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BRAZILIAN PESTICIDES OUTLOOK 1/

by

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CONTENTS

I - PRESENT STATUS OF PESTICIDES PRODUCTION AND MARKET

The pesticide supply to Brazilian agriculture is made through the union of import products and products of national manufacture. In the last ten years there has been a steady growth in the demand for pesticides, following the increase of agriculture.

In Table I appear the data concerning the decennium 1963/72, figuring the consumption of insecticides, fungicides (importation and national production) and herbicides (all imported). The evolution of some of them is analysed in the schedules which appear unfolded.

I-1. National Production

The national production of pesticides appears in Table II. There, can be verified a very regular growth of DDT manufacture, able to fully meet the demand; some imports of the product are destined for use in public health - malaria combat. At the present time there is only one DDT plant in Brazil.

The same occurs with BHC which constitutes with the former the bulk of pesticides used in the country. Three firms that in the past 25 years began the production of BHC, removed themselves from the market, leaving only one firm.

Together, the chlorinated DDT and BHC represent 80% of the total pesticide production in Brazil; it had earlier attained

90%, but in the last time there is a tendency to transfer part of the market to the phosphorous products. Methyl and ethyl parathion are manufactured by one local enterprise (another test formerly produced ethyl parathion removed itself from the market five years ago). In recent time there is a preference for methyl paration.

Fungicide sectional manufacture is represented by the production of maneb by two firms. Since the beginning of this production six years ago, the increase shows its great acceptance and in the last two years the product has already been exported.

The decennium 1963/72 in percentual terms shows an increase of production at the rate of 500% of DDT, and 300% of BHC and parathion; the general total shows a rise of 450% during this period.

I-2. Imports

Tables III, IV, V and VI give import data regarding insecticides, fungicides and herbicides.

Due to a great number of products, it is difficult to make an analysis of their participation in the total; the insecticides were gathered in traditional groups: chlorinated, phosphoryl, carbamate and others (the last covering all others, including acaricides), which appear in Table IV.

At first sight the general totals seem to demonstrate a certain regularity in growth and almost fixed rate of growth in the last

five years (information is given below on the increase [illegible] 17,000 tonnes to almost 29,000 tonnes from 1973 to 1974). In fact, what happened was a continuous import of greater volume of technical products. So, it could not be made a comparison between the beginning and end of the period, when the percentage of concentrated products was smaller than in recent years.

It can be verified that the phosphoryl insecticides, which represented only 10% of the total in 1963, rose to about 20% in 1972. As the import of chlorinated products in the last year there was an evident increase compared to former years, that can be explained by DDT imports for use in public health. It is necessary to mention the cautious appearance of carbamates at the beginning of the above decennium, with a subsequent good acceptance by users which justifies a separate title in the statistics.

From 1963 to 1972 insecticide imports increased five fold. In Table V are demonstrated import numbers concerning fungicides, gathered in groups of active ingredient (due to a great volume those containing copper are shown separately).

What immediately calls the attention is the impressive increase in copper oxichloride imports in 1972, in comparison with former years. This is explained by the rust of coffee trees in the Central area of Brazil, where the Brazilian coffee planting is concentrated. This consumption will increase in the next few years, when farmers recognize the necessity of protecting their plants, which is what is not happening now. The potential consumption of products containing copper and others for use against the rust, is at least four times the total figuring in Table IV.

It has also to be mentioned the increase in imports and consumption of wettable powder of sulphur, that indicates that this happens to provide treatment in citrus crops against mites.
Copper sulphate is a commodity that is imported regularly and its consumption is related to viticulture and fruits of mild climate.

Fungicide imports increased three times during the decennium 1963/72. In Table I are the numbers of herbicide imports between 1963 and 1972. The introduction of herbicides was one of the greatest developments in the pesticide sector: between 1963 and 1972 there was a consumption increase of 20 times. Mainly in the last five years occurred an impressive progress in the use of herbicides, stimulated by reasons of technical and social order.

Although the figures in the schedule are for about 20 products, one of them, the 2,4-D, is responsible for 30% of the imports last year, and for about 50% in the previous years.

Total value of imports (thousands dollars C and F) of pesticides (excluding 1972 because there was not even preliminary data) show the following numbers: 1963 - 8.736; 1964 - 8.929; 1965 - 12.005; 1966 - 12.691; 1967 - 14.138; 1968 - 21.044; 1969 - 23.283; 1970 - 28.703; 1971 - 34.727.

I-3. Commercialization

Three enterprise groups act in the market of pesticide distribution: those which manufacture or import products; those which distribute to other firms; those which manufacture or import and also formulate mixtures and the formulators, which acquire raw material from the first two and prepare finished goods.

The first group figures American, English, Swiss, French, Italian, German, Japanese and other enterprises.

There is healthy competition in the pesticides market, allowing Brazil to benefit itself from great concerns in the technical field of pesticides, brought by firms which own new products and patents. Cotton is the crop which allows for great variety in the use of insecticides and acaricides, and it is cultivated that about 75% of their volume is destined to the protection against pests; coffee figures as an insecticide and fungicide consumer; there is a great market in garden and potatoes crops. Soy crop is now beginning to be a great consumer, as well as grain crops (mainly wheat and rice).

Pesticide distribution enterprises maintain a staff of agronomist engineers that promote the use of their products to the farmers. There are more than 300 of these technicians working for all enterprises, some of them also acting in the fertilizer sector.

In pesticide commercialization the system of direct sales prevails, through the visit of agents to the farmers, on their land. Big volume of sales is for long term payment, with official financing, at reduced interests. But a decennium ago, when this arrangement did not exist, the firms themselves financed the sales and in this way created the pesticide market in Brazil.

TABLE I - BRAZILIAN PESTICIDE MARKET (1963 - 1972)

Importation and Domestic Production

Physical volume (Tonnes)

SECTION	CALENDAR YEAR									
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 a/
TOTAL - Pesticide Market	15,781	16,193	22,393	30,781	25,453	35,943	40,650	40,965	47,211	67,955
Insecticides	9,308	12,560	17,932	22,984	18,475	28,465	33,514	29,771	30,611	38,901
Importation	5,334	8,489	11,787	14,274	11,366	17,670	21,400	17,267	17,331	24,896
Domestic Production	3,974	4,071	6,145	8,710	7,109	10,795	12,114	12,504	13,280	14,005
Fungicides	6,213	3,268	4,220	7,342	6,059	5,647	5,685	7,765	11,558	24,304
Importation	6,213	3,268	4,220	7,342	5,859	4,947	4,185	6,125	8,619	20,054
Domestic Production	-	-	-	-	200	700	1,500	1,640	2,939	4,250
Herbicides										
All Imported Material	260	365	241	455	921	1,831	1,451	3,429	5,042	4,750

a/ Preliminary data.

Source - Sindicato de Formicidas e Inseticidas de São Paulo.

TABLE II - BRAZILIAN PESTICIDE DOMESTIC PRODUCTION (1963 - 1972)

Physical volume - (Tonnes)

SECTION	CALENDAR YEAR									
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 a/
GRAND TOTAL	3,974	4,071	6,145	8,710	7,309	11,495	13,614	12,144	16,219	18,255
Insecticides	3,974	4,071	6,145	8,710	7,109	10,795	12,114	10,504	13,280	14,005
DDT	1,129	1,689	1,775	2,679	2,060	3,586	3,716	4,200	4,800	6,000
BHC	2,067	1,717	3,009	5,164	4,449	6,378	6,787	6,472	6,735	5,825
Ethyl parathion	305	385	600	230	226	68	155	404	189	456
Methyl parathion	473	280	761	637	374	763	1,456	1,428	556	1,724
Fungicide										
Maneb	-	-	-	-	200	700	1,500	1,640	2,939	4,250

a/ Preliminary data.

Source - Sindicato de Formicidas e Inseticidas de São Paulo.

TABLE III - BRAZILIAN PESTICIDE IMPORTS (1963 - 1972)

Physical volume (Tonnes)

SECTION	CALENDAR YEAR									
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 a/
TOTAL	11,807	12,122	16,248	22,071	18,146	24,448	27,035	26,821	30,992	49,700
Insecticides	5,334	8,489	11,787	14,274	11,366	17,670	21,400	17,267	17,331	24,896
Fungicides	6,213	3,268	4,220	7,342	5,859	4,947	4,185	6,125	8,619	20,054
Herbicides	260	365	241	455	921	1,831	1,451	3,429	5,042	4,750

a/ Preliminary data.

Source - Sindicato de Formicidas e Inseticidas de São Paulo.

TABLE IV BRAZILIAN INSECTICIDES IMPORTS (1963 - 1972)

Physical volume (Tonnes)

CHEMICAL GROUPS	CALENDAR YEAR									
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 a/
TOTAL	5,334	8,489	11,787	14,274	11,366	17,670	21,400	17,267	17,331	24,896
Chlorinated	3,399	5,846	8,378	11,035	7,724	11,456	13,004	7,080	8,064	13,830
Phosphates	468	676	996	916	622	1,829	3,328	3,456	3,454	4,996
Carbamates	6	184	213	188	122	354	471	706	680	570
Others	1,461	1,783	2,200	2,135	2,898	4,031	4,597	6,025	5,133	5,500

a/ Preliminary data.

Source - Sindicato de Formicidas e Inseticidas de São Paulo.

TABLE V - BRAZILIAN FUNGICIDES IMPORTS (1963 - 1972)

Physical volume (Tonnes)

CHEMICAL GROUP	CALENDAR YEAR									
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 a/
TOTAL	6,213	3,268	4,220	7,342	5,859	4,947	4,185	6,125	8,619	20,054
Carbamates	1,205	521	750	2,904	1,584	781	812	981	1,717	1,400
Chlorinated	7	0	14	8	46	113	85	218	422	478
Copper oxychloride	458	292	449	979	907	699	572	1,230	1,746	12,500
Ready cuprics	291	30	32	330	383	186	45	90	215	989
Copper sulfate	3,680	1,932	2,249	2,036	2,230	2,293	1,893	2,113	2,847	2,950
Wettable sulphur	257	68	412	502	347	467	337	848	1,200	1,060
Mercurial seed dressing	85	107	177	220	127	184	195	358	224	169
Tin acetate & hydroxide	34	78	19	191	149	53	105	179	144	90
Others	196	240	118	172	86	171	141	108	104	418

a/ Preliminary data.

Source - Sindicato de Formicidas e Inseticidas de São Paulo.

TABLE - VI - BRAZILIAN HERBICIDES IMPORTS [1963 - 1972]

Physical volume (Tonnes)

CHEMICAL GROUP	CALENDAR YEAR									
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972 a/
TOTAL	260	365	241	455	921	1,831	1,431	3,429	5,042	4,750
2,4-D	163	207	115	145	301	885	872	1,698	2,473	1,608
Picloran (Tordon)	-	-	-	55	151	376	31	424	378	414
Triazine Derivates	17	2	-	70	166	217	173	291	602	450
Propanil	23	60	55	15	126	50	96	402	134	458
Trifluralina (Treflan)	-	-	18	28	-	36	64	107	259	352
Urea Derivates	11	10	37	86	60	123	95	154	2 0	336
Bromacil	-	-	-	9	1	11	11	18	29	21
Paraquat	-	-	4	10	16	13	32	49	248	248
2,4-5T	27	25	4	18	23	18	21	64	214	113
Dalapon	11	19	-	-	11	48	5	62	74	61
Machete	-	-	-	-	-	-	-	18	62	116
MCPB (Tropotone)	-	-	2	6	12	-	13	70	-	50
Flurodifen	-	-	-	-	-	-	-	21	72	36
Tribunil	-	-	-	-	-	-	-	8	-	5
Planavin	-	-	-	-	-	7	4	4	18	122
MCPA	1	7	1	-	5	1	10	13	9	12
TCA	4	21	-	11	13	15	12	15	10	20
Dacthal	-	-	-	-	-	-	2	4	-	6
DNBP + DNOC	2	6	-	-	12	-	-	6	10	15
Diquat	-	-	-	-	-	-	-	1	5	3
Vernocate (Vernam)	-	-	-	-	-	-	-	-	1	15
Others	1	8	5	2	24	28	30	-	104	89

a/ Preliminary data.

Sour e - Sindicato de Formicidas e Inseticidas de São Paulo.

II - TRENDS IN USE, APPLICATION AND FORMULATION OF PESTICIDES

II-1. Rules for use and commercialization

The regulation in Brazil for pesticides use and market is an attribution of the Federal Government, according to the Regulation of Plant Protection.

This regulation is a basic piece of the legislation on the matter, and specific conditions in its Chapter VI, included between articles 53 and 75, which is complemented by Decrees and Deliberations of the Minister of Agriculture, or of the Director of Plant Protection Division, which is the organ responsible for the execution of this legislation.

In this legislation it is stipulated that any pesticide to be used or commercialized in Brazil has to previously obtain its registration and licensing in the Plant Protection Division (DNSV) of the Ministry of Agriculture.

II.1.1. Registration and licensing of pesticides

This is obtained through a request by any firm legally entitled in Brazil for the market of phytosanitary products, or for the industry and commerce, if the case.

The request shall have attached:

(i) declarations of official research institutions proving that in tests performed in Brazil the product

as efficient in the control of pests or diseases mentioned in the request for registration, certificate of approved technical tests by entitled laboratory, three copies of Plant Directions signed by an agronomist engineer, duly registered in Local Council of Engineering, Architecture and Agronomy.

(ii) sample in sealed package.

if the pesticide is from a foreign country it will also be necessary to provide literature proving its efficiency, as well as its number of registration in the proper organ of the foreign country or in the United States Department of Agriculture (U.S.D.A.).

All documents are studied by technicians of Phytosanitary Products Department and of the Central Laboratory of Vegetal Pathology, and if they agree, they propose its registration and licensing by the Director of Plant Protection Division.

It is worthy of notice that the registration and licensing are valid only for the conditions determined in "the Directions". Any new use of the pesticide or modification in dosage shall be previously submitted to examination and approval of Plant Protection Division. So the "the Directions" shall detail which are the pests, on which crops the pesticide will be used, the way and time of application, dosage, time between last application and harvest. They will also follow Brazilian legislation of public health in all its details and declare the number of its registration in DDSV.

When the pesticide contains a new active ingredient in Brazil, DDSV requests the opinion of entitled organs of the Ministry of Health, in order that they set up conditions concerning the preser-

-vation of public health. For this purpose, in the case of pesticides with a new active ingredient, the [illegible] registration and licensing shall [illegible] attention to possible [illegible] in its toxicology, and information mainly regarding the following topics: LD50 oral and dermal [illegible] effect, [illegible] methods of chemical analysis used to determine its active ingredient, with limits of evaluation error, total qualitative composition, specifying, according to the case, pigments and adjuvants, if there are [illegible] in the composition of the product, which are the ones that are active against plant pests or diseases. The registration validity term given by DDSV is of five years, after which its renewal shall be requested through a requirement of the interested firm, [illegible] by new "Use Directions" which will undergo new examination of official technicians.

II.1.2. Supervision and Control of Pesticide Commerce and Use

It is observed by the Ministry of Agriculture having co-ordination and standardization of Plant Protection Division and execution by its local organs represented by the State Directories of the Ministry of Agriculture.

Through a covenant, the competence of supervision and control of pesticide use and commerce is delegated in several States to Departments of Agriculture, which are organs of state power. Besides warnings, in the supervision and control are foreseen punishments which include fines, arrest of lots and also cancellation of its registration and licensing.

In order to aid these activities, a system of eight Local Laboratories for Analysis of Phytosanitary Products is being set up, where official samples extracted for fiscalization purposes will be sent.

II-2. Trends in use and application of pesticides

II.2.1. Previous guidance.

We call previous guidance the "Use Directions" prepared by technicians of the firm which requests registration and licensing, and that analysed and discussed and consdidered by official technicians as correct and incorporated in the register and licencing, under which conditions the pesticide can be used and applied. The package of pesticide shall be followed with a copy of "Use Directions" in order that the farmer who purchases it can observe the conditions indicated by the manufacturer and approved by the government, receiving in this way a previously written guidance on its use and application.

II.2.2. Guidance to the farmers

The guidance to Brazilian farmers on use and application of pesticides is directed either by public service or private enterprise. For this purpose use is made of any and all processes of communication, aiming to reach either lower classes or groups and individuals. The Ministry of Agriculture, besides its organs of direct administration , reckons on the System of Agricultural Extension represented by Brazilian Association of Agricultural Credit and Assistance (ABCAR) which has more than 2,000 offices distributed over the whole country.

The State Departments of Agriculture are also active in this guidance, and some of them, for instance, the one of São Paulo, have adequate systems of technical assistance.

L. private enterprise in performance of the syndicates will be organized, distinguishing [illegible] Sindicat o. Insecticid. and Ant-Cill [illegible] Industries o[illegible] State o[illegible] Paulo. Also in this activity the Brazilian Association o[illegible] Cattl[illegible] and Farming Pesticides has an excellent position.

The firms which manufacture, formulate and commercialize pesticides, have in general their technical departments of guidance, with approximately 300 agronomist engineers in the whole country. The progress in Brazilian communication has been remarkable over the past [illegible] and all the country is covered by a telecommunication system, either of radio or television, making it easy for the farmers to receive guidance with aims at safe and efficient use of pesticides.

II-3. Support to the guidance on use and application

II.3.1. Support of official organs

II.3.1.1 Support of national official organs

The research in Brazil is co-ordinated by the National Council of Researches, organ of federal government, where the private enterprise has representation.

In the agricultural area the research is co-ordinated and supervised by Brazilian Enterprise of Farming and Cattle Research (EMBRAPA), linked to the Ministry of Agriculture, that besides

having a system of eight Local Institutes which control [illegible] more than fifty Experimental Stations with more than 700 agronomist engineers, supports and stimulates the activities and projects of agricultural research in the whole country.

The phytosanitary research is not the strong point in the system of Brazilian agricultural research, but can reckon on this base, and has remarkable development in some areas such as São Paulo, with the Institute of Biology and Institute of Agronomy, and in respect to some crops such as cocoa (CEPLAC in Bahia and Amazonas, rice (IRGA), sugar cane (IAA) and coffee (IBC).

The Universities have now an active participation also in phytosanitary research, being another point of support to the guidance of use and application of pesticides.

II.3.1.2. Support of international organizations

The support of FAO to the phytosanitary research in Brazil must be emphasized. This works through several projects, particularly the BRA-524 which aims at the development of works with pesticides in the Institute of Biology - S. Paulo - besides the covenant with the Institute of Sugar and Alcohol to the study of grasshoppers that attack sugar cane, and also the study of coffee rust, among others.

UNIDO has an office in Brazil and it is trying to increase its activities.

The International Committee of Agricultural Protection (CIPA) comprising Brazil, Argentina, Bolivia, Chile, Paraguay and

Uruguay, is a local organ which has supported and developed very much phytosanitary research, sending information of other member countries, besides promoting technical meetings of use and application on pesticides.

The governments of several countries have signed covenants with Brazilian government aiming after the agricultural support and development, and these are the United States, Germany, Canada France, Holland, etc.

11.3.2. Support of Private Enterprises

Due to extremely favourable conditions in Brazil, almost all big international enterprises which work with pesticides, operate in Brazil, either directly, by means of branches or associates, or through representatives and contacts with Brazilian firms.

Because of this they transmit to their agents the knowledge and technology on pesticides.

In several specific cases they send their international technicians or make use of Brazilian technicians to study the use and application of pesticides. Some firms even maintain experimental stations in order to develop their works.

So, the concurrence that arises is sound and profitable, representing one of the most efficient technical elements in the use and application of pesticides. Besides the firms themselves, the class syndicates and the Brazilian Association of Farming and Cattle Pesticides also support the guidance on the use and application of pesticides.

II-4. Trends in formulations of pesticides

This guidance to formulators and manufacturers is given by private enterprise for a long time now, following Item II.3.2. on use and application.

Regarding public participation it is a more recent activity which had remarkable development through the Project BRA-524 of FAO. As a matter of fact, this Project motivated and prepared Brazilian official technicians for this that now be considered stable.

The main goal of this Project regarding the guidance in formulations of pesticides is consolidated in Pilot Plant to Pesticide Formulation, installed in Campinas, State of São Paulo, in subordination of the Institute of Biology.

Great results are expected from this Pilot Plant, not only to the Government but mainly to Brazilian firms.

III - OFFICIAL INCENTIVES TO PESTICIDE CONSUMING

In the last few years the Brazilian government has made an effort to promote the increase of agricultural productivity and production, creating stimulus to attain the envisaged goals. Many of them benefit indirectly consumption of agricultural pesticides; others are specifically for this purpose.

The insecticides and fungicides [illegible] national production have some official benefits. DDT, BHC, Ethyl and Methyl Parathion and Maneb are protected by an import tax, aiming for the development of their manufacture and the stability of the industry. In certain cases a system of **options** is settled: for the imports **authorization it** is necessary to previously obtain a certain quantity of national product.

In general, imported pesticides with no locally produced equivalent have exemption from import taxes. Besides, they are free of two taxes which are levied on almost all other kinds of products : IPI - "Imposto de Produção Industrial" (Federal Tax) and ICM - "Imposto de Circulação de Mercadorias" (State Tax). The purpose of these exemptions is to decrease the final cost of the product, allowing its broad use by the farmers.

Pesticide financing also promotes greater utilization. The purchases can be made through a range of private banks, which act as financing agents of the federal government. They are made for long term payment - 45 days after the harvest - and the government absorbs the greater part of the interest. From 17% on the operation,

the government collects only 7% from the farmer. This practice has been decisive in increasing pesticides consumption. The operations are co-ordinated by an official organization called "Fundo de Desenvolvimento da Agricultura" (Fundag.). To all this can be added one more incentive for pesticide use and as additions the value of reversion on their acquisition can be multiplied by three in deductions of Income Tax (each cruzeiro of investment in this sector make possible deduction of 3 cruzeiros on the income tax slips).

The organs of agricultural products co-ordinated by the government also provide incentive for use of pesticides and other products. The IBC - "Instituto Brasileiro do Café", finances for payment in five years the purchase of equipment and fungicides, with no interest. The CEPLAC - an organ for technical and economic assistance to cocoa producers - has some rules to favour these purchases, the same applies to the "Instituto do Açucar e Alcool", regarding sugar cane.

Recently some special programmes have been developed which give priority to the promotion of pesticides use. Among these can be named Proterra, created to give greater agricultural development to the North East of Brazil, all financial facilities, term and reduced interests (in certain cases with no interest) are contributing to the establishement of pesticide use in areas not yet developed.

In addition, but associated to pesticide consumption, one must mention the minimum prices fixed to a group of agricultural products -- taking into consideration pesticide use in this respect.

IV. CONTEMPLATED DEVELOPMENT IN PESTICIDE PRODUCTION

Brazil plans to go ahead with its development, transforming it into the most balanced and harmonious country possible, intending to offer its inhabitants conditions for an agreeable and happy life.

It seeks, therefore, to throw off not only the differences between its geo-economic countries, but also between its activities where industrial progress is still greater than agricultural progress.

As is illustrated in the Holy Book, without good and satisfactory progress, this is only building up a gold statue with clay feet.

So, Brazil is now at a stage where it can ensure a solid and growing rate of agricultural progress.

Official organs are handling a series of fields, leaving others to free enterprise, and at the same time trying to give them all the support and stimulus they need.

In the complex case of pesticide production development in Brazil, with the establishment of a national industry to meet the needs of its agriculture, most of the factors to be considered escape from the public dominion scope.

The government is identifying and analysing the problems; it is not planning yet for Government industry, but only for the stimulation of private enterprise to establish this type of industry in Brazil.

With this aim in mind, the government will not force private enterprises to build plants to produce Brazilian pesticides; they will be allowed to choose for themselves on questions such as imports of technical products. The pesticides will merely be formulated here.

The purpose is that the farmer can enjoy efficient pesticides at the most convenient prices possible, for the control of weeds or farming diseases.

The option concerning the fabrication or formulation of pesticides pertains to the enterprises.

Obviously, the government will try to give more support to the fabrication of pesticides.

Rate of growth of Brazilian agriculture was in 1969 6.0%, in 1970, 9.0% and in 1971, 11.4%. Aware of the great importance of the phytosanitary problem, it offers excellent prospects for the establishment of some pesticide plants, at the very least. Plans for the establishment of a copper oxychloride plant are known: this will meet the growing demands of coffee farms, concerned with the coffee rust problem.

The prospect of establishing a herbicide plant (2,4-D) is also concrete. Its commercialization in Brazil already exceeds the sum of 1,3 million dollars.

V- PROBLEMS ECONOMICALLY DEVELOPMENT OF PESTICIDE PRODUCTION

V.1. Raw Materials Deficiencies

V.1.1. New Petrochemical Industry

National exploration of petroleum and its by-products in Brazil is relatively recent. It only increased with the Government's determined effort to win over various oppositions, and acquire the state monopoly. Then the Petrobras S.A., was created - an enterprise with miscellaneous capital.

The petrochemical industry is therefore much younger and is undergoing intense development at the present time.

It should be noted that, referring to the petrochemical industry, there is no monopoly, since this is open to private enterprise, receiving great stimulus from the government.

Despite the great rise, national production of petroleum and its by-products is still lower than demand. This demand is growing with Brazilian development, and is forcing the nation to explore for petroleum outside the country

Variations in prices of petrochemical products on the international market sometimes adversely affect the purchase of raw materials for the production of pesticides; these become much more economical if imported from outside than to be produced in Brazil. It would be necessary for this to build industrial complexes at very high cost. This makes it difficult for economists to decide on new plant construction, since it cannot guarantee a stable and long-term appraisable income flow.

V.1.2. Insufficient Production of Other Basic Materials

Another problem for the pesticide formulation industry in Brazil is presented here. We already have reasonable facilities for manufacturing chlorine, a basic raw material for a series of insecticides - the others, such as hydrochloric acid and sulphuric acid, are still incipient.

Mines of other raw materials such as copper are known, (e.g. in Bahia and in Rio Grande do Sul), but these have not been duly explored for many reasons.

Concerning the preparation of pesticides for application in powder form, Brazil has many mines of inactive materials, which have not yet been satisfactorily explored for this purpose, due to the lack of conclusive studies about inactive patterns to supply that industry.

This makes for a vicious circle, because pesticide formulators in fact cannot find on the market sufficient supplies of inactive materials of good quality, as long as the suppliers cannot have the materials because they do not meet the requirements.

V.2. Deficiency of Adequate Technology

V.2.1. Intricate Technology and the High Cost

We saw in the last item of V.1.2. that there might be widespread availability of inactive materials for powder formulations, but the lack of a well-developed national technology for pesticides is the obstructive factor. This kind of technology requires technical

specialization at high level and the use of foreign shipment of high operational and purchase costs.

International enterprises with the necessary technical know-how are still not openly interested in the fields of exploration of mineral mines for production of raw materials for active principles so as to auxiliary materials. Maybe this is because they are facing other aspects of pesticide production and commercialization which will give much more assured advantages, and the Brazilian government, as the consumer, still does not require highly refined quality. First, because of the lack of adequate technology, and secondly, because they are still satisfied with the products offered to them. The potential of the consumer market is so great that the competition still does not require such dedication.

V.2.2. Lack of technicians adequately dedicated to the problem

Attention paid to some specific aspects of a good pesticide only increased substantially in official areas after the action of Project BRA-52 of FAO, concerning the development of pesticides through work at the Instituto Biológico of São Paulo, as stated before.

As this is a recent project, Brazil still could not count on a sufficient number of technicians dedicated to the problem, and this problem will still take some time to solve, since private enterprises offer the best salaries and conditions for working, which attract a great number of governmental technicians who are becoming distinguished in this field.

V.2.3. Patents and Marks

V.2.3.1. Legal Protection

It is obvious that legal protection concerning patents and trade marks, besides the great advantages and stimulus which occurs from it, is also a problem for the development of pesticides production in a growing country.

V.2.3.2. Secrets due to competition

Pesticide companies try to outdo other competitors in keeping solutions to problems occurring in their products a secret, until they are sure of safeguarding their rights through legislation of marks and patents.

As previously stated, this method brings various advantages but also presents a problems to the development of pesticide production, being one of the great differences between capitalism and socialism.

V.3. World-wide Commercialization System

World-wide comercialization of pesticides is under the control of a relatively small group acting in all the countries.

The reasons for this occurrence are various, and some are well known, such as the complexity of factors surrounding the production of a good pesticide, and the high cost for its development.

This system [illegible] offers many advantages to developing countries, such as the prompt availability [illegible] of the most modern pesticides, but it becomes very difficult to establish one national industry for attending to this field.

V.f. New Pesticide Research

For a growing country like Brazil, it is difficult to do research into new pesticides, since the country has scarcely any capital reserves or technological resources to support it.

It has been estimated that it would cost about ten million US dollars to make an efficient and safe pesticide available for commercialization which can compensate materials and human resources used by the enterprises for its searches. It is obvious that this is out of the reach of a developing country, and that is why it must count upon international enterprises in search of products to control certain pests or diseases in their farming which acts in some areas under different conditions, requiring new solutions..

VI - CONCLUSIONS

1. Brazil offers exceptional conditions regarding either political stability or potency of consuming market, with its agriculture in a stage of great expansion, and a remarkable general growth, to the increase of pesticide manufacture.

2. The devotion of the Brazilian Government to guarantee a constant and harmonious development of the country provides the arise and development of several elements of support to the production of agricultural pesticides.

3. The official incentives offered to private enterprise and the freedom of choice and action given, help a great deal in the development of pesticide production.

4. As Brazil is the most industrialized country in South America, with a population of more than 100 million people, not bordering only with two South-American countries, Equador and Chile, and having a very wide system of transport and communication, it gives good conditions to a production of pesticides appropriate to supply all the area comprised by ALALC (Latin-American Association of Free Commerce).

6. The absence of satisfactory technological development in the production of pesticides consititutes a problem.

7. The small relative number of technicians dedicated to the pesticides industry constitutes a problem.

8. The lack of pilot plants for formulation of pesticides is another problem in several areas of Brazil.

9. The works of phytosanitary research, and specifically those concerning pesticides are still far from filling the needs of Brazil; this is another problem for its development.

10. International assistance in the phytosanitary area and in the production of pesticides is not completely developed, tending more to other fields of agriculture, which is a deficiency.

11. FAO performance, through the Project BRA-524, brought benefits to the field of pesticides, constituting in itself an element to overcome the problem.

12. The large guidance on the use and application of pesticides is an element favourable to the development of its production.

13. The good understanding and co-operation among the organs of public service and private enterprise in pesticides field is a favourable element to its development.

VII - RECOMMENDATIONS

1. It will be favourable to make a study on the part of UNIDO and the Brazilian Government, on the establishment of specific agreements of technical assistance regarding pesticides, aiming at its development.

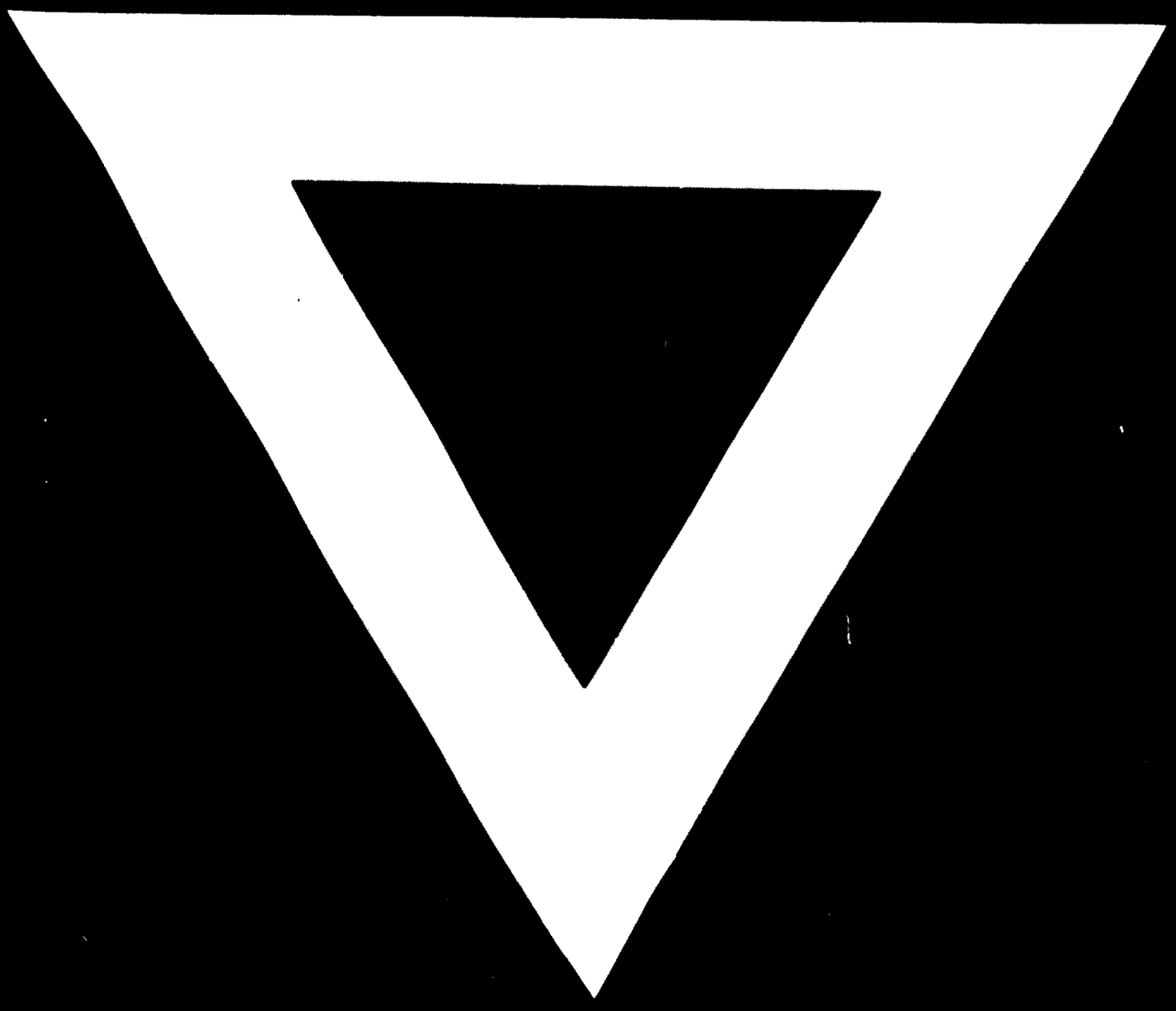
2. International enterprises still not operating in Brazil should take notice of the opportunities it offers and study conditions to operate here.

3. International enterprises which already operate in Brazil, should devote greater attention to the opportunities that Brazil offers them, and increase their activities.

4. Brazil should provide more opportunities and incentives to promoting a greater number of technicians devoted to pesticides, either in its production, or in its use and application.

VIII - FINAL NOTE

This report was prepared with the co-operation of the Syndicate of Insecticide and Ant-Killer Industries of the State of São Paulo, thanks to the courtesy of its President, agronomist-engineer Lucas Carlos Baptistella, and of agronomist-engineer Miguel Martins Chaves, technical employee of Plant Protection Division of the Ministry of Agriculture, at the disposal of the Ministry of the Interiors.



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