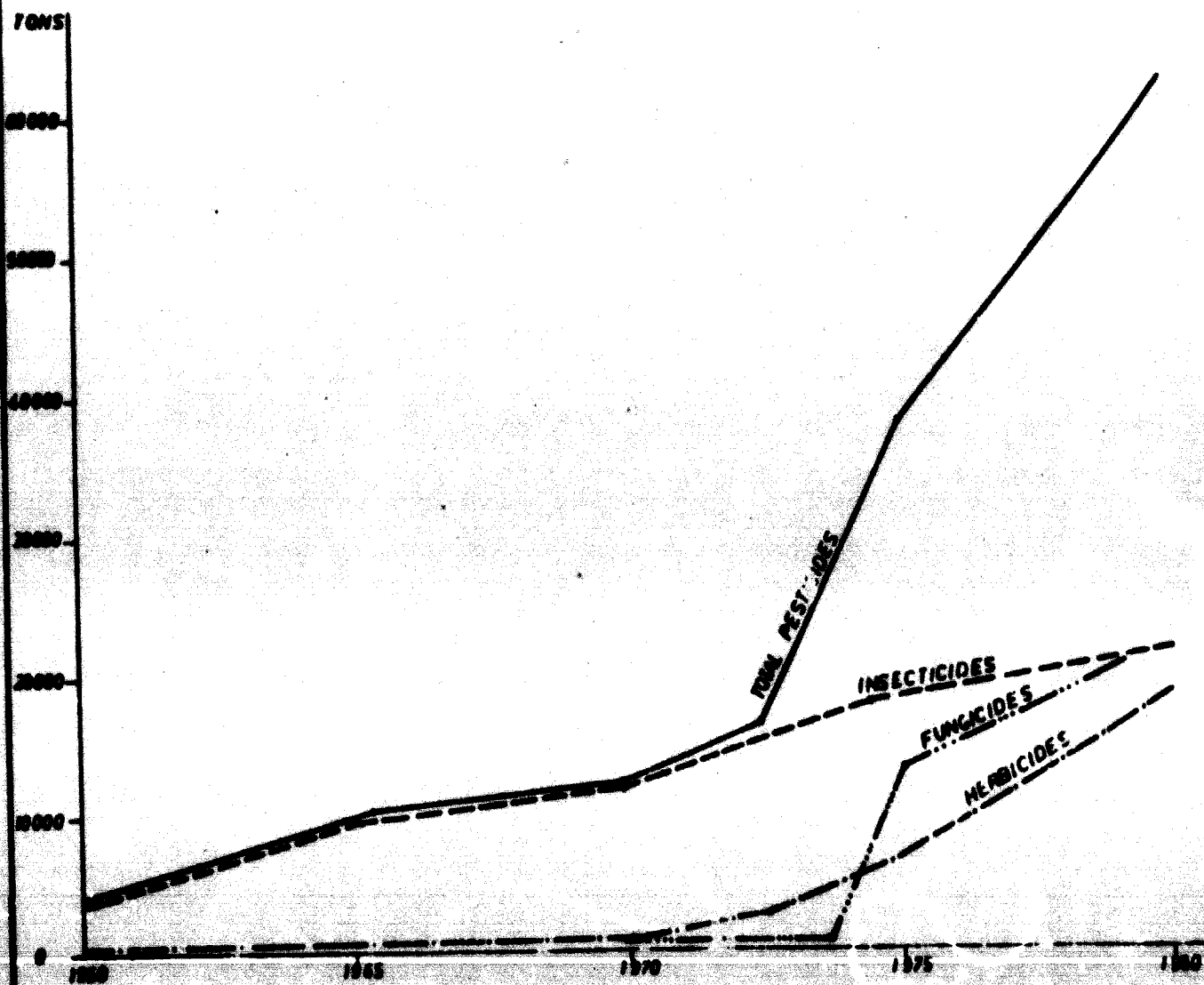
(Forecasts for 1975 and 1980 given as active ingredient)

- tons -		
Name	1975	1980 ¹⁾
A. INSECTICIDES		
a) Organic chlorinated compounds	5,400	2,000
b) OP-compounds	5,750	6,160
c) Carbamates	2,000	2,000
d) Dibutox (dinoseb)	2,000	4,000
e) Barium polysulphide	3,000	6,000
f) Others	50	1,000
Total	18,200	21,160
B. FUNGICIDES²⁾		
a) Inorganic compounds	8,300	12,000
b) Organic compounds	4,925	9,800
Total	13,225	21,800
C. HERBICIDES		
a) 2.4-D (acid equivalent) (esters and dimethylamine salt)	1,000	1,000
b) Sim-triazine derivatives	5,500	9,000
c) Carbamates	-	4,650
d) Quaternary dipiridil compounds	-	1,500
e) Others	-	2,400
Total	6,500	18,550
D. OTHER PRODUCTS	160	1,265
Grand total	38,085	62,775

1) Forecasts for 1980 are informative only.
2) Copper sulphate is not included.

DEVELOPMENT OF PESTICIDES PRODUCTION IN ROMANIA

- a. i. -



005: forecasts for 1980 informative only.



12.8.74