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EXPERIMENTAL PLANTING OF WINTER WHEAT IN KARAGANDA OBLAST

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[Tables referred to are appended.]

Natural Conditions

The climatic conditions in Karaganda Oblast [approx 49°-50'N, 73°-10'E] are severe. The mean annual atmospheric temperature is +2° C. The absolute minimum temperature on the surface of the ground is -44.6° C in January. The absolute maximum temperature is +68.8° C in July. Spring freezing is probable until 20 June, and early snow is possible by the 20 August. Only July is free of freezing temperatures. The diurnal temperature fluctuation is very pronounced.

The amount of precipitation is insignificant. During the period 1931-1948, the average annual precipitation was 217.7 mm, with the variation being from 132.2 mm in 1940, to 419.7 mm in 1947. The maximum precipitation was in July, although in about 50% of the cases there was a shift to an earlier date.

The prevailing winds are southwest, resulting in blizzards in the winter and dry winds or sometimes dust storms in the summer. The storms blow the snow from unprotected fields, and an unequal distribution of snow on the ground exists in the region.

The depth of the snow averages 18 cm and varies from 11 to 25 cm. By the first of April, the snow usually has completely thawed, but the temperature of the soil surface at this period can be as low as -27.2°.

The high temperatures and winds cause considerable evaporation of moisture. The evaporation from open water surfaces during the vegetation period averaged 969 mm from 1931 to 1942.

The lowest relative humidity exists in June, when the earing and flowering take place and the ripening of the winter grain begins.

The soils are principally light-colored, of light-weight composition, with little humus content, and of fine and unstable texture.

The Cultivation of Winter Wheat

Work with winter wheat at the Karaganda Agricultural Experimental Station was started in 1932.

At the station, in the years 1932 to 1942, winter wheat planted on fallow land wintered more or less safely only three times. For seven of the years it was either completely or in great part destroyed by frost.

Since 1943, an improvement has been made in the agricultural technique by sowing winter wheat in stubble, which is more appropriate under local conditions. During the 6-year period 1943-1948, winter wheat was transferred to stubble-sowing and made a completely resistant culture.

Since 1936, winter wheat has been sown on fallow land in small amounts under actual production conditions. Since fall of 1942, more of the wheat was planted in stubble each year until in 1945 it was nearly all sown in the summer crop stubble (Table 1).

Since 1948 winter wheat was planted on fallow land only in special experimental plots. There was no damage by freezing.

In 1942-43, there was a great deal of broadcasting (dispersed sowing) in the stubble, with subsequent closing by a harrow, which produced no sprouting at all. The high percentage of loss was characteristic of the "idle" /fallow field/, but not of the stubble sowing. In the following years broadcasting was not used and damage to the seed was attributed partially to freezing (1944-45), but largely to the insufficient development of the agricultural technique of stubble-sowing under local conditions, and in some cases to the poor implementation of the sowing technique.

During all the years, the harvest of winter wheat from the stubble fields was greater than that from the fallow fields. In 1948, the field on which the winter wheat was grown had been fertilized with ammonium nitrate in the amount of 1 centner per hectare. The harvest was calculated only for 700 hectares. The additional yield from the fertilized seed was 3.7 centners per hectare. On an average, the fertilized areas yielded 11.0 centners per hectare.

Thus, in large growing areas the problem of cultivating winter wheat in the stubble of the summer crop under conditions prevailing in the Karaganda Oblast has been solved successfully. At the same time, the behavior of winter wheat cultivated on fallow land is completely irregular.

Can Winter Wheat Be Cultivated on Fallow Land Between Rows?

At the experimental station the fallow between rows of sunflowers, safflower, corn, sorghum, and African millet was used for the sowing of winter wheat. The distance between rows was narrowed from 12 to 1.8 meters (single-row horse-drawn drill). Even in such closely spaced rows of long-stem plants,

70-100% of the wheat crop froze in the winter of 1945-46. The winter wheat crop is sufficiently safe only when sown between corn or sorghum rows which are 90 cm apart. However, in this case the intersticial fallow is narrower than for normal sowing of intersticial crops, and the winter crop is actually not sown on fallow land but on the stubble of the intertilled crop. In itself it is not practical to grow corn and sorghum on bogara /a name used in Central Asia for cultivated fields which are irrigated by rain only, without the aid of artificial irrigation/ due to the low yield of the grain and its being frozen by early autumn frost. Sunflowers are not practical for this system in view of the impossibility of sowing winter wheat in its rows before reaping the harvest.

Generally speaking, we came to the conclusion that intersticial fallow is as unsuitable for sowing of winter wheat as ordinary fallow.

Conditions for the Emergence of Seedlings in Fall and Wintering Crops

Simultaneous and timely sprouting is one of the important prerequisites indicating successful wintering of winter crops. In years with moist falls, the production of seedlings depends only on the time of sowing and the care taken in carrying it out. In dry years, even in black, well-worked fallow, it is very difficult to retain the moisture necessary for simultaneous sprouting of the seed.

In all the years of the test there were seedlings of the winter crop but usually they appeared late, at the end of September or in October.

Attempts to obtain good sprouting when the seed is planted deeply in dried-out land which contains only a fraction of the necessary moisture result in failure: there is then considerable loss of seed in sprouting.

In stubble, the seeds are planted at a depth of 2-4 cm. Sprouting takes place uniformly and simultaneously, and the determining factor is the moisture of the soil.

Depending on the fall precipitation, winter wheat plants frequently start wintering in the two-leaflet stage and do not sprout. The test indicates that for late fall planting (15 October 1947) the plants winter in the seedling stage, and differ from those planted earlier (15 September) by a five-day lag in earing. The yield of grain for the 15 of September planting is 9.4 centners per hectare and for the 15 of October 9.6 centners per hectare.

The process of prewinter hardening proceeds more successfully in stubble than on fallow land. Well-hardened plants do not die during the first half of winter even at quite low temperatures.

As many investigations showed, the destruction of winter wheat plants in fallow occurs in the second half of winter. In such cases, the plants sprout from under the snow with brown leaves and cracks in the tillering bundles.

Thinning-out of the stubble crop occurs in the spring when it comes out from under the snow. The plants do not bush, have a pale color, and begin to die.

As established by T. D. Lysenko (see entry 9 in bibliography), this destruction is connected with the lack of nitrogen in the spring and starvation of the plant.

By our tests it was established that wheat plants collected on 16 May 1948 which were cultivated in summer wheat stubble contained different amounts of total nitrogen, depending on whether fertilizer was added in

the spring or not. The yield of plants on land to which fertilizer had been added was greatly increased (Table 2).

The insufficiency of nitrogen is compensated by the addition of fertilizer in the spring. After the addition of fertilizer, the plants developed in an entirely normal manner and in the final analysis their grain yield was increased.

Thus, stubble insures a reliable survival of winter wheat. The plants planted on fallow land are not hardened as thoroughly and are damaged during the winter by mechanical disruption of tissue.

Planting and Care of Winter Wheat

Sowing standards for winter wheat in both stubble and on fallow land were studied for 2 years. A sowing standard of 3-4 million seeds [per hectare?] was found to be sufficient for bogara. For irrigated land, it is 25-30% higher. The weight norm adopted in actual practice is 100 kilograms for bogara, and 120-125 kilograms for irrigated land, which corresponds to 3-4 million with an absolute weight of seed amounting to 25-30 grams.

During the first 2 years of cultivating the winter crop in stubble, the influence of the friability of the soil on the wintering of the plants and the yield of the grain was studied (Table 3).

It can be seen from the table that negative results were obtained. Tilling the stubble before sowing results in freezing the winter wheat and reduction of the wheat yield, and also of the yield, of winter rye.

Therefore, great care should be given to tilling the soil before planting the previous crop. In preparing the fallow land before spring wheat, one must turn the bed of perennial grass by plow to a depth of 24-26 cm. Preparation of the soil before sowing and sowing the preceding crop is conducted with great care and with a maximum leveling of the soil surface in order to create favorable conditions for winter wheat. In the tillering period, the previous crop is worked with a rotary hoe. The surface of the soil is made friable by this process and ruts from the wheels of tractors and drills, which disturb the accurate placing of winter wheat seed, are eliminated.

The effect of fertilizer on the yield of winter wheat was studied under conditions of a special ten-field grassfield crop rotation. The winter wheat was sown in the stubble of the summer wheat which had been planted in black fertilized fallow. Prior to 1947, the winter wheat did not receive nitrogenous fertilizers in the spring and the grain yield was lower. The response of winter wheat to the fertilizer applied before the summer wheat is characterized by the data in Table 4.

On an average, during 3 years, (1945-1947) the yield of winter wheat was 56% of the yield of summer wheat (the preceding crop). In 1947, in small areas and in 1948, in the whole test area, fertilization of the winter wheat by ammonium nitrate was used in the amount of 30-50 kilograms per hectare. As a result, the ratio of yields of winter and summer wheat was inverted (Table 5).

The introduction of fertilizer significantly increased the yield of grain, and the effect of the fertilizer added to fallow land was clearly noticeable as the yield of winter wheat exceeded that of the summer wheat by 30-40%. The fertilization of winter wheat by nitrogen for 2 years gave an increase of grain yield illustrated in Table 6.

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In moist years, nitrogen fertilizer doubles the yield of winter wheat, and in dry ones it increases it by 30 to 47% as an analysis of the extensive production test of 1948 shows.

An insufficient supply of soil moisture reduces the yield of winter wheat. In areas with properly organized irrigation, the grain harvest remains high from year to year.

Due to the early trapping of even small snowfalls by the stubble of the previous crop, further snow accummulation is facilitated and the depth of the snow cover reaches 50-70 cm.

Spring maintenance consists of fertilizations effected after early morning frosts, of raking the stubble with horsedrawn rakes (if it is too dense or high), and of making the surface of the soil more friable by the rotary hoe.

As was demonstrated by the results of the production test, the conditions necessary for the success of stubble sowing must be the general improvement of cultivation and tillage, the careful completion of all operations for tilling the soil and planting (straight row, correct operation of each disk, and proper operation of the rotating appliance insuring the accurate sowing of each seed), and adequate tending of the plants. The loss due to freezing in the planting of winter wheat is usually the result of poor planting, the unevenness of the soil worked before the previous crop, and the reduction of the sowing norm [sowing standard equals number of seeds per unit area]. Even in years with great loss from freezing (1945), when freezing of some of the steppe flora occurred, there was a good yield of the winter crop on individual fields where there was a uniform stand and good protection of the plants.

Good yield of the previous crop is an indication for a good winter wheat yield.

The test also shows that not just any section is suitable for planting winter wheat. Winter wheat is a more exacting culture than winter rye and requires more fertile soil. Thus, in 1948 the yield of grain at the test station varied from 9.6 to 23.4 centners per hectare, depending on the fertility of the soil. Therefore, winter rye is introduced in crop rotation in raised sections with poor soil subject to being blown away by the wind. Winter wheat is planted in crop rotation in low sections with coarser soil, in particular sections where there is estuary irrigation.

The Position of Winter Wheat in Grassfield Crop Rotation

The relative effectiveness of various alternations of winter and summer wheat were studied in a special crop rotation.

From the data of Table 7, the superiority of summer wheat over winter rye can be seen. Summer wheat on a yearly average over 8 years produced 1.2 centners more grain per hectare than winter rye. Therefore the fallow land must be diverted to the leading crop of the eastern territories -- summer wheat.

Hard summer wheat is usually planted on perennial grass beds, and in rotation, soft wheat. The investigation of the planting of winter wheat in the stubble of the summer harvest was conducted in 1948 (Table 8).

The winter wheat was fertilized with ammonium nitrate in the amount of 1 centner per hectare. The increase of grain per hectare for two crop rotation fields was around 1.1 centners, besides saving fuel for tilling and working the whole crop rotation field before planting.

The preceding tests provide grounds for the belief that winter wheat has two very reliable positions in crop rotation: in the stubble of summer wheat which is planted in fallow, and in the stubble of summer wheat planted on a perennial grass bed.

Stubble-Sowing as the Preceding Stage in the Case of Other Rotation Crops

During 1947-1948, the station first checked the yield of spring wheat on plots, one of which was a bed of 3-year old lucerne, and the other a "stubble bed" resulting from 2-year planting of winter wheat (Table 9).

Similar results were received from both plots and the test was extended.

Introduction of Winter Wheat into the Sowing Practice of the Oblast

In the winter of 1948, a team of scientific workers of the Karaganda Experiment Station did considerable work in selecting areas for sowing winter wheat in Karaganda Oblast and in popularizing the test by reports and publications. At the time of sowing, the workers from the station issued immediate instructions at the working points.

In the kolkhozes and sovkhozes of Karaganda Oblast, considerable areas of winter wheat were sown in stubble. Winter wheat has been definitely taken into the field crop rotation system of Karaganda Oblast.

BIBLIOGRAPHY

1. Zaytseva, A. A., "Methods of Cultivating Winter Wheat on Stubble in Our Oblast," Sotsialisticheskaya Karaganda, No 157, 8 Aug 1948.

2. Kornilov, A. A., and Zaytseva, A. A., "Crop Rotation for Karaganda Oblast," Sotsialisticheskaya Karaganda, No 2 (2703), 4 Jan 1946.

3. Kostyuchenko, I. A., "Agricultural Science Serves Russia," Sotsialisticheskoye Zemledeliye, No 134, 13 Nov 1943.

4. Lysenko, T. D., "Completion in Time of the Problem of Planting Winter Wheat in Siberia," Dok v-s Ak Selkhoz Nauk imeni Lenin, No 7-8, 1942.

5. Lysenko, T. D., "Methods of Controlling the Hibernal Loss of Winter Crops in Siberia," Sotsialisticheskoye Karaganda, No 183, 5 Nov 1943.

6. Lysenko, T. D., "What is the Nature of Our Proposal to Plant Winter Crops in Stubble on the Steppes of Siberia?" Sovkhoznoye Proizvodstvo, No 4, 1944.

7. Lysenko, T. D., "The Cultivation of Winter Wheat on the Steppes of Siberia," Sotsialisticheskoye Zemledeliye, No 142, 30 Nov 1944.

8. Lysenko, T. D., "The Cultivation of Winter Wheat on the Steppes of Siberia," Sovkhoznoye Proizvodstvo, No 10-11, 1945.

9. Lysenko, T. D., "Tasks of the All-Union Academy of Agricultural Sciences imeni Lenin in the Light of the Decree of the Plenum of the TsK VKP(b) on Measures for Improving Agriculture in the Postwar Period," Selektsiya i Semonovodstvo, No 3, 1947.

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10. Lysenko, T. D., "Winter Wheat in the Fields of Siberia," Izvestiya, No 41, 19 Feb 1948.

11. Fedulov, L. P., "Reports on a Group of Crop Rotation Tests at the Karaganda Experiment Station for the Period 1945-1948."

Table 1

Production of Alabasskaya Winter Wheat Planting in Karaganda Oblast

Yr of Harvest	Ratio of Planted Areas (%)		Alabasskaya Winter Wheat: Destroyed Crop (% of planted area)		Alabasskaya Winter Wheat: Yield of Grain (centners/ha)	
	Fallow	Stubble	Fallow	Stubble	Fallow	Stubble
1943	47	53	34.0	56.0	3.9	5.4
1944	52	48	27.4	6.7	3.7	4.0
1945	9	91	89.0	68.5	0.7	4.5
1946	7	93	84.6	40.7	5.2	8.8
1947	6	94	100	3.2	-	8.5
1948	0	100	-	0.0	-	8.3

Table 2

Nitrogen Content in Alabasskaya Wheat Plants (% of absolute dry weight) and Grain Yield

Plot	Nitrogen % in Plant: Leaves	Tillering Bundles	Whole Plant	Grain Yield: Centners/ha	%
Without fertilizer	2.42	1.68	2.29	7.9	100
With 1 centner of Ammonium nitrate fertilizer/ha	4.08	2.82	3.90	10.3	130

Table 3

Effect of Tilling Stubble in Fall on Yield of Winter Crop

Types of Tilling	Yield of Grain (centners/ha)					
	1944		1945		1946	
	Winter Wheat	Winter Rye	Winter Wheat	Winter Rye	Winter Wheat	Winter Rye
Untilled	4.7	4.1.	2.3	4.1	12.0	9.2
Cultivating	4.4	4.4	-	-		8.5
Disking	4.5	5.9	0.7	3.0	-	-

Table 4

Yield of Tsezium III Summer Wheat and Alabasskaya Winter Wheat

Variations of Fertilizer in Fallow	Summer Wheat		Winter Wheat	
	Centers/ha	%	Centers/ha	%
Without fertilizer	12.8	100	7.4	100
60 kg/ha of P_2O_5 in superphosphates	14.1	110	7.6	103
20 tons of manure/ha	14.9	116	8.4	114

Table 5

Average Yields of Summer and Winter Wheats During 2 Years, 1947-1948 (centners/ha)

Variations of Fertilizer in Fallow	Tsezium III (preceding crop)		Alabasskaya (fertilizer supplying 30-50 kg of N)		Yield of Winter Wheat (% of summer wheat yield)
	Centners/ha	%	Centners/ha	%	
Without fertilizer	10.7	100	15.1	100	141
60 kg/ha of P_2O_5 in superphosphates	12.0	112	17.0	112	142
20 tons of manure/ha	13.1	122	17.9	118	130

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Table 6

Yield of Winter Wheat on Fertilization

In Stubble of Summer Wheat Planted in Unfertilized Fallow	1947	1948	Avg for 2 Yr
Without fertilizer	8.7	7.9	8.3
30-50 kg/ha of nitrogen in ammonium nitrate	19.0	10.3	14.6
Increase due to fertilizer (centners/ha)	10.3	2.4	6.3
Increase in %	119	31	75

Table 7

Yield of Winter Rye and Summer Wheat on Black Fallow Fertilized with Manure (centners/ha)

Crop	1941	1942	1943	1944	1945	1946	1947	1948	Avg for 8 Yr Centners/ha	%
Winter rye	5.9	12.1	7.7	7.9	8.3	20.9	23.0	23.5	13.7	100
Summer wheat	8.1	9.1	9.2	8.1	11.5	24.3	26.5	22.4	14.9	109

Table 8

Grain Yield in 1947 and 1948 (centners/ha)

Alternation of Crops	Grain Yield 1947	1948	Total for 2 Yr	Alternation of Crops	Grain Yield 1947	1948	Total for 2 Yr
Summer wheat on perennial grass bed	22.4	-	-	Summer wheat on perennial grass bed	22.4	-	-
Winter wheat on stubble	-	16.5	-	Summer wheat after plowing	-	14.4	-
Total	-	-	38.9	* Total	-	-	36.8*

[*Text says 1.1 centners/ha increase, table shows 2.1]

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Table 9

Yield of Winter Wheat in Relation to Bed
(centners/ha)

Type of Bed	1947	1948	Avg for 2 Yr
Bed of 3-year old lucerne	21.4	17.2	19.3
Stubble bed of 2 years of planting	23.1	15.6	19.3

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