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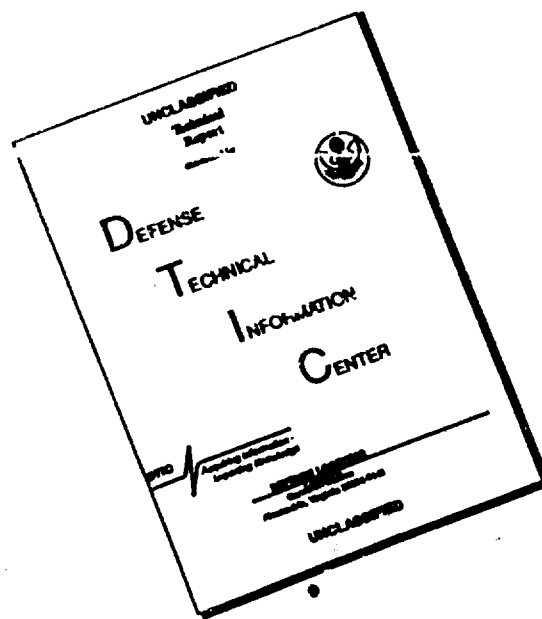
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SNOW MOLD OF WINTER GRAINS

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S. M. Tupenevich

In many oblasts (republics) of the USSR, some losses of winter grain yield are due to poor overwintering. Unfavorable climatic factors present during the late autumn, winter and early spring are one cause of the thinning out of such grain stands; they are, in fact, a frequent cause of the complete destruction of the crop in individual fields. These include sudden fluctuation of subfreezing temperature when there is no snow upon the ground (winter injury), above-freezing temperature in conjunction with a deep snow cover (rotting), or excessive amount of water in the soil, either in the fall, before the winter crop plants become dormant, or in the spring when the snow is melting.

The weakened and partially damaged winter-grain plants, on emerging from the snow, become infected with the causative agent of snow mold (*Fusarium nivale* Ces.); and, in the northeastern districts with sclerotium (*Sclerotinia graminearum* Elenev). The prevalence of these diseases, which are primarily responsible for springtime damage to winter-grain crops, is shown in the accompanying Table.

In Arkhangel'skaya Oblast and the Komi ASSR, the winter of 1963/64 set in during the latter part of October and was relatively mild. By mid-February the depth of snow cover reached 30-50 cm, with the ground being frozen to a depth of 30 to 90 cm. Thawing began early in the spring (12 April), but lasted to the end of April. Under these conditions, snow mold on winter rye did not develop widely. Out of the 2,828 hectares under this crop which were surveyed, 481 hectares were found to be infected, and on these the loss of seedlings reached only 2.4%. In the Komi ASSR the snow mold was also not widely developed (1-5%).

In Kirovskaya Oblast the autumn of 1963 was of long duration, warm, and favorable to the development of winter crops. The snow was established by 24-25 November. The first half of the winter was cold with little snowfall. By mid-December sub-freezing temperatures had reached minus 30-35°C, while the snow cover was 10-11 cm deep. This brought about a

partial loss of winter crops, due to winter injury, in the southeastern districts of the oblast. The latter half of the winter was marked by heavy snowfall. This was followed by a late spring with protracted melting of the snow. As a result, the winter grain crops were relatively little affected by snow mold and sclerotium (1.8%).

Prevalence of Snow Mold on Winter Grain Crops in the Spring of 1964

Republic or Oblast	Surveyed area of winter rye and wheat (hectares)	Area of crops affected by snow mold (hectares)	Extent of stand thinning due to snow mold (per cent)
Leningradskaya Oblast	42,202	3,047	7.2
Pskovskaya Oblast	2,671	505	2.0
Novgorodskaya Oblast	500	200	0.5-2.0
Yaroslavl'skaya Oblast	400	14	0.5-2.0
Smolenskaya Oblast	--	32	0.5-2.9
Moscow Oblast	1,210	418	0.6-4.0
Ivanovskaya Oblast	40,959	8,477	0.2-9.0; 1.1*
Minskaya Oblast	29,952	6,013	1.2**
Gomel'skaya Oblast	726	726	6.1
Arkhangel'skaya Oblast	2,828	481	2.4
Komi ASSR	2,000	2,000	1-5
Kirovskaya Oblast	11,920	215	1.8*
Udmurtskaya ASSR	13,613	2,371	5.6*
Mariyskaya ASSR	1,737	1,711	0.5*
Gor'kovskaya Oblast	1,368	1,368	1.4
Bashkirskaya ASSR	94,923	6,392	0.5-2.5*
Tatarskaya ASSR	409	409	2.6
Mordovskaya ASSR	34,000	1,000	2.0
Latvian SSR	539	539	2.6***
Lithuanian SSR	244	200	0.5
Estonian SSR	66	60	0.5-1.0**
Kirovogradskaya Oblast	240	240	2-3
Kiyevskaya Oblast	370	270	2.3
Dnepropetrovskaya Oblast	272	272	
Rovenskaya Oblast	240	240	0.8
Cherkasskaya Oblast	600	260	3.4
Ivano-Frankovskaya Oblast	136	136	2.0
North Osetinskaya Oblast	2,500	625	5.0

- * snow mold and sclerotium
- ** snow mold and damping-off
- *** snow mold and typhulesis

In the Udmurtskaya ASSR, 92% of winter rye crop became dormant while in a good or satisfactory condition. The first snowfall occurred with the ground frozen to a slight depth (2-3 cm), but in November thawing took place and the soil became waterlogged; a sudden cold spell set in late in November: subfreezing temperatures reached minus 17-24°C with a

snow cover of 2-9 cm; a partial damage to the winter crops, due to the cold, was observed, along with thinning by 10-20% in the case of the later plantings and in areas of succession cropping. In addition, the lateness of the spring thaw worsened the condition of the winter grain crops. Infection with snow mold and sclerotium was found on 2,371 hectares, out of the 13,613 hectares which were surveyed. The losses of winter grain crops due to various reasons amounted to 5.6%.

In the Mordovskaya ASSR, within the 34,000 hectares of winter crops surveyed, snow mold was observed on 1,000 hectares; the disease exhibited infection foci, at which up to 12% of the plants perished (at the "Svobodny Trud" kolkhoz in Krasnoslobodskiy Rayon).

In the Mariyskaya ASSR the winter grain crops were little affected by snow mold and sclerotium.

In Gor'kovskaya Oblast, Tatarskaya ASSR and Mordovskaya ASSR the autumn of 1963 was of long duration, warm and favorable to the development of winter-grain seedlings. The snow cover (2-3 cm) became established by the end of November, in subfreezing weather. By that time the ground was frozen to a depth of 13-19 cm. During December-January depth of snow cover reached 19-27 cm, which ensured a safe overwintering of the winter crops. Melting of the snow started by the end of March, but the fields did not become completely free until 18-20 April. Snow mold showed a very slight development on the winter grain crops. A thinning of the stands to an extent of 8-12%, due to the disease, was observed on 98 hectares in the two kolkhozes -- "Traktor" and "Prozhektor" of the Urenskiy Rayon, Gor'kovskaya Oblast.

In the Bashkirskaya ASSR, following the prolonged autumn of 1963, and the late and protracted melting of the snow in the spring, snow mold and sclerotium developed on the winter grain crops; at some places damping-off was observed. Sclerotium on winter rye was recorded for 749 hectares in the farms of the Birskiy and Chishminskiy rayons; only a small amount of plants were killed (0.2-2.5%).

In the northwestern zone (Leningradskaya, Pskovskaya, Novgorodskaya oblasts) the autumn of 1963 was of long duration and warm; in October the amount of precipitation, in the form of rain, exceeded the normal by one and a half times or more; over low-lying land the soil became waterlogged. However, a snow cover was formed by mid-November over ground frozen at a slightly subfreezing temperature. Brief periods of thawing occurred during the winter (in December and January), but by 25 January and 25 March winter-crop plants showed 90% growth in block-tests. The snow started to melt early (at the beginning of April), but was not gone until 21-22 April. Snow mold developed mainly on low-lying land. Bare spots marked the areas of damping-off. In the Leningradskaya Oblast the loss of winter grain crops due to damping-off and winter mold infection amounted to 7.2%.

In the Baltic Republics the average temperature during September and

October exceeded the normal by 1-2°, while precipitation during October and November was 20-100% above the normal level. A snow cover of 6-10 cm became established during the third ten-day period of November, over a frozen ground. December was colder than usual; depth of frozen ground reached 21-30 cm. January was 1-2° warmer than usual, with periods of thaw; at this time, depth of snow cover decreased to 2-7 cm. February was cold. Snow cover reached 15-20 cm. The snow started to melt from 20 March on, but this was followed by several snowfalls and periods of thaw. The spring season started during the first ten-day period of April, and the weather became consistently warm by the latter half of the same month; this promoted a rapid growth of winter grain crops. Snow mold and typhulexis were mildly manifested on areas where melting of the snow followed a protracted course -- in the Tartuskiy, Vyruskiy and Pyaruskiy rayons of Estonian SSR.

In the Smolenskaya, Moscow, Ivanovskaya, Yaroslavskaya and Kostromskaya oblasts the autumn was of long duration and warm. Snow cover became established in the latter half of November and persisted steadily, with brief periods of thaw. Winter grain crops reached the stage of dormancy in good or in satisfactory condition and underwent satisfactory overwintering. The snow was gone from the fields during the latter half of April. Here the snow mold affected the winter crops only to a slight extent, causing only a partial thinning of the stand of seedlings.

Snow mold was encountered more frequently on fields where the winter crop seedlings underwent excessive development in the autumn (former Zvenigorodskiy and Volokolamskiy rayons of Moscow Oblast), over which a thinning of the stand, ranging from 0.6 to 10%, was observed in the spring in an area of 220 hectares.

In Ivanovskaya Oblast, a springtime survey of 40,959 hectares under winter crops showed a low degree of infection with snow mold on 5,577 hectares, while over 2,900 hectares were slightly affected by sclerotium.

A limited development of snow mold on winter grain crops was observed in the spring of 1964 also in the Kiev, Dnepropetrovskaya, Kirovogradskaya, Rovenskaya, Cherkasskaya and Ivano-Frankovskaya oblasts.

As a rare occurrence, snow mold was observed in the spring of 1964 on winter grain crops in the North-Osetinskaya ASSR. The disease was manifested focally over an area of 650 hectares, where the stands were thinned to an extent reaching 5%, out of the 2,500 hectares which were surveyed. Once the weather became warm, the winter crops showed satisfactory growth.

In all the oblasts and republics where winter mold and sclerotium were found, application of side-dressing and harrowing of the winter grain crops were instituted during the spring of 1964. In the Komi ASSR these procedures were carried out over 45% of the planted area; they were also widely utilized in the Kirovskaya Oblast, Udmurtskaya ASSR, Mariyskaya ASSR, Bashkirskaya ASSR, etc.

Following the springtime application of side-dressing and harrowing

of winter crops, in the Udmurtskaya ASSR the yield of winter rye from the areas so treated was increased by 4 centners, and that of winter wheat by 5 centners per hectare.

In the control of snow mold and sclerotium, of particular importance is enhancement of winterhardiness of the plants, which is achieved by applying a number of agricultural-engineering procedures [early, deep-tilling of the soil; shallow plowing of the land to be fallowed; control of cereal weed-plants which spread sclerotium; application of organic and mineral fertilizers (in accordance with the norms) prior to planting winter grain crop; liming of the soil; conservation of optimal water content in the soil]. An example of superior agronomic environment for the growing of winter crops is provided by the State experiment plots in the Leningradskaya, Novgorodskaya, and other oblasts. On these plots, with their superior agronomic environment, from 85 to 98% of crops overwintered during 1963-1964; there was a low prevalence of snow mold; grain yields--to take two examples--ranged from 18 to 24.8 centners per hectare at the Gatchinskiy plot, and from 25 to 28 at the Roshchinskiy plot.