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THE WORK OF STATE SELECTION STATIONS

E.T. Varenitsa
Candidate of agricultural Sciences

There are now 72 selection stations in the USSR which are distributed over the most important soil and climate zones. The majority of these stations are located in land areas of from 1,500 - 2,000 hectares.

The stations are equipped with modern machinery and equipment. For example, the average yearly work load of a 15 horsepower tractor is little more than 300 hectares of soft plowing. The work of the selection stations extends into many directions of productive and scientific investigations. They conduct selective seed-growing and experimental agronomic work in grain, leguminous seed and olive crops and perennial grasses; they carry on research in chemical agriculture, physiology and crop protection. In addition, some stations conduct experimental work in animal husbandry and farm mechanization.

Selection stations were given the following functions:

a) To develop new high-yielding varieties adaptable to local soil and climatic conditions, and to improve selection and local varieties.

b) To cultivate superior seeds of agricultural crops which are suitable to particular zones in sufficient quantities to assure an adequate supply for the seed districts of the rayon experimental farms.

c) To develop agricultural practices which are best suited to particular agricultural zones of the Soviet Union and which will lead to large stable harvests.

The selection and seed growing work of the stations are based on the teachings of Darwin, Timiryazev, Michurin and Lysenko, while the

experimental agronomic practices and research are based on the teachings of Dokuchayev, Kostichev and Williams.

During their 12 years of existence, the selection stations developed and sent to the state variety testing stations (sortoispytaniye) over 650 new highly productive varieties of agricultural crops. These included 105 varieties of winter wheat, 112 varieties of summer wheat, 54 varieties of oats, and 75 varieties of leguminous seed crops. 280 of these varieties have been distributed to suitable regions and are already grown in large numbers. The work of some selection stations has been particularly successful. At the Krasnodar Station, Academician P.P. Luk'yanenko, following the lead of the Michurin principle of crossing geographically separated types, developed a new highly rust-resistant type of Novo Ukrainka winter wheat. This variety has successfully passed the state variety testing stations. Within a short period of time over half a million hectares were sown with this variety. P.P. Luk'yanenko also developed other valuable types of winter and summer wheat such as Skorospelka (early ripening) 1, Kubanka (hard) 3, Kubanka (hard) 893 and others which are now being examined by the state variety testing stations.

At the Azerbaydzhan Station, selection specialist V.N. Gromachevskiy developed more than 10 high-yielding types of grain crops. Among these are varieties of durum (Arandana and Khoranka) and soft wheat (Arabugdasa, Shark, Enelik and others) which are characterized by their high-productivity and resistance to drought and diseases. Over half a million hectares are already sown with these varieties. Their productivity exceeds that of the older, local types by 30 - 40 percent.

At the Stavropol' Station, selection specialists S.G. Syrovatskiy, L.F. Rusakov and A.N. Snetkova developed high-yielding varieties of

winter wheat, Voroshilovskaya hybrids 481, 491 and others which are also rust-resistant.

At the Nevelsensk Station, a variety of winter wheat, Ulyanovka, which is high-yielding and resistant to unfavorable winter conditions and shattering, was developed. This variety was widely distributed and extends even to the central regions of the USSR.

At the Kazan Station, a variety of winter rye with large kernels, Kazan 5 and 6, was developed and its yield exceeds that of the standard variety, Avangard, by 2 - 4 centners [redacted] per hectare. This variety is widely distributed.

At the Stalin Station, a new high-yielding variety of summer wheat, Artimovka, was obtained. At the Kharkhov Station a new type of durum wheat, Narodnaya, was developed. These varieties have been progressively regionalized.

The Narym Selection Station, working under the difficult conditions of the Far North, developed for its zone two new varieties of winter rye (No 313 and 343), summer wheat (Narym No 3, Narym No 5), hull-less oats, Narym grass and also several other varieties. All of these were sent to the state variety testing station between 1947 - 1948.

The Kamalinsk Selection Station (Krasnoyarsk Kray) developed and put into cultivation over the last ten years three varieties of summer wheat, two varieties of oats, vetches and alfalfas, one variety of barley and clover and four varieties of perennial grasses. These varieties are already being sown over an area of 300,000 hectares.

In addition, in 1948 this station sent to the state variety testing station nine new varieties of various crops which are improvements of earlier developed and cultivated varieties. For example, a new variety of summer wheat, Mil'turum 1103, was developed by cross-breeding the regionalized variety, Kamalinka. This new variety ripens 4 - 5 days sooner and

has a yield which exceeds that of older types by 2 - 4 centners per hectare. The new variety possesses a non-lodging chaff and a large hyaline kernel.

The Leningrad Station turned over to the state variety testing stations thirteen varieties of grain crops of which seven were regionalized and put into cultivation.

High-yielding, blight-resistant varieties of potatoes were developed by the White Russian, Petrovsk, and Izgevsk Stations. The Barnaul', Kirgiz, Milyutin, Tulun and several other stations have also attained significant success in selection work.

The Association of Scientific Workers of the All-Union Selection and Genetic Institute imeni T.D. Lysenko succeeded in developing highly valuable varieties of winter wheat OD-3 and OD -12 (originator-F.G. Kirinchenko and others). These are distinguished by their high-productivity and winter-resistance. They are already being cultivated on hundreds of thousands of hectares and are continuing to expand rapidly. Also developed were a variety of summer wheat 1163 (originator-T.D. Lysenko) which was developed in the record-breaking time of 2 1/2 years, on the basis of the theory of phase development; a variety of barley OD -14 (originator-P.F. Sarkaviy); a variety of cotton OD-1 (originator-Academician M.A. Ol'shanskiy) and others.

The basic methods of the selection work are: continuous improvement of selection from natural and artificial (hybrid) seeds and from existing selection varieties; hybridization followed by selection of gametes during fertilization; selection of parental pairs in crossing, on the basis of phase analysis; vegetative hybridization; crop

mutations under environmental conditions; controlled breeding of plant organisms.

The Mendelism-Morganism Theory, which was completely discredited at the August Session of the All-Union Academy of Agricultural Sciences, no longer has a place in selection work. When this theory was applied, selection specialists treated hybridization merely as a combination of genes. Condition of parental types in crossing was not considered, and the most important behavior of organisms, that is, their selectivity during fertilization, was ignored. If in some cases a selection specialist achieved success, it was simply a matter of good luck. Thus, it is no wonder that, in spite of long application of artificial hybridization in several selection stations (Kharkov, Mironova, Nemerchansk, Krasnokuts, Bezenchuksk and several other older stations), results are very insignificant.

Having changed the theoretical basis of selection practices, many stations began to apply inter-variety hybridization followed by selection of gametes during fertilization, as a method which creates many different biologically-valuable and agriculturally-useful varieties.

A comparative study of hybrids of selective and forced fertilization showed the great advantage of the former over the latter. This was clearly shown in the comparison of hybrids of similar combinations obtained by forced pollination and by limited and free pollination (crossing of pairs), in experiments conducted at the Mironova Selection Station. For example, in the crossing of winter wheat Eritrospermum 15 with Shmitovka 103 in 1947, the following results were obtained in the second generation.

36.2 percent of the hybrids of the group produced from forced pollination survived the winter, whereas 72.2 percent of the group produced from selective fertilization survived. The average harvest of one crop of the first group was 70.9 hectares, of the second group 222.8 hectares. The average productive sprouting (kustistost') in the first group was 3.09, in the second 3.64. The hybrids of both groups in their first generation characteristically were, scarcely distinguishable. Both showed their best qualities. However under the rigid winter conditions of the testing of 1946-47, it was at once evident that the hybrids of one were sturdier than the others.

In the past few years, selection stations have developed high-yielding varieties on the basis of selective fertilization. This year two new varieties of winter wheat will be widely tested, namely, Sovetskaya and Yubileynaya, which were produced on the Mironovski Station. According to the results of four years testing, the former exceeds the standard Ukrainka in yield capacity by an average of 8 centners per hectare, and the latter by 5.6 centners per hectare. These winter wheats, Sovetskaya and Yubileynaya, are distinguished from Ukrainka by their greater winter resistance and resistance to brown rust.

In the past four or five years, the Uralsk, Shatilovsk, Marym, Krasnodarsk, Kamalinsk, Azerbaydzhan, Stavropol', Barnaul' and several other stations have been successfully conducting work on this method of freely crossing intervarieties. A number of selection stations are applying a definite variation of winter forms of wheat into summer varieties, and variations of summer into winter.

Academician P.P. Luk'yanenko obtained very noteworthy results in the course of his work on the transmutation of the winter wheat Voroshilovskaya into summer wheat. In particular, the summer Voroshilovskaya wheat produced a sizeable degree of rust-resistance. Alma Ata Station developed a variety of summer wheat by modifying the

characteristics of the winter wheat Ukrainka. This summer Ukrainka wheat exceeds the standard yield by 3 to 4 centners per hectare and does not shatter; it thrashes well and is distinguished by its great resistance to fungus diseases and to lodging. Several stations have already achieved success in applying this method of vegetative hybridization of the grass family, thus opening up new unlimited possibilities for selection of plant cultures.

In 1947, a new variety of winter wheat was delivered to a state variety testing station. This was developed by selection specialist Illarionov at the Yaroslavl Station, by the vegetative grafting of the winter wheat Dyupabl' onto the winter rye Vyatka. The grafting was conducted under laboratory conditions, in which the grafting components were in phase of one-centimeter seedlings. Three years testing revealed that this type of wheat was high-yielding and winter-resistant.

At the Kamalin Station, specialist A.S. Pushkin has been widely applying the vegetative hybridization of summer wheat, by transfering the bud (grafting) in a distinct phase of its formation, to the seed of another variety (an uncultivated plant). Components in vegetative hybridization were selected within the same or different varieties and types of field plants. Originally, graftings were effected by using fully developed, normally ripened buds of the graft and the endosperm of the uncultivated plant. Later however, undeveloped buds and endosperm were used in transmutations. Such hybridization is conducted under field conditions, in which development of the buds is incomplete. Hybridization therefore is carried over to the crest or secondary portion of a seed of another variety or type, which continues to develop on the maternal plant. In this way valuable types

of summer wheat have been obtained which entail thorough study and testing.

Specialist Mukhin (Belorusskaya Selection Station) has been successfully conducting vegetative hybridization of buckwheat with Fagopyrum tataricum. He obtained a high-yielding type of hybrid buckwheat which is a valuable material for the development of new varieties.

At the Mordovsk Station, specialist Mikhaylov obtained vegetative hybrids by grafting native buckwheats to wild types of this culture. These are distinguished by their sturdy development and large kernel. They are now being intensively cultivated on this Station. Valuable high-yielding types of soy-bean have been obtained by this same method at the Amur Station.

At the Kinel Station, specialist Orlov successfully developed a new high-yielding variety of potato, which is distinguished by large tubers weighing upto 1700 grams. This variety, Kinel'skiy bogatyr', is a vegetative hybrid, in which the regionalized variety Epikur served as the graft, while the Canadian variety Katogdin served as the uncultivated plant.

In this field of hybridization, it should be noted that in a number of instances little attention has been devoted to the question of an efficient method of developing hybrids of grassy plants. Specialists often forget that the obtaining of a hybrid type is only the beginning; the hybrid must then be cultivated ..... according to I.V. Michurin's definition of the conditions controlling the successful development of new types.

"First of all, the characteristics of each hybrid, which is cultivated from seeds of a fruit obtained from the crossing of two producers, consist only of a combination of those qualities

inherited in the transfer of characteristics to it from the plant-producers (the male-parent, the female-parent and their offspring), whose development in the early stages of the hybrid's growth, has been favored by external environmental conditions. Consequently the organism of each seedling-hybrid is the sum, and its components are the characteristics of the plant-producers plus the influence of the surrounding environment."

Academician T.D. Lysenko points out that hybridization will not give positive results, unless conditions are created to assure development of those characteristics and qualities. Achieving the latter in a new variety poses a problem to the specialist. Selection specialists and physiologists, while widely applying the principles of selective fertilization in hybridization and of vegetative hybridization thus greatly increasing the effectiveness of selection work, should ascertain the basic requirements of plants. These should be in relation to the conditions of the outside environment, which control development of valuable biological and economical factors of outstanding varieties. As these requirements are ascertained for each specific geographic region, a specialist will better master the process of formation and will directly control the creation of new types, necessary for the productivity of plant cultures.

Application of Michurin methods of work at selection stations has achieved great practical results. However it must be stated that there are some stations which are still not cognizant of the foremost methods, use them slightly or apply only a portion of them. They inevitably suffer failure and do not justify their existence. There are about ten selection stations in this catagory, including the Kalinin, Chubash, Severo-Donets and Vologod stations which have not

put a single type into production. Individual scientific co-workers of stations, until lately, were upholding the principles of Morgan and were even hindering the stations in solving their practical problems.

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An important division of work of the state selection stations is the cultivation of superior seeds of granular, leguminous seed and olive plants and grasses. During the course of their work, these stations have cultivated more than 1.4 million centners of superior seeds.

Formal Genetic Science had developed an indifferent attitude to questions concerning agricultural techniques of cultivation. The primary attention of the selection specialist and seed grower was focused only on the preservation of pure strains and protection against morphological changes. Such a theory was harmful and disarmed the practical workers in their struggle to improve plant cultures by creating ideal tilling conditions. There are many cases in which the strain was worsened by this endeavor to obtain a pure strain (typicalness). This was the case with the rye of Lisitsyn at the Shatilov Selection Station.

Academician T.D. Lysenko proceeded from the theory of phase development, in counterbalance to Mendelism. He proved that the characteristics and qualities of an organism are developed in the process of formation and development of the organism, under the influence of external environment. According to Lysenko, "External conditions, being included and assimilated by the living substance,

are not actually external but internal; that is, they become part of the living substance and, for nourishment and development, require the nutriments of those conditions of their former external environment."

The capability of organisms to require and select definite conditions for life and development, according to the definition of Academician Lysenko, is the most essential peculiarity of their heriditary nature. Every living substance builds itself from the conditions of the external environment according to its heritage. By ascertaining the conditionsnecessary for the formation of these or other characteristics of an organism, it is possible to change them into the type necessary to mankind, by changing their conditions of life. Proceeding from these principles, in 1939, the All-Union Conference on Seed Growing accepted this method of cultivating superior seeds in state selection stations. This resulted in uninterrupted improving of selection, enrichment of the hereditary basis of seed plants by inter-variety crossing and advanced education in the field of agricultural techniques.

In recent years, a very valuable practical result was obtained on many state selection stations. They have been producing superior seeds which are not only distinguished by a high degree of purity but, as a rule, are more yielding than other reproductions of these same varieties. For example, the superior seeds of winter rye at the White Russian Station were 23 percent more yielding than widely cultivated reproductions, and oats were 9 percent more yielding.

The superior seeds of the Yaroslav Station excel durable reproductions in yield: winter rye by 11.7%, summer wheat by 12.7%, oats by 10% and peas by 15%. The Kazan Station produces the following seeds: winter rye whichare 5% more yielding than other seed varieties;

winter wheat 10%, summer wheat 16% and oats 10% more yielding. Similar results were obtained by the Shatilov, Marym, Kirgiz and Mironova Stations. The biological diversity of forms of a given variety in seed growing nurseries is representative of the hundreds and thousands of tested seeds. This permits stations to select the most productive seedling of regionalized varieties, and thus not only cultivate high quality superior seeds but also improve existing varieties. For example, the Krasnodarsk Station, in the process of seed growing, substantially improved the nutritive qualities of the kernel of the winter wheat variety, Pervenets, and raised sharply the resistance to yellow rust quality of the variety, Voroshilov.

The Onokhoysk Selection Station, by using this same method, improved the varieties of summer wheat Leda and Lyutestsens 062. According to the results of variety testing, the improved Lyutedtsens 062 (family 2433) is more yielding than the original by 2 - 3 centners per hectare and the absolute weight of its kernel is higher.

At the Leningrad Station, in the process of seed growing, a number of high yielding seeds of the summer wheat Tulun 70 B/8 were selected. The family L-74 excelled the original variety in yield by 5.2 centners per hectare or 22% above the standard.

In recent years, a number of stations have widely accepted Lysenko's method of inter-variety crossing to produce an improved variety of superior winter rye seeds. The Gor'kov, Mordov, Onokhoysk, Kamalinsk Stations from this method obtained a superior seed which excels original seeds in yield by 2 - 3 centners per hectare. Experience attests to the great effect of this method of artificial pollination of farm crops which was suggested by A.I. Musiyko. For example, with corn, the increase in harvest of pollinated crops reaches 3 - 4 centners per hectare, with winter rye 2 - 4 centners, with sunflower

2 - 3 centners and with millet 1.5 centners per hectare. This method had substantially improved the species qualities of the seeds, thus ensuring an increase in harvest in the ensuing years.

Mention must now be made regarding the sizable deficiencies in seed growing at a number of stations and superior seed-growing farms. Several selection stations obtained negative results by mechanically applying the recommended method of seed growing of grain cultures, without determining local natural conditions and the peculiarities of individual crops. For example, wide-row planting recommended for granular crops in the south were transferred to the conditions in Siberia (particularly in the first years of the stations' work). This caused a sharp decrease in the harvest of nurseries and sometimes even in loss of crops. At individual stations, in the struggle for simplification of seed growing, the number of seedlings in selection and seed nurseries was cut to the minimum. This resulted in a worsening of the variety.

In some cases, a huge number of rows (often tens and hundreds of thousands) were planted in seed-growing nurseries. As a result the selection specialist had no chance to investigate them carefully, either in making a selection or rejection. In seed-growing work with local varieties, there are a number of cases in which individual domestic selection was incorrectly applied. This resulted in the disintegration and impoverishment of the natural popularization of harmoniously constructed bio-morphotypes under the influence of local natural conditions. During the mechanical expansion of the method of seed growing from grain crops to grasses, the hereditary basis of local varieties even deteriorated. A great fault in the work of selection stations and superior seed growing farms is the slight increase of new varieties and slight progress in their production.

Frequently the whole system of seed growing in a given district (selection stations, superior seed-growing farms and regional farms) has been worked on the basis of cultivation of superior seed and reproduction of older widely distributed varieties. As a result, necessary attention is not devoted to new and better yielding types.

There are still many stations (Krasnokutsk, Kamyshin, Smolensk, Ryazan, Chakinsk and others) which conduct selection and seed-growing work on a low agrotechnical level, receive poor harvests and from year to year fail to fulfill the plan required for superior seeds. These stations ignore the most important factor for the improvement of species qualities of a variety, namely, high agrotechnical background. As a rule, they produce superior seeds with unsatisfactory species qualities which frequently do not respond to first-class soil conditions. Such seeds are in no way distinguishable from the usual seeds by yield capacity, but they often surpass, in all other qualities, seeds produced on collective farms in high-yield regions.

Selection stations develop their economy on the basis of systematic realization of the grassland system of farming. In this way, they harmoniously strive to unite the most important branches of agriculture, plant growing, animal husbandry, apiculture, horticulture, by introducing correct grassland field and grain crop-rotations, by creating field shelter belts, by utilizing local water resources etc.

The majority of stations have already introduced on their fields correct grassland field and grain crop-rotations. The cutting of grain crop-rotations on those stations, where this has not already been effectuated, will be completed in 1949. The utilization of grassland crop-rotations on those stations, where this has not already been put into practice, will be completed in 1951. Perennial grasses in this way will occupy up to 30% of the area of the stations' plowed land. The sowing of herbaceous-leguminous grass mixtures, in addition to its agrotechnical influence on the soil (by creation of sturdy, finely clotted structures) permits the supplying of vital quantities of

highly valuable hay to the growing livestock industry. In three years (1949-51) the total yield of hay from perennial grasses should increase more than 1 1/2 times.

Shelter belt planting plays an important role as the factor regulating the water system which creates the conditions for the conversion of the nature of steppe and forest-steppe regions. This decisively removes the influence of former periodic droughts. State selection stations for several years have been conducting afforestation work: more than 2100 hectares of forest strips have been planted (520 of these in 1948).

The stations have a well developed livestock industry. On 1 January 1949, livestock of horned large-cattle had increased 60% as compared with the pre-war level, ~~livestock of~~ swine 20%, sheep 240%, horses 10%. In connection with the adoption of the three year state plan of development of animal husbandry, livestock will increase at even a higher rate, and the pre-war level for large-horned cattle will be exceeded almost 2 1/2 times. Particular attention is herewith turned to the improvement of cattle species and productivity.

Adoption of the grassland system of farming on stations creates prerequisites for the progressive increase in soil fertility and the uninterrupted growth of farm crop yields. The beneficial action of this complex grass system of farming can be judged according to the results of the Kaminnostep State Selection Station (now the Institute of Agriculture of the Central-Black Soil Belt imeni V. Dokuchaev). Here by using the complex Dokuchaev-Williams system, the harvest of granular crops grew from year to year as is evident from the following data:

TABLE I

INCREASE IN HARVEST AT THE KAMENNOSTEP STATION
(AVERAGE HARVEST IN CENTNERS PER HECTARE)

YEARS	GRANULAR		LEGUMINOUS
	WINTER	SUMMER	
1934-1936	13.3	9.7	10.3
1937-1939	18.8	13.6	10,5
1940-1941	20.5	14.6	12.9
1943-1945	21.4	21.1	15.3

The Ural Station obtained much the same significant results. In turn the existing grassland system of farming maintained a progressive increase in harvests in the extremely arid southeast where the annual precipitation total seldom exceeds 200 millimeters.

The harvest of superior seeds for a three year period is shown on Table II.

TABLE II

INCREASE IN HARVEST AT THE URAL STATE SELECTION STATION

CROPS	1938-40 (c/h)	1941-43 (c/h)	1941-43 (% to 1938-40)	1944-46 (c/h)	1944-46 (% to 1938-40)	1947 (c/h)	1947 (% to 1938-40)
GRAIN CROPS (winter and summer)	7.3	9.7	133	12.8	175	12.9	176
Of these: SUMMER WHEAT	7.0	7.3	104	9.5	136	11.4	163
WINTER RYE	6.3	12.0	190	15.7	249	16.2	257

The Aleksandrov Selection Station is a good example of the use of the grassland system of farming outside of the black soil belt. It was organized in 1938 on the soil base of a poorly constructed state farm. At that time, the arable layer was not more than 12-15 centimeters and podzol was deposited deeper. Here, by the

introduction of field and grain crop rotations grass penetration increased up to 50%. In the course of five years, this in turn afforded an opportunity to plant grass in all areas.

By applying correct tilling methods and by using the system of organic and mineral fertilizers, the Station steadily increased its harvest. The average grain harvest has increased more than twofold over the past fifteen years. The Station completely utilized field and grain crop-rotation and the depth of arable stratum reached 22 centimeters. Now the Station has begun the planting of shelter belts.

The required plan for superior seeds for the ten years (1938-48) was 122% fulfilled, and 37,000 centners of seeds or 174% of the plan were produced. According to the data of competitive variety-testing, the superior seed of the Station surpasses the yield capacity of ordinary seeds by 3.5 - 12%.

The Narym Station, by introducing field crop-rotations and correlating the cultivation and fertilization of the soil, obtained a harvest of grain crops yielding 8 - 10 centners per hectare under conditions of the far north. After adopting the grassland system, the harvest steadily increased and for the past eight years has had an average yield of 21.6 centners per hectare. The Station daily exceeds the plan of output of superior seeds and has become a profitable farm.

A number of stations have acquired large and stable harvests of grain crops and in this way have contributed to the development of selection seed- growing works. (TABLE III)

TABLE III

HARVEST OF GRAIN CROPS
(Centners/Hectare)

STATION	1944	1945	1946	1947	1948
TURKMAN	15.6	19.0	20.1	23.1	20.0
KURGIZ	16.1	18.8	23.0	27.9	25.1
YAROSLAV	18.1	13.7	15.3	21.0	22.4
KRASNODARSK	12.5	18.5	16.4	20.1	16.3
STENDSK	—	—	18.2	23.7	26.9

Completely different results were obtained at the Krasnokutsk Station and the Kamishinsk Station, which are located in the south-east under natural conditions similar to those characteristic of the region of the Ural Station, but less severe.

At the Krasnokutsk Station, grassland crop-rotations were introduced, and perennial grasses have been occupying a considerable portion of the fields, but do not produce the needed agrotechnical effect. As a result of ignorance of the requirements of the grass-land system of farming and because of unsatisfactory agricultural techniques, the Station obtains a very low yield in grain crops.

Kamishinsk, Smolensk, Ryazansk, Falensk and several other Stations continue to obtain low yields. However in the light of facts mentioned earlier, it is evident that a selection station in any zone by persistently utilizing the grassland system of farming, can achieve a substantial increase in harvest. It should be emphasized that the installing of the grassland system of farming on state selection station fields, besides enhancing the fertility of the soil and the increase in yield, has a tremendous methodological significance.

The author of the grassland system of farming V.R.Williams, while speaking on the perspectives of the selection of crops, asserted that "Only from the moment of the acquisition of soil stability and hence, of the supplying of water to a cultivated crop, is the wide field of activity open for the selection of crops, the limit of whose influence is still difficult to foresee."

Only the systematic putting into practice of the Dokuchaev-Williams system, can create the most satisfactory environment for the growth and development of plant cultures and possess a reliable background for the development of new high-yielding varieties.

According to the teaching of Academician V.R. Williams, soil and microclimatical environment qualitatively change basic forms under the influence of the activity of organisms (composites of perennial leguminous and herbaceous grasses, wood species and soil microorganisms. Thus, organisms,reacting to the soil and climate, change and under the influence of altered conditions of life vary their own nature.

Before selection-testing institutions was put the problem of systematically perfecting 1) methods and means of improving cultivated varieties adapted to the conditions of their zone, 2) measures of protecting them from deterioration and degeneration and, 3) means for mass production of hybrid seeds of corn, winter and summer wheats and buckwheats for the soils of collective and state farms.

These tasks can be successfully accomplished only on the basis of full utilization of the grassland system of farming. This will create the necessary environment, that is, the conditions of fertilization, which provide for the production of plant cultures highly productive for a given region.

State selection stations are gyided by the following resolution of the Soviet of Ministers of the USSR, "Regarding the plan of shelter belt

planting, installing the grassland crop-rotations and the construction of reservoirs and water tanks to provide large and stable harvests in the steppe and forest-steppe regions of the European part of USSR...." The stations have been at the same time obligated to develop and perfect means for fast and cheap afforestation and shelter belt plantings, while widely applying nest plantings and forest plantings.

In 1949, selection stations planted 670 hectares of shelter belts on their farms in the regions of the steppe and forest-steppe zone. Of this number, 380 hectares were planted according to the nest method. The following stations fulfilled the spring plan for forest planting better than other stations: Rostov (Director A.P. Bondarenko) planted shelter belts on an area of 59 hectares, 40 of which were by the nest method; Bezenchuk (Director V.I. Pozdnyakov) planted 50 hectares, 19 of which were by the nest method; Northern Donets (Director M.P. Kurin) 33 hectares, 10 by the nest method; Stavropol' (Director V.I. Balyura) 31 hectares, 15 by the nest method; White Russian (Director V.I. Tsivinskiy) 32 hectares, 24 by the nest method; Moscow (Director A.N. Tsevetkov) 34 hectares, 15 by the nest method etc. All of them substantially overfulfilled not only their spring but also their yearly plan for forest planting. The Stalingrad, Petrov, Kamelsk, Barnaul, Slavgorod and Moldav Stations also obtained good results.

The plan for spring plantings according to this system was 139% fulfilled by state selection stations. Altogether, more than 1000 hectares were planted, thus surpassing the yearly goal for forest planting. Of these 500 hectares, or 130% of the yearly plan were planted according to the nest method.

The wide application of the grassland system of farming creates unlimited possibilities for the progressive increase in harvest of farm crops. However a substantial increase in harvest is limited by the

fact that existing varieties of grain crops that is, winter and summer wheat, rye, barley, cannot fully utilize a high agrotechnical background, in view of the insufficient toughness of hay. In the time of an excess of food, these varieties usually go to waste which often results in a decrease in yield.

The problem is 1) to create varieties of field crops which are more valuable than existing varieties, 2) to utilize the conditions of the surrounding environment namely, a high agrotechnical background and fertile soils, and 3) to produce higher yields.

Consequently, it is necessary to create varieties with a considerably greater strength or greater ramose spikes than existing varieties, so that the increase in yield is not at the expense of solidifying the soil. Work has already been started in this direction at a number of selection stations. In 1948, 14 stations (Georgian, Moldav, Mironova and others) organized the work with ramose wheat, selected the best crops according to productivity and conducted hybridization with the best varieties of winter and summer wheats.

At the Georgian, Kirgiz and Moldav Stations, numerous high-yielding hybrid seedlings were developed. The seeds of the hybrids of the first generation of ramose wheat were sown on the fields of the Mironova, Krasnodarsk, Moscow and Moldav Stations, together with winter forms produced at the Gorki Lenin and Odessa Selection-Genetic Institute. The purpose of this was to create new, high-yielding, sturdy ramose varieties of wheat conforming to the natural conditions of these regions. In 1949, more than 20 stations were working on the adaptability of ramose types of wheat. The state selection stations of Kazakhstan use, in the capacity of the raw material, a new form of ramose wheat developed in the valley of the river Tokraun (Kounrodsk rayon, Karagandin oblast). This wheat has been in

existence there for many years under the local name of Bes-Bas-Biday which denotes "Five-year Wheat." This form of wheat, Turgidium, is distinguished by a large ramose spike whose kernel weighs up to 9 grams (compared with the usual of 0.5 - 1.5 grams).

In the work of developing high-yielding varieties of ramose winter wheat, particular attention will now be turned to the formation of the qualities of the winter resistance of hybrids. This is particularly important because hybrids have been produced from the crossing of summer ramose wheat with winter non-ramose wheat. This method of direct cultivation of the plant will be widely applied by the stations. Lysenko recommends that the hybrid seeds, produced in southern regions (e.g. the Ukraine), be cultivated under the conditions of Siberia, but later, by early spring, be transferred in their entirety to those conditions for which the seeds were developed. Thus, winter resistance will be formed in Siberia, while the yield capacity and other agriculturally valuable qualities will be under the influence of local natural conditions.

State selection stations are developing the means for mass production of hybrid seed of winter and summer wheat, corn, buckwheat and winter rye by a method of inter-variety cross-pollination, on the basis of the selective capacity of plants during fertilization. According to Lysenko, any process in the organism possesses a selectivity comparative to the assimilated external conditions. The process of fertilization is also no exception in this relation.

Selective fertilization (under free wind pollination) provides an increase in vitality and adaptability of both self-pollinated and cross-pollinated crops. In turn, it provides an increase in the yield capacity of those crops whose economically valuable qualities conform to the biologically useful properties of plants. On this basis, Lysenko proposed

the method of inter-variety cross-pollination by the free pollination of the best regionalized variety for a given locality with other regionalized varieties.

Experimental data of the Odessa Selection-Genetic Institute, the Mironova, Krasnodarsk and other state selection stations confirmed the tremendous biological importance of inter-variety crossing. For example, according to the data of the Mironova Station, the seeds of the first generation from the inter-variety crossing of winter wheat Ukrainka exceed by 15 - 20% the yield of the regular seeds of this variety. Particularly significant is the advantage of these seeds in the years of unfavorable meterological conditions.

Thus, in 1947, the tests conducted at Mironova were characterized by the bitter winter conditions. Results showed that the hybrid seeds of the second generation of Ukrainka which were produced from inter-variety crossing, exceeded the yield of the original variety by 6.2 centners per hectare.

The varity Erithrospermum 15 of the Verkhnyach Station compiled an excess of 3 centners per hectare, and the variety Lyutestsens 17 had an excess of 2.9 centners per hectares. The winter 1946-47 was unfavorable for winter crops and many others cultivated in the Ukraine. Crops suffered greatly from frost, while seeds produced from inter-variety crossing passed the winter considerably better and produced a higher yield.

According to the data of the Moscow Station, the seeds of a local strain of winter wheat, which had been restored by inter-variety cross-pollination, produced a harvest of 33.6 centners per hectare, whereas the original seeds of this strain produced only 20.8 centners per hectare.

At the Barnaul' Station, it was also noted that inter-variety

cross-pollination increases the winter-resestance and yield capacity of the regionalized strain of winter wheat Lyutestsens 329. Here the increase in harvest often reaches 38%, at the expense of a sharp increase in winter-resistance.

At the Kharkov Station, inter-variety hybrids of the winter wheat Gostianum 237 produced up to 24% increase in harvest in the second generation, while the variety Ukrainka's increase was up to 10%.

In 1948 the means of producing hybrid seeds were studied by 35 selection stations, which collected on the whole, 192.8 centners of hybrid seeds (of various generations). In addition, 2200 centners of parental forms of corn were cultivated for those sections organized into collective farms producing hybrid seeds. By the fall of 1948, a young crop was cultivated by means of hybrid seeds of winter wheat and rye; in all 96.2 centners were sown. In the following year, production of 3306 centners of hybrid seeds was planned on those 71 stations.

The problem is to convert to the large production of hybrid seeds of winter and summer wheat, rye, buckwheat, corn and other crops at all selection stations.

The work of Lysenko opened wide opportunities for the improvement of the species qualities of seeds. Changes in the conditions of the surrounding environment, in the early period of formation of the plants and their separate organs, provide the changing of the species in a way necessary for man. Work has been conducted at the Omsk Institute of Grain Cultivation on the restoration of the seeds of summer wheat, by means of winter stubble sowing. This permits the production of high-yielding seeds of summer wheat which is smut-resistant. In 1948 this work was conducted on stations which planted 48 hectares of summer wheat in the winter. In 1949 winter planting of summer wheat on areas of more than 220 hectares was proposed by stations in Siberia, Far East,

the Urals and the Southeast.

The seeds of winter wheat perish on the windy fields in the steppe regions of Siberia and North Kazakhstan due to the severe winter conditions. Because of this, the sowing of winter wheat until recently has not been effectuated in work conditions of a given zone. The method of sowing winter stubble wheat as suggested by Lysenko, solved the problem of good yearly wintering. The selection stations of this zone must develop agricultural techniques for stubble sowings of winter wheat applicable to local conditions. In 1948 experimental seeds of winter stubble wheat were cultivated over an area of 177 hectares by nine stations in Siberia. In 1949 stubble plantings were planned by all selection stations of the steppe zone of Siberia and North Kazakhstan.

Selection stations widely study all agrotechnical methods. At the selection stations in the alfalfa zone, reasons for the falling off of blossoms and buds of alfalfa are investigated thoroughly and measures are developed to combat them.

Summer sowings of alfalfa have been substantially expanded at a pair of stations in the south and southeast. 39 stations have been conducting this work. Particular attention is paid to the study and selection of the components of grass mixtures. Because this question has not been decided for a number of southern regions, it has greatly retarded the introduction of grass composite sowings of leguminous and herbaceous grasses on fields of collective farms.

Experimental work in this connection is being conducted at the Moldav, Nosovsk, Stalingrad, Barnaul', Rostov and several other selection stations. At 65 stations research analysis is to be conducted for the purpose of developing the system of grassland crop-rotations and the system of processing soils and fertilizers. These systems are to be applicable to the local soil and climate conditions. A number of selection stations are working out procedures and methods

for the fight against agricultural pests and are testing, in particular, new poisonous chemicals.

Much attention is devoted to questions of putting into practice the achievements of the Michurin agricultural science and the experiences of the foremost agricultural scientists. All stations assist two or three neighboring collective farms in utilizing the Dokuchaev-Williams system of farming.

State selection stations also assist in demonstrating new scientific methods to the superior seed-growing farms and regional farms. State selection farms are also obliged to create new varieties of farm crops which are most capable of utilizing the fertility of the soil and a high agricultural technical background. These are the prerequisites for solving these responsible tasks directed towards the ultimate elevation of collective farm production and the improvement of the workers' welfare.

Division of State Selection Stations
of the
Ministry of Farming of the USSR