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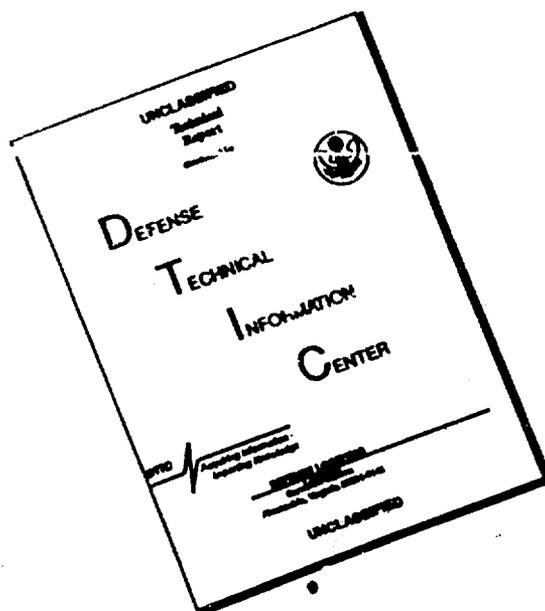
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PLANNED PARTIAL CHANGE OF VARIETIES IN PRODUCED GRAIN AND THE CONTROL OF RUST

P. G. Karaerov

From the editor/ Modern feeling -- a fundamental attribute of the Soviet specialist. The readers attention is turned to the published form of the chief agronomist of the Food Industry Kombinat imeni Stalin, P.G. Karaerov. The nature of his proposition, practically tested in the fields of the Kombinat is that a series of ~~of~~ farms which produce trade grain (not grain for seeds of variety stocks) can, without waiting for a complete test of new varieties on the selection stations and "state variety plots", immediately obtain perspective candidates in a variety for propagation in the farms and at once sow significant areas with them in a series of wide production experiments.

It is known that many newly developed varieties exhibit large harvests at first and show considerable resistance to disease but later they lose them, and do not even develop up to the end of the period of the variety tests. In proposing a planned partial change of varieties, sowing for production on the commercial farms, as a rule, will operate on increasing the level of productivity by means of newly developed varieties with their "recent heredity". /

Krasnodar Krai possesses rich soil and a climate favorable for agricultural cultivation. It is one of the principle winter wheat regions of the European part of the USSR.

Winter wheat occupies more than 30% of all the sowing area and yields a high harvest. However, along with the favorable factors in the nature of the krai are many phenomena which abruptly reduce the harvests of winter wheat. One such destructive factor appears to be a disease of plants in the form of a brown rust.

Summer spores of the rust spend the winter here on the leaves of windfallen cereals; they maintain their viability on the early sowings of winter sowings and affect the sowings up to their maturation. This disease grows especially vigorously in wet years when the foliated surface of the winter wheat occurs continuously covered with pustules of the rust. In 1951 even the spikes and awns of winter wheat were strongly affected.

Disappearances of the harvest of winter wheat, affected by the rust, result from the strong reductions of the nature of the grain. For example, in 1951, when the rust was very great (according to a comparison with 1950 which was more favorable in this respect) within the Food Industry Kombinat imeni Stalin, the following relationships of the groups of grain was produced (Table 1).

Table 1.  
Groups of Grain According to Quality  
(in % of the entire harvest)

	1950	1951
High (more than 780 gm)	4.2	2.7
Medium (779-751gm)	85.6	58.7
Low (less than 750 gm)	38.6	49.7

Thus, in 1951, high and medium quality grain constituted only 61.4% of the total yield, while in the preceding year, these groups constituted almost nine-tenths of the harvest. The peak of the harvest and its quality, dropped sharply during a rapid change from the hot and dry days which frequently occur in the northern Caucasus

to cool wet weather (favorable for the development of rust).

In 1951, on the Otrad-Kubansk state variety plot of winter wheat, "Early Ripening L-3 (Skorospelka L-3) which was 3% infested with 01st rust, yielded 44 tsentners per hectare, but New Ukraine 83 (Novoukrainka 83), usually slightly surpassed in the harvest by Skorospelka L-3, gave as little as 46.6% less after rust affect 52% of it.

At present there are no agricultural procedures which destroy rust once it has started to develop. Agricultural science sets procedures; directions for the reduction of the rate of infection of plants with rust, for example, by the establishment of later periods of sowing in as much as the early sowings are strongly affected.

All measures, leading to the production of hardier plants, demonstrate the plant's resistance to rust. At present, methods of surface manuring and of supplying food other than through the roots have been developed which, according to certain data, reduce to one-half the development of rust. (translator's note: the writer implies that nutrients are absorbed directly through the leaves and other parts of the plant which are above the ground). However, these methods are as yet found in nightly experiments on insignificant plots of land; they have not yet been applied on a wide or industrial scale.

For a long time the selection of rust resistant varieties of winter wheat was considered the only course for overcoming the spread of rust. But practice shows that a variety selected at a breeding station as being little affected or even immune to rust, in the course of time begins, after being propagated in the same place, to be damaged whereupon the extent of the damage to the plants of this variety increases yearly. In some regions this is noticeable particularly abruptly, in others it is modified by other factors.

We have already said that in wet years the rust develops especially vigorously. We present the data of the effect of rust on different varieties of winter wheat on the Otrad-Kubansk government breeding plots (Table 2).

TABLE 2

The effects of rust on winter wheat

VARIETY	EFFECTS BY YEARS (in %)				
	1947	1948	1949	1950	1951
Novoukrainka 83	0	8	17	35	52
Voroshilov	0	18	13	36	88
Ferrugineous G-115	0	4	22	26	-
Kubansk 133	0	3	18	48	36
Hybrid 481	0	5	22	48	75
Olessa 3	0	4	21	43	49

Table 2 shows that the development of rust gradually increases on the varieties under consideration, some of which were released by the breeding station as rust resistant. By reason of such progressive increases of rust on the varieties of winter wheat, which were formerly unaffected by it, many botanists and phytopathologists explain the appearance of new breeds of the fungus which are adapted to the new conditions. However, no one saw either these breeds or any other indications of their appearance except the indicated effect of the rust on the new varieties of winter wheat. This explanation really does not give any methods for preventing the loss of harvests to practical persons (operators) of agricultural economy.

Workers of the Food Industry Kombinat imeni Stalin (village of Xutorok, Krasnodar Krai) observed the damage to the different varieties of winter wheat and determined that this damage depends not on the variety but on the place where the seeds are raised.

A new variety, previously not grown on the farm, is usually weakly affected (by rust) the first year. Even seeds of old varieties, formerly grown some years previously on this farm, but brought in from other regions with more arid climate, give first year plants which are less affected by the rust than are sowings of varieties which occupy the majority of the sections.

They explain this phenomenon by the fact that when they begin to sow a new variety alongside another variety, spores of the fungus which ~~are~~ growing on the plants of the old variety, do not affect this new variety so strongly because there are a few differences in the chemical consistency of their cell sap.

However, spores which fall on the leaves of weakened (owing to mechanical injury or damage by harmful insects) plants of the new variety or on the rotted leaves of these plants, reproduce and give spores which are already more adapted to the new food conditions. When this new variety really spreads to all sections of the sowings of winter wheat (i.e. when it is planted as the major variety for commercial harvest—trans.) the majority of the spores grow (the ones bred in the unusual conditions) and the rust spreads on this variety which is soon badly damaged and progressively increases, of course in relation to the weather conditions of the year.

In order to put an end to the damage and to the excessive development of rust, in the Food Industry Kombinat imeni Stalin/ planned partial change of the varieties of winter wheat was introduced. This appeared possible thanks to the fact that the Kombinat generally produces commercial wheat but to consider its restricted but best known aspect of the variety grades does not tell all of its farming activities. This work has been carried out at the Kombinat (with the exclusion of the war years) since 1938.

Three or four varieties are always found in the sowings of the Kombinat, the first of which, occupying the majority of the field, depends on a substitute in the next year; the second, occupying 100-300 hectares, is prepared for occupying the main plots (i.e. it will be the commercial crop the next year—trans.), and one or two new varieties occupy small plots (from 0.1-3 hectares) and are studied.

Workers of the Food Industry Kombinat imeni Stalin retain constant communication with the breeding stations and the state variety plots and attentively study all findings of the various tests of the new varieties.

As soon as a new variety is developed, perspective to resistance to rust and

other economical features, the Kombinat obtains a small portion of the seeds in order to study them under farm conditions.

While the variety goes through state variety tests (if it is actually economically valuable and yields a quantity admissible or tentative for reproduction in the district where the Food Industry Kombinat is located), all principle sowings of it in the meantime have already been made and the Kombinat generally leads the majority of the farms of the Krai in one or two years. If the new variety proves unsuccessful for any reason, work with it is immediately stopped.

Data characterizing fifteen years work of the Food Industry Kombinat are given in Table 3.

TABLE 3  
Area of the Kombinat put in sowings of different varieties of winter wheat (in%)

Variety	Year											
	1938	1939	1940	1941	1942- 1945	1946	1947	1948	1949	1950	1951	1952
Stavropol'ka 328	97.4	2.4	-	-	-	-	-	-	-	-	-	-
Ukrainka 246	2.0	73.6	34.1	-	-	-	-	-	-	-	-	-
Voroshilov	0.6	21.6	56.0	81.3	-	-	-	-	-	-	-	-
Krasnodar 622/2	-	2.4	9.9	18.7	100	96.6	87.0	-	-	-	-	-
Novoukrainka 83/4	-	-	-	-	-	3.4	13.0	89.3	95.0	99.4	95.9	79.1
Shkoda	-	-	-	-	-	-	-	-	-	0.6	2.6	20.7
Ferrugineous 0-115	-	-	-	-	-	-	-	0.6	4.4	-	-	-
Skorospelka L-1	-	-	-	-	-	-	-	0.1	0.6	-	-	-
VIB- 116	-	-	-	-	-	-	-	-	-	-	0.4	-
Novoukrainka 83/4	-	-	-	-	-	-	-	-	-	-	0.1	-
Besostafá rannafá 4 (early continuous)	-	-	-	-	-	-	-	-	-	-	-	0.2

In 1948, the variety Ferrugineous 0-115 was tested, but it developed very severely a stinking smut and soon had fermented. Early ripening (Skorospelka) L-1 in the following year was damaged by bacterial and work with it was thus discontinued. Research Operations were discontinued with Novoukrainka 83/4 in view of the fact that, in place of this variety, two perspective ones were isolated - Shkoda and Skorospelafá rannafá (early continuous, evidently the one listed in the table as Besostafá rannafá 4-trans.)

Such a partial change of varieties makes it possible to obtain yearly harvests of winter wheat of 1-2 centners per hectare more than the other farms in the region which are not conducting similar work.

This work is made easier by applications in the Food Industry Kombinat of methods of accelerated propagation of seed. In order to begin to propagate the new variety, even a few kilograms of seed is sufficient. For example, propagation of summer barley of the variety Sparfak was begun in 1940 with 4 kg. of seed. Usually, however, the work is started with 20-30 kg of seed or even more, from which propagation is accelerated in one year, which increases the effectiveness of the use of the new variety.

Very small normal sowings are applied for the first propagation (about 25-50 kg. per hectare). Seeds are sown on high grade agricultural ground usually with a rough fallow with the application of fertilizer (or manure-trans.). The sowings are controlled in broad agreement with the most favorable periods. In the fall and spring agreeable conditions are provided for manual cultivation and careful supervision is used in looking after the condition of the plants.

If a very small quantity of seed is sown, sowings are made by hand in soil marked out beforehand (50 x 50 cm.) Such sowings run, depending on the absolute weight of the seeds, 2 - 3 kg. of seed per hectare.

The coefficient of reproduction in such a method of sowing is very large and while the yield per hectare is not always large, all in the separate cases add up to a considerable volume. However in 1937, 8 centners of seeds of Voroshilov winter wheat was sown on 25 hectares, that is 32 kg. per hectare but in 1938 from one of the propagated sections 693 centners were thrashed which amounts to 27.6 centners per hectare.

In 1938, 30 centners of the Krasnodar 622/2 variety were sown on 100 hectares (30kg per hectare). The harvest of 12.6 centners per hectare was obtained — this is very low compared to the production of the Kombinat on sections of previous propagations. But even in this case the coefficient of propagation was equal to 1:42; that is extremely high when compared to better production sowings where the coefficient does not amount to more than 1: 15-20.

In the results of such rapid propagation the introduction of new varieties usually takes not more than 3-4 years. Thus Krasnodar 622/2 and Voroshilov occupied the fields on the fourth year of propagation but Novoukrainka 83 did so on the third year.

Possessing a large quantity of seeds of a new variety at the moment when, having been run through the state variety tests, it amounts to a quantity recommended for the district, the Kombinat supplies seeds of this variety to all surrounding farms and gives to them (the benefits of-trans.) its rapid propagation even though at this time the Kombinat itself fully prepares for its change in the fields.

Of course, such a partial change of varieties, a difficult matter, can be undertaken only by advanced, high culture farms such as the Food Industry Kombinat imeni Stalin. It is impossible to recommend a similar change of varieties to everyone without including the Sovkhoz (state farms) and the Kolkhoz (collective farms). However, many of these methods may be useful to all farms. For example, one may cite at length instances where one or another of the Kolkhoz has seed; of

a low category since it was not obtained in time either from the Zagotzerno (no translation available but it is likely an abbreviation of the Office for the Procurement and distribution of grain) or the Gossortzagotzerno (? State Office for the Procurement and distribution of varieties of grain). According to these statements, the hidden desire of undesirable managers of these farms is to busy themselves with the propagation of selected seeds.

Applying the same adopted fast propagation as the Food Industry Kombinat imeni Stalin, any farm can always provide itself with high quality grain in three to four years.

Also one can not forget that the partial change of varieties of winter wheat reduces the degree of development of rust, even though this control is of short duration. Hence by such agricultural practices which are necessarily the same, one can determine which of the measures put in practice in the Food Industry Kombinat imeni Stalin are applicable for conditions of each farm and to what extent they are acceptable to the farms as well as to operate in conformity with the farms.

In addition it is important to know the following:

1. At present there are no developed measures for the direct destruction or for preventive treatment for rust in winter wheat; in the number of other indirect methods of control of this disease which sharply lowers the productivity, the change of varieties is not conclusive.

2. All varieties according to measures of their reproduction in one or another location are affected by rust in a progressive rate, hence a change of varieties brings about a temporary reduction in the development of rust.

3. Methods of speeding up propagation, including working capacity itself, ~~also~~ makes it possible for the farm to quickly change varieties when they start to be severely affected by rust.

Food Industry Kombinat imeni Stalin

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