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SOVIET RESEARCH AND DEVELOPMENTS IN INSECTICIDES AND METHODS OF APPLICATION

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SOVIET RESEARCH AND DEVELOPMENTS IN INSECTICIDES AND METHODS OF APPLICATION

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I. A SPRAYER WITH REVOLVING ATOMIZERS

(page 13)

A. V. Funikov

A sprayer with revolving atomizers, designated for the aerial treatment of agricultural crops with oily preparations at a low liquid delivery (1.5 l/sec), has been constructed at a State Scientific Research Institute of the German Federal Republic. The new sprayer possesses a number of improvements over the usual valve stems. It ensures an equal distribution of the poisonous chemical to the entire area treated and greater productivity. When spraying with diesel fuel the total width of area covered is 130 meters, while the working area (25 drops per cm^2) is 56-64 meters. Over 90% of the droplets formed during dispersion have a diameter not more than 100 microns. Such a fine diffusion of settling particles is made only by the aerosol generator mounted on the Ka-15 helicopter.

In the current year the sprayer with the revolving atomizers will undergo production testing.

II. CHEMICAL METHOD OF COMBATTING WHEAT AND BARLEY SMUT

(pages 15-18) I. M. Polyakov

In recent years wheat and barley smut has caused ever more losses to agriculture in our country. The reason for this is that controls are not being sought for a certain form of the disease. The thermal method of treating seeds with a mordant has not been widely used because of its complexity and difficulty under industrial conditions.

More productive and less cumbersome is the method proposed by us for the chemical treatment of seeds with the aid of a thiocyanogen preparation (25% parathiocyanogenaniline), but in a series of cases it is insufficiently effective. In relation to wheat, this is explained by the physiological virility of the grain, the relationship to the zonal peculiarities, the variety and the conditions of crop cultivation. Thus, for example, Lyutestsens 62 from Ussuriysk (a wet zone) each year was found completely free of wheat smut in spite of the fact that control plants were infected by 15-20%. However, the seed of that same variety but grown in the Voronezh Oblast was completely free of this provoker only in that case when it ripened in the more humid year.

Analogous differences were also observed for varieties of wheat. Thus, Gordeiforme, cultivated in virgin soil, upon being treated with thiocyanogen, as a rule, was almost never infected with wheat smut which cannot be said for Tsezium -- a more early ripening variety and hence providing a rapid physiological ripening of the seeds.

Along with the observations mentioned, we obtained also direct experimental evidence of remarkable phenomena. As a result of the work performed we came to the conclusion that in physiologically ripe seeds the wheat smut stimulant, on account of its mass, is found in a special form (a type of microsclerotia), resistant to the various forms of directed action. Numerous experiments indicated that if such seeds are wet with water and kept damp for several hours, then they easily yield to the action of thiocyanogen: the stimulant becomes more vulnerable. However, this circumstance significantly complicates the matter.

During the immediate action of the toxicant on the physiologically mature seeds, a portion of the stimulant found in the form of microsclerotia, as if it were "serving its time" pending the disturbance of the preparation from the interaction with plants, but later in the affected seeds it rapidly is developed and together with the latter withdraws into the growth.

Starting from this premise we also presented ourselves the task of discovering an additional agent with the help of which the remainder of the stimulant can be eliminated. Such an agent, as our investigations demonstrated, can serve as the subsequent vernalization, active drying or setting treated seeds in an oxygen-free environment. As much as it was desired to shorten the seed treatment period to a minimum, we

found that its active drying appeared more effective and rational, arranged after treatment by thiocyanogen. The importance of this method is well illustrated by the data obtained in an experiment on a series of wheat varieties, whose seeds with considerable difficulty were free from wheat smut, if only one preparation had acted on them.

From the data in Table 1, it is apparent that thiocyanogen combined with active drying of the seeds very sharply decreases infection of the seeds. Worse results were obtained for Tsezium: for the Kustanay seeds of this variety the effectiveness of the method studied was less significant than for the Akmolinsk seeds. This can be explained by the fact that the first were grown in a dry year; the second -- in a damp year. It is interesting that a deviation was observed for this type even during the thermal process of seed treatment. Not in vain did a number of specialists recommend an increase in exposure both during the preliminary moistening and during the active heating of the seeds to improve the effectiveness of the thermal treatment of Tsezium wheat.

In subsequent and more detailed investigations we clarified the optimal operational conditions for the active grain drying: four hours with the temperature of the heat carrier at 60° C, the moisture is well eliminated from all varieties of wheat; this does not harm, but conversely even improves seed germination and the subsequent plant growth.

During the course of studying the problem we made a comparative evaluation of the existing types of driers: the standard hearth driers -- in Belorussian SSR and in the Omsk Oblast; "Kuzbass" -- in the Fedorovsk Grain Sovkhoz, Kustanay Oblast and "VISKhOM" -- in the Karabalyk State Selection Station.

From the obtained data (Table 2) it can be seen that in principle, all of the driers tested are suitable for the given purpose. True in some of them, mainly the hearth types, some seeds lost their ability to germinate after the drying. However in no case did this have negative consequences with regard to the yield. Indeed the plants grown from the dehydrated seed are characterized by greater tillering which offset the loss in germination.

Special experiments, conducted in the course of recent years, also indicated that wheat seeds used for purposes of combatting wheat smut can be treated beforehand according to the method recommended by us, up to the time of sowing during the entire year. This will increase both effectiveness of the chemical method and the yield from the seeds treated with thiocyanogen. This can be especially clearly seen by comparing the data (Table 1) which concern the experiments with Tsezium wheat in Kustanay. Here seeds were treated in 1955 whereby one part of them was sown immediately after treatment while the other part was kept a year until 1956. In the latter case the effectiveness of treatment was increased 15 times.

Table 1

Development of Wheat Smut (%) in Sowings of Wheat

Test Variant	Lysitestsens 62 Far East	Lysitestsens 62 Krasnodar	Lysitestsens 62 Voronezh	Al'bidum Novosibirsk	Smena Kustanay	Akmolinka Kustanay	Gordeiforme 189 Kustanay	Tsezium III Akmolinsk, 1955	Tsezium III Kustanay 1955	Tsezium III Kustanay 1956
Control	11.3	7.2	0.8	3.0	3.8	0.6	0.7	4.6	10.5	3.1
Treatment of seeds with thiocyanogen with subsequent drying in air	0.6	1.0	0.4	0.6	0.6	0.3	0.1	2.6	4.3	1.1
Treatment of seeds with thiocyanogen with subsequent active drying at 60° C for 90 min	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.1	3.0	0.2

Table 2

Variety	Test Variation	Thickness of Stand per 1 m^2	Infection With Wheat Smut, %	Harvest centner/ hectare	Type of Drier
Akmolinka	Control	343	1.6	6.3	
	Treated with thiocyanogen and the usual drying	315	0.6	6.7	
	Treated with thiocyanogen and active drying	322	0.0	9.5	"Kuzbass"
Gordeiforme 189	Control	260	0.7	8.5	
	Treated with chiocyanogen and active drying	282	0.0	10.5	"VISKhOM"
Mil'turum	Control	265	1.5	12.6	
	Treated with thiocyangen and usual drying	228	0.6	8.6	
	Treated with thiocyangen and active drying	198	0.1	14.0	Standard hearth drier
Tsezium III	Control	405	6.2	8.2	
	Treated with thiocyanogen and usual drying	253	3.3	10.0	
	Treated with thiocyanogen and active drying	282	0.4	10.5	Standard hearth drier

The active drying of seeds has a very positive meaning in controlling wheat smut not only in the case of seed treatment by the chemical method but even during the thermal treatment. The effectiveness of the latter, as has been shown by our special experiments and existing practice, also depends on the physiological maturity of the grain. But here the subsequent active drying of seeds, as a rule, completely prevents the development of wheat smut in seed grain from treated and dried grain.

From all that has been set forth follows that preliminary seed treatment and active drying of the grain treated with thiocyanogen offer the possibility of relieving tension during the autumn planting period, of improving the quality of seeding material and of sharply increasing the capacity to control wheat smut, which appears to be one of important conditions for increasing grain harvests.

In the organization of this work, many kolkhozes, sovkhozes and agricultural organs, especially in the regions where virgin lands are being mastered, should be interested. The question now is how to better organize it? Some consider that the mighty drying machinery are more expediously placed at grain processing points. Others favor the chemical treatment and active drying to be done together with grain cleaning at so-called grain factories.

Our common leaning must lead to this that everywhere, where possible, to unite in the various types of drying equipment the treatment of grain against wheat smut with active drying of the seeds.

The curiosity of inventors and designers must be concentrated at the present time to the rapid development of such a type of highly productive machinery which can be used for the chemical treatment of seeds and be joined with the various types of drying apparatus.

Upon analyzing the different methods of combatting wheat smut, it will shortly become necessary to establish the so-called anaerobic method. This method was first proposed by our naturalist V. S. Zaleskiy. In recent years his investigations have received much attention in Canada and Czechoslovakia.

This method of control in a recent, very wise modification consists in this: wheat and barley seeds are initially soaked in water for 4 hours at 22° C; then transferred to a sealed area for 96 hours where anaerobic (oxygen-free) conditions were created, after which the method has been named. The moist wheat and barley seeds endure these conditions comparatively easily but the smuts of these crops cannot suffer these conditions at all. In Canada from a series of experiments they recommended special containers to create anaerobic conditions and hold the moistened seeds, from which even the air can be evacuated; in Czechoslovakia -- bags made out of various synthetic films (polymers) were recommended.

Our examination of this method of controlling wheat smut indicated that its effectiveness likewise depends on conditions which determine the physiological maturity of the seeds of the different

varieties, depending on the areas where they were grown, the effectiveness of its application was insignificant. This happened, for instance, with the Lyutestsens 62 wheat grown in Khabarovsk.

In addition to this, the use of thiocyanogen in place of water gave excellent results. The grain was placed in a solution of this preparation for only one hour at the usual temperature and later it was placed under anaerobic conditions. As a result the wheat, grown from these seeds, was completely free of wheat smut infection whereas the 6.5% of the control group was infected. Better development of plants and an increased yield were also observed in the experiment.

Acknowledging a number of desirable features, noted above in the proposed method, we consider it expedient to confirm and improve it for small batches of grain in those zones of the Soviet Union where a drying unit for the specific conditions cannot be organized in the near future.

III. NEW ORGANIC FUNGICIDES

(page 54) M. P. Umnov

The chemical industry of Czechoslovakia has begun the mass production of new fungicides "Novozir L" and "Novozir N." In connection with the extensive testing of these products planned to be held in our country, it appeared noteworthy to present the data which has been published in the Czechoslovakian literature.

"Novozir N" (Tsineb) contains 50% active ingredient -- the zinc salt of ethylenebis-dithiocarbamic acid; "Novozir L" contains the same amount of the zinc salt of dimethyldithiocarbamic acid. The prepared Novozir product -- a damp powder -- consists of particles not larger than 3 microns in diameter. Owing to this its suspension is very stable (25-40% of the particles settles in 30 minutes). It can be used during the entire vegetation period.

Both preparations are effective against potato phyto-phthora, apple tree scab, vine mildew, hop perenosporosis and many other fungal diseases. In experiments against apple tree scab they were compared to cupricol (copper oxychloride) which contains 30% copper, and appeared to be more effective than the latter, when they were more effective in preventing diseases in the fruit than on the leaves. The orchard was sprayed with "Novozir L" 4 times which lowered the degree of scab infection by 90% in comparison with the control.

Novozir N was tested in comparison with cupricol and Bordeaux mixture against vine mildew and in many cases gave better results than the copper-containing agents and, in addition, stimulated the growth of bushes and ripening of grape bunches which advantageously distinguished it from copper sulfate which inhibit the growth of grapevine. Infection of the leaves with grape mildew was 10% less with the treatment with a 1% suspension of Novozir N than with Bordeaux mixture. A 0.5% solution of Novozir N was equal in effectiveness to a 1% Bordeaux mixture. However, this systematic application of this fungicide during the entire grapevine vegetation period makes the plants more susceptible to the fungus (Erisyphe oidium) against which it is not effective. This shortcoming can be overcome by conducting some spraying with a combination of Novozir and copper carbonate or copper oxychloride. Under these conditions vine-growers should use Novozir only up to time of blossoming and Bordeaux mixture after blossoming.

Against potato phytophthora (water rot) Novozir N was used in comparison with cupricol and Bordeaux mixture. A 1% Novozir N solution lowered infection of the leaves by 65-80%, a like cupricol solution 70-85% and Bordeaux mixture 59-63%. The harvest was increased in comparison with the control 23.5, 12 and 22.2% respectively.

In every publication attention was drawn to the fact that Novozir in the recommended concentrations of 0.6-1.0% has practically no harmful effect on plants. It can be used in combined solutions with DDT and

organophosphorus preparations simultaneously for controlling insects, mites and ticks, and fungal diseases.

IV. IN THE ALL-UNION ACADEMY OF AGRICULTURAL SCIENCES IMENI LENIN (VASKhNIL)

O. A. Aleshina

(page 61)

A Coordination Council under the leadership of Director of All-Union Institute of Plant Protection, I. M. Polyakov, has been created in the Department of Soil Science of VASKhNIL to strengthen scientific research projects and their coordination. The Council replaces Bureau in the Section on Plant Protection. A total of 44 persons comprises its staff. They represent the different branches of science -- entomology, phytopathology, virology, toxicology, zoology, etc.

The chief tasks of the Council will be the following: the organizational and scientific-methodical direction of research in the entire country; development of topical plans; distribution of concrete tasks to the scientific research establishments and methodical aid to them; examination and approbation of research methods and of plans to publish scientific works; review of work results and making plans on them for their introduction into production and the further development of science; calling scientific methodical conferences, seminars and congresses; consideration of reports from the individual scientific research establishments and scientific workers; preparation and publication of handbooks, annotations, etc.

At the first session of the Council the members were charged with the organization of research in determined zones of the country: N. A. Dorozhkin in Belorussia; L. A. Kanchaveli in Georgia; V. I. Ul'yanishchev in Azerbaydzhan; V. P. Vasil'yev in the Ukraine; E. Ya. Ozols in the Baltic area; Zh. P. Dzhiyembayev in Kazakhstan; K. I. Mirpulatov in Uzbekistan; V. G. Stativkin in Tadzhikistan; L. N. Zotsenko in Moldavia; G. M. Mardzhanyan in Armenia; I. M. Belyayev in RSFSR; A. P. Golubentseva in Siberia and K. P. Grivanov in the TsChO /Tsentral'no-chernozemnaya oblast' -- Central Black-Earth Region/ and the Volga region. Responsibilities for programs were also assigned. Research on the immunity of plants to diseases will be coordinated by M. S. Dunin; on the chemistry of insecticides and fungicides by N. N. Mel'nikov; on pests and diseases of corn by R. Ye. Nemlyienko; on the prognosis of the appearance of pests and diseases by I. Ya. Polyakov; on virus diseases of plants by K. S. Sukhov; on biological methods by N. A. Telenga; on the use of biophysics in plant protection by S. V. Andreyev; on the development of measures to control plant pests and diseases in the virgin lands by T. G. Grigor'yev; on the use of chemical methods by P. V. Sazonov; on aviation by S. G. Starostin; on mechanization by N. K. Tarnovich; on herbicides by N. A. Shipinov, on quarantine by Ye. M. Shumakov; on pests and diseases of sugar beets by O. I. Petrukha.

Three commissions were created subordinated to the Council: for the publication of literature (Chairman Ye. M. Shumakov), for the introduction of scientific achievements into production (Chairman V. V. Kosov) and for the coordination of the efforts among the VUZes (Chairman E. E. Savzdarg).

At the second session of the Coordination Council the plan for conducting the zonal planning-methodical conferences in 1960 was confirmed.

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