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10 June 1981

USSR Report

LIFE SCIENCES

AGROTECHNOLOGY AND FOOD RESOURCES

(FOUO 1/81)

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ECOLOGICAL PROBLEMS

UDC 633.11"321":631.526.32:631.5

AGROTECHNICAL FEATURES OF OMSKAYA 9 SPRING WHEAT

Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 3, Mar 81 pp 27-28

[Article by Candidate of Agricultural Sciences V. M. Novikov]

[Text] The Omskaya 9 strain has a number of commercially valuable characteristics and properties: high grain yield and quality, drought resistance, and resistance to stem rust and lodging. However if we are to realize its potentials to the fullest, we would need to create particular conditions for the growth and development of the plants, with a consideration for their biological features and the zone in which they are grown.

The productivity of spring wheat in the south of West Siberia and in northern Kazakhstan depends in many ways on the sowing time and density.

In order to determine the best planting time and the seed sowing norm for the new strain in this zone, special research was conducted in 1974-1979 at the "Novoural'skoye" experimental production farm of the Siberian Scientific Research Institute of Agriculture.

The experimental plot contained common chernozem soil with a moderate supply of mobile phosphorus; the concentration of useable potassium was high.

The meteorological conditions varied in the period of plant vegetation. In 1974 there was a "Saratov"-type drought (about 30 percent of the total 127 mm of precipitation during the vegetation period fell in July-August); in 1975 the drought persisted throughout the entire vegetation period (total precipitation in that same period was 94.4 mm); the weather in 1976-1978 was typified by a shortage of moisture in the first half of vegetation (conditions typical of the south of West Siberia). In 1979, more precipitation fell during the entire vegetation period than in other years--187.3 mm, but it was distributed extremely irregularly: There was no rain at all from 9 July to 18 August (41 days).

Differences in the meteorological conditions in the years of the experiments permitted a sufficiently full evaluation of the new strain in comparison with the formerly regionalized Saratovskaya 29. In 1974-1975 the yields were not very high, and differences between the strains were insignificant. Between 1976 and 1979 Omskaya 9 demonstrated a clear advantage: In 1976 its yield was 24.1 c/ha, it was 27.9 c/ha in 1977, 28.3 c/ha in 1978, and 33.3 c/ha in 1979; the yields exceeded

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those of Saratovskaya 29 in corresponding years by 3.7, 3.7, 6.0, and 3.2 c/ha; the greatest difference--6.0 c/ha--fell in 1978, when the first half of the vegetation period was the driest.

The greater resistance of the new strain to drought in this period is associated to a certain extent with the rhythm of the plant's development: The period from sprouting to heading is 4 to 5 days longer for Omskaya 9 than for Saratovskaya 29, which is reflected in the total time of vegetation as well.

Omskaya 9 is a moderately late strain, and its vegetation time is the limiting factor in the choice of planting time in the south of West Siberia and in northern Kazakhstan. An analysis of the dependence of the length of the plant vegetation period on the planting period (lasting 10 days) with a consideration for significant differences in weather conditions in the different years of the experiment demonstrated significant variations in the length of the period from planting to sprouting, and in the interphasal period between sprouting and heading.

In 1977, which was distinguished as a hot year, seeds planted 12 May sprouted after 9 days, while in 1978, which was a cold year, sprouts appeared after 15 days; heading began after 42 and 47 days respectively.

The duration of the period from heading to waxy ripeness did not vary from one year to the next when early planting was involved, since maturation occurred at a rather high air temperature. The entire period of vegetation (from planting to maturation) varied from 95 to 107 days in different years.

Planting time had a great influence on the availability of heat (the required quantity of effective temperatures) to the plants and the duration of interphasal periods: With later planting, the period from planting to sprouting and the period from sprouting to heading were shorter in comparison with early planting. However the period from heading to grain maturation was longer with late planting. In 1978 it was 4 days longer in comparison with that of crops planted at the optimum time, and it was 8-9 days longer in comparison with the minimum length of this period. Vegetation proceeds for a longer period of time because maturation of wheat grain halts at a temperature of 15°C. Observations showed that on the average for 3 years in which planting occurred on 21-22 May, waxy ripeness of Omskaya 9 grain occurred at a sum of effective temperatures (following appearance of sprouts) of 1,147°C. With early planting, plants used 84°C more of heat, while with late planting (in late May and early June), despite the longer vegetation period, plants used less (an average of 109°C less). Maturation occurred at an insufficient quantity of effective temperatures, which retarded maturation and worsened grain quality. In years with early frost, Omskaya 9 grain planted late may not mature at all.

Consequently, influencing the intensity of crop growth processes and the swiftness of the organ formation stages, the aggregate of meteorological factors in the end predetermines the grain yield. It was experimentally established that with early planting (11-12 May), plant bushiness is insufficient, and the heads are small, with relatively fine grain; with the optimum planting time (21-22 May), bushiness is better, and every head produces more grain; with late planting (30 May to 2 June) the grain content of the heads rises, but productive bushiness and grain size decline (Table 1).

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Table 1. Omskaya 9 Yield Structure Depending on Planting Time and Seed Sowing Norm (1976-1978)

Planting Time	Seed Sowing Norm (million per hectare)		
	2	3	4
Productive Bushiness			
11-12 May	1.77	1.66	1.49
21-22 May	2.11	1.79	1.65
30 May-2 June	1.57	1.51	1.51
Number of Grains Per Head (Units)			
11-12 May	22.4	18.6	19.7
21-22 May	25.5	22.6	18.7
30 May-2 June	28.0	23.2	21.8
Weight of 1,000 Grains (gm)			
11-12 May	43.4	40.2	38.9
21-22 May	45.5	44.8	43.9
30 May-2 June	43.4	42.0	39.6

Table 2. Grain Yield of Omskaya 9 Wheat (c/ha) Planted on Fallow (Averages for 1976-1978)

Planting Time	Seed Planting Norms (Millions per ha)			Average for Planting Times ($HCP_{0.95}$-1.91)	Average for Preceding Fertilizations ($HCP_{0.95}$=1.56)
	2	3	4		
Without Fertilizer					
11-12 May	16.4	16.1	16.7	16.4	
21-22 May	20.7	24.0	25.7	23.5	22.1
30 May-2 June	25.6	25.7	27.6	26.3	
With Phosphorus Application, 60 kg/ha					
11-12 May	19.3	20.5	20.9	20.2	
21-22 May	26.1	28.9	28.7	27.9	26.4
30 May-2 June	29.2	30.6	33.8	31.2	

The grain yield depended more on planting time than on other factors (Table 2). With early planting it was low, and with optimum planting time it was higher.

The experiments permit the conclusion that it would be unsuitable to plant Omskaya 9 later than 22 May, since the grain would consequently exhibit poorer qualities.

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The data in Table 2 also indicate that application of phosphorus fertilizer to fallow has a positive influence as well: The yield increment averaged 4.3 c/ha. Moreover it was more significant with late planting and with a higher seed sowing norm--6.2 c/ha. Phosphorus application produced a lesser impact with early planting and a lower sowing norm (the yield increment was 2.9 c/ha).

Three million seeds per hectare should be adopted as the optimum seed sowing norm for the new strain, when it is planted on 21-22 May. This norm should be increased only in years when the hydrothermal conditions promote longer vegetation, and when planting is late, in which case bushiness may decrease due to overheating of the soil in this period.

A comparison of responses to preceding crops and fertilization demonstrated the new strain's significant superiority over Saratovskaya 29 when planted 21-22 May at a dose of 3 million seeds per hectare. When planted on fallow, it also revealed a greater resistance to lodging. Also important is the fact that Omskaya 9 yields are persistently greater than those of Saratovskaya 29, when planted as the third crop after fallow. While the advantage with fertilized fallow is 4.2 c/ha, it is 3.5 c/ha for unfertilized stubble fields.

Thus the new strain of soft spring wheat, Omskaya 9, is significantly superior in yield to Saratovskaya 29 in years with hydrothermal conditions typical of the zone for which it is regionalized. The optimum planting time is the beginning of the last third of May, and the seed sowing norm is 3 million seeds per hectare. Increasing the latter to 4 million seeds per hectare would be suitable only when planting is delayed to the end of May and when phosphorus fertilizer is applied to fallow. When planting occurs in late May through early June, the temperature conditions experienced by the maturing grain worsen, which increases the time of plant vegetation. The new strain permits the fullest utilization of sophisticated agrotechnical procedures, which permits its classification as an intensive strain.

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FOOD PACKAGING

UDC: 664.933.036.52

HYGIENIC PROBLEMS REFERABLE TO MANUFACTURE OF PASTEURIZED CANNED FOODS AND MEANS OF SOLVING THEM

Krasnodar IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PISHCHEVAYA TEKHNOLOGIYA in Russian No 1 (140), Jan-Feb 81 pp 21-22

[Article by Yu. G. Kostenko, S. Ya. Lyubashenko, P. P. Stepanenko and T. S. Shagova, Department of Veterinary Sanitary Expert Certification and Microbiology, Moscow Technological Institute of the Meat and Dairy Industry, submitted 6 Nov 80]

[Text] The scientists of the Moscow Technological Institute of the Meat and Dairy Industry have conducted in-depth studies on hygiene of production. They investigated a set of issues involved in sanitary engineering aspects of design and construction of new enterprises, specifications for raw material and ingredients, cans, etc. All these studies are aimed at improving hygienic conditions and reducing the possibility of penetration of microflora in products when they are prepared.

The design of a plant for pasteurized canning differs from plants that produce canned goods that are sterilized in the ordinary way. There, the optimum approach is to construct a separate plant building with a separate service ["bytovoy"?] unit.

In a specialized facility for pasteurized canned foods, the passageway for delivery of meat from the refrigerator or receiving and unloading platform, raw material accumulator, section for stripping and trimming meat, aging, preparing brine [marinades], packaging raw material, storing and processing ingredients, containers and stock, heat-treatment of cans, rapid cooling after pasteurization, packing and storing the end product are separated from one another. This minimizes penetration of microorganisms into production rooms and reduces the expense of maintaining a specific microclimate in the different departments and sections of the cannery. There are increased hygienic requirements with regard to arrangement of rooms, shops and sections. For example, the walls are tiled over their entire height and the ceilings are painted with light-colored oil paint.

Forced ventilation units must be equipped with special filters for purifying the air, using type D-33 kl filters which reduce by up to 170 times the amount of microorganisms in the air delivered into a room. However, such treatment of forced air cannot assure the proper sanitary parameters in plant rooms during work of the personnel, since microflora penetrates through doorways, with the clothing of workers, raw material, etc. Treatment with ultraviolet rays (BUV type lamp), at the rate of 1 W/m^3 for 1 h, reduces microorganisms in air by 65%.

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Bactericidal lamps are turned out when workers are absent, before the start of the work period and during the lunch break.

Special hygienic conditions are required for preparing raw material for pasteurized canned ham, while handling pork and during subsequent technological operations in the canning shop. The main objective here is to prevent contamination of raw material by microflora and lower the microorganism content on the surface of the meat. Pigs are slaughtered in separate batches or on a separate shift. After exsanguinating the animals, it is mandatory to clean the skin of the carcasses in a mechanized unit with warm water (25-35°C), using brush or beater devices. This reduces bacterial contamination of the surface of carcasses by more than 70 times. To prepare pasteurized canned goods, it is best to use as raw material pork with the skin left on, since the integument prevents penetration of microflora into the deep layers of meat. When processing the carcasses in the slaughtering-dressing [cutting] shop, it is imperative to use advanced technology, for example, continuous action units for scalding the carcasses in vertical position and, before refrigeration, to treat the cut meat with hot air at 120°C for 2-2.5 min, or place the surface of the sides over the flame of a gas burner. There are higher requirements for organizing work places, with mandatory piping of hot and cold water to them.

Such hygienic requirements for shops where animals are processed result in production of pork with high sanitary parameters: no more than 10,000 microorganisms per cm^2 meat surface.

At modern canneries, prior to stripping in the raw material department, the sides [cuts] of meat are submitted to sanitary treatment in specialized units--"meat surface sterilizers." Testing of operating modes for this device (treatment with a steam and air mixture for 50 s at 80°C, live steam, hot air for 1.5-2 min at 120°C) revealed that the best effect is achieved with hot air. This reduces by 1.5-2 times the amounts of microorganisms on the surface of the meat sides.

Ingredients (brine, gelatin) may have a strong effect on sanitary parameters of the end product.

Brine that is injected must be sterile. Boiling or treatment in reactors for 25±5 min at 120±2°C are simple and available methods of sterilization. However, these methods are extremely labor-consuming, and one can use with success ultrafiltration or Zeiss filters, which results in a savings of up to 26 rubles for sterilization per ton brine.

Three-fold heat treatment with dry air for 6-7 h at 80°C yields a good efect with regard to lowering the initial microorganism content of gelatin, and this kills many species of microbes.

The optimum mode of sanitary treatment of tins is to deliver hot water (80°C) for 11 s, then live steam for at least 4 s directly to the inside of the cans, with placement thereof upside down.

Use of hot air at 160°C for 30 min elicits a good effect for treatment of lids after drying paste. In order to demonstrate the possible adverse effect of

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sterilization of lids on the quality of paste, 25 tests of airtight sealing were conducted with the use of ether by the conventional method. As shown by the results, all of the tins had an airtight seal after being crimped [rolled?].

Thus, a systems approach must be used in the production of pasteurized canned foods in order to create the appropriate hygienic conditions at all stages of production. Use of the approaches discussed made it possible to develop a new technology in our country with a high economic effect.

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UDC: 664.8(47+57)"1980+1981"

PRODUCTION OF VEGETABLES, FRUIT AND PRODUCTS DERIVED FROM THEM TO BE INCREASED IN 1981

Moscow KONSERVNAYA I OVOSHCHESUSHIL'NAYA PROMYSHLENNOST' in Russian No 3, Mar 81 pp 2-3

[Article]

[Text] Having deployed on a broad scale the socialist competition in honor of the 26th Party Congress, the workers of enterprises in the canning, vegetable-dehydrating and food concentrating industry of the USSR Ministry of the Food Industry, fulfilled the production plan by 102.7% in 1980. The plan for output was overfulfilled by 49.8 million rubles. Enterprises of the canning industry fulfilled the output [sales] plan in all of the republics, with the exception of Azplodoovoshchprom [Azerbaijan Fruit and Vegetable Industry].

A total of 7708 million standard cans of fruit and vegetables have been produced.

As compared to 1975, labor productivity increased by 5.6% under the 10th Five-Year Plan.

Annual mean output of canned goods (as compared to the 9th Five-Year Plan) increased by 967 million standard cans, or 14%.

Production of canned beets, cabbage, green tomatoes and pumpkin, as well as canned vegetables with fish, was organized in order to augment the volume of output.

Last year, 307 million standard cans of "Green peas" (versus 178 million in 1979), 250 million standard cans of "Grape juice" (235 million in 1979), 263,000 tons of food concentrates, 22,000 tons of dry infant food and 14,300 tons of potato products were produced.

The workers of enterprises under the ministries of the food industry of Belorussian SSR (101%), Georgian SSR (100%), Latvian SSR (102%), Kirghiz SSR (103%), Estonian SSR (100.5%), Azplodoovoshchprom (100.4%), Glavplodvinprom [Main Administration for the Fruit and Wine Industry] of Ukrainian SSR (110%) and Goskomvinprom [State Committee for the Wine Industry] of the RSFSR (102%) have fulfilled the canned food production plan.

In 1980, canned goods output increased by 488 million standard tins, of which 295 million are referable to new construction and remodeling and 193 million resulting from introduction of administrative and engineering measures.

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The second sections have been started up in the canneries of Kamenka, Khmel'nitskaya Oblast (production capacity 20 million standard tins) and in Orgeyev, (Moldavian SSR (15.5 million standard tins). The production capacity of the Kutais Cannery has been increased by 19 million standard cans, that of the Gardabani Cannery (Georgian SSR) by 20 million, Kamenskiy Cannery (Moldavian SSR) by 66.1 million standard tins, etc.

A total of 28 self-contained technological lines have been installed at the canning enterprises for processing "Green peas," tomato paste, fruit juices, canned cucumbers and lines for producing metal containers.

AS-550 tomato paste production lines have been started up at the Kharabalinskiy, Adyge "Order of Red Banner of Labor," Samarkand "Hammer and Sickle," Namangan and Gazalkent canneries; lines for processing canned cucumbers, with output capacity of 3 tons/h, have been started up at the Shakhrisyabz, Andizhan, Samarkand "Hammer and Sickle," Nal'chik and other plants.

In accordance with the tasks put to workers under the 10th Five-Year Plan, there was virtual renewal of the assortment of canned foods for children. As compared to 1975, production thereof increased by 2.3 times and reached 428 million standard tins in 1980. The variety has been broadened, the quality and packaging of prepared foods, as well as sanitary engineering, have been improved.

The CC CPSU, USSR Council of Ministers, AUCCTU and CC [central committee] of the Komsomol named the workers of the Pendzhikent Association (Tajik SSR) as victors of the All-Union socialist competition to improve the effectiveness of production and quality of work, as well as successful fulfillment of the state plan for economic and social development in 1980, and they were awarded the challenge Red Banner of the CC CPSU, USSR Council of Ministers, AUCCTU and Komsomol CC.

As a result of the All-Union socialist competition in the fourth quarter of 1980, the challenge Red Banner of the USSR Ministry of the Food Industry and CC of the trade-union of food industry workers was awarded to the best enterprises: Dnepropetrovsk Food Concentrate Combine, Belokany Cannery, Geokchay Agrarian-Industrial Association, Bendery Cannery imeni M. I. Kalinin and the Gazalkent Cannery.

The third prize was awarded to the workers of the Biryul'skiy Experimental Plant.

At the same time, because of the inclement weather in some parts of our country and inadequate organization of procurement, there was a shortfall of 1,166,000 tons of fruit and vegetables planned to be delivered for processing and a 1,442 million shortfall of standard canned goods.

The situation was particularly bad with procurement and fulfillment of the production plan at enterprises under the ministries of the food industry of RSFSR, Ukrainian SSR, Tajik SSR, Moldplodoovoshchprom [Moldavian Fruit and Vegetable Industry] and Uzplodoovoshchvinprom [Uzbek Fruit, Vegetable and Wine Industry].

Guided by the decree adopted by the July (1978) plenum of the CC CPSU concerning organization of cost-accounting associations for the production and processing of potatoes and vegetables, and the instructions of L. I. Brezhnev at the October

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(1980) plenum of the CC CPSU concerning the food program and upgrading the system of production management and processing of agricultural products, the CC CPSU and USSR Council of Ministers deemed it necessary to form a Union-Republic USSR Ministry of the Fruit and Vegetable Industry.

The main tasks for the Ministry of the Fruit and Vegetable Industry were defined as follows:

To meet the needs of the public with regard to fruit and vegetables, grapes and potatoes in fresh and processed form.

To implement production of vegetables (particularly those that are not in wide use and green ones), fruit, berries, table grape varieties, spring potatoes, cucurbits and other agricultural products in specialized sovkhozes and other agricultural enterprises under its jurisdiction.

To implement standardized technical policies in the country with regard to production, procurement, processing, storage and sale of fruit vegetables, table grapes and potatoes.

To implement raising high-grade planting material and seeds of varieties of vegetables, cucurbits, fruit, berries, subtropical, floral and ornamental plants and grapes, high-grade potato seeds assigned to specific regions, in order to meet the demands of kolkhozes, sovkhozes, other agricultural enterprises and the public, as well as for export.

To organize and implement state purchases of vegetables, cucurbits, fruit, berries, grapes and potatoes at kolkhozes, sovkhozes and other State agricultural enterprises by contract agreements.

To develop and approve plans for distribution of vegetables, cucurbits, fruit, berries, grapes and potatoes delivered to the general Union fund and received through import; to deliver fruit and vegetables, grapes and potatoes to the general Union fund, as well as to implement supervision of fulfillment of plans for forming and using the general Union fund, attachment of supplies and consumers, and ongoing [operational] shunting of resources of these products.

To process vegetables, cucurbits, fruit, berries, grapes and potatoes at subordinate canning and other processing enterprises.

To store procured and processed fruit and vegetables, grapes and potatoes, and organize containerized transportation and packaging of these products.

To implement wholesale and retail trade through a specialized trade network for fruit and vegetable products, grapes and potatoes, and delivery of these products to enterprises of State and cooperative trade and public catering, administrations of working supply [worker provisions?] of ministries and agencies, children's, therapeutic institutions, and other consumers, as well as organization of interrepublic and interoblast transportation of fruit and vegetables, grapes and potatoes.

In 1981, the enterprises must produce 9300 million standard tins of fruit and vegetables (1592 million, or 20.6%, more than in 1980), 293,000 tons of food

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concentrates, 96,900 tons of food products made from corn and other types of grain, 20,000 tons of potato products, 23,600 tons of dry foods for children, 20,800 tons of quick-frozen products, 17,900 tons of dehydrated [or dry] vegetables and potatoes.

The output of "Tomato juice" will increase by 170 million standard tins, stewed fruit production will increase by 150 million, "Green peas" by 43 million and fruit juices by 200 million standard cans.

To provide for the planned volume of output of commercial products, it is imperative to procure 4,100,000 tons of vegetables, 3,000,000 tons of which should be tomatoes, 1,586,000 tons of fruit, 160,000 tons of grapes and 360,000 tons of potatoes.

It is planned to start up new facilities with production capacity of 330 million standard tins of products, of which 163 million standard tins will be obtained as a result of introduction of management and engineering measures.

As a result of expansion and remodeling, there will be an increase in output capacity of the canneries in Ostrogozhsk (by 17 million standard cans), Astrakhan' (by 23 million), Fergana (by 11 million), Glodyany (by 15 million) and Tartu (by 7 million standard tins).

In the new season for processing raw material, all the new construction projects, which have been operating for a long time at 35-50% capacity, will have to be run at full capacity.

There are plans to install more than 40 automatic and mechanized self-containing lines at enterprises of this industry.

As they prepared for the 26th CPSU Congress, the workers of enterprises and sovkhozes found new reserves for augmenting harvests and output, improving the quality of products, and took on the obligation of increasing production and procurement of vegetables, fruit and grapes in the first year of the 11th Five-Year Plan.

It is imperative to deploy, on an even broader scale, active work aimed at increasing in all ways the effectiveness of national production and quality of work, accelerating growth of labor productivity, economical consumption and optimum use of fuel, metal, raw material and materials, maximum utilization of all available resources so that there is stable operation of enterprises in the first year of the new five-year plan, on the basis of strict adherence to State and labor discipline, and increasing the responsibility of personnel for the job entrusted to them, as well as to fulfill and overfulfill the tasks as spelled out in the plan.

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FOOD PRODUCTION

THE FOOD PROGRAM--AN ELEMENT OF THE ECONOMIC POLICY OF THE CPSU

Krasnodar IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PISHCHEVAYA TEKHNOLOGIYA in Russian No 1 (140), Jan-Feb 81 pp 7-9

[Article by G. V. Kruzhkov, G. K. Dolunts and V. V. Mel'sitov, All-Union Correspondence Institute of the Food Industry, Krasnodar "Order of Red Banner of Labor" Polytechnical Institute]

[Text] In an atmosphere of high political and labor enthusiasm, the Communist Party and Soviet people confidently welcomed the next, 26th, CPSU Congress. Speaking at the June (1980) plenum of the CC of the party, comrade L. I. Brezhnev, general secretary of the CC CPSU and chairman of the presidium of the USSR Supreme Soviet, stated: "Every congress has opened up new horizons to our party and country. I am confident that the forthcoming congress will do the same, and it is called upon to define the strategy and tactics at the present stage of building of communism."

The draft of the "Main Directions of Economic and Social Development of the USSR in 1981-1985 and the period up to 1990," which was comprehensively discussed and enthusiastically approved, is of enormous theoretical and practical significance to the party and people. It sums up the development of our homeland under the 10th Five-Year Plan, generalizes the rich experience of building of communism in the USSR, describes the strategy and tactics of economic, social and spiritual development of our country with due consideration of the specific conditions of the 1980's.

Every section, every line of the Draft of the CC CPSU for the 26th Party Congress offer vivid evidence of the vast creative potential under fully developed socialism, that the supreme goal of the economic strategy of our party was and still is the concern about consistently raising the material and cultural standard of living for the people, developing optimum conditions for comprehensive development of the personality.

L. I. Brezhnev stressed at the October (1980) plenum of the CC CPSU that: "... the party has placed growth of the people's standard of living in the center of practical work in the field of economics."

As compared to the Ninth Five-Year Plan, national income rose by 400 billion rubles, the national product increased by 717 billion rubles and agricultural production increased by 50 billion rubles under the 10th Five-Year Plan. Production of consumer goods increased by 21%; the assortment of goods has increased

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and their quality improved. The material and technical base of agriculture has strengthened. More than 170 billion rubles, or more than 27% of the total capital investments in the national economy, have been allocated to agriculture. The mean annual gross grain harvest exceeded 200 million tons for the first time in this 5-year period. There was an increase in production of cotton, eggs, meat, milk and other products.

Four-fifths of the national income were used directly for consumer goods, housing and sociocultural construction. The real income per capita increased by 17%. Mean wages of blue and white collar workers increased by over 1[illegible]% and the income of kolkhoz workers in the public sector increased by 26%. Payments and benefits disbursed from the public consumption fund increased to 438 rubles per capita in 1980, versus 354 rubles in 1975. Retail trade turnover increased by 24% and services increased by 43%. Housing conditions have been improved for over 50 million people. In the years of the 10th Five-Year Plan, 12.5 million graduates of vocational and technical schools and 10 million specialists who graduated from VUZ's and tekhnikums of our country have come into the mainstream of the national economy.

Under the 11th Five-Year Plan, it is planned to further raise the material and cultural standard of living and create optimum conditions for comprehensive development of the individual [or personality]. According to the draft of the "Main Directions," the national income will increase by 18-20% in the next 5 years, and real income per capita will increase by 16-18%. This will be implemented by raising the average monthly wages of blue and white collar workers from 168.5 to 190-195 rubles and that of kolkhoz workers in the public sector by 20-22%. The objective has been set of satisfying better the public's purchasing demands for various goods and services. The retail trade turnover in State and cooperative trade will increase by 22-25% in these 5 years.

The party's concern for the welfare of the people is also manifested by the fact that there are plans for accelerated increase in industrial production referable to group "B" sectors, as compared to group "A" sectors.

The agroindustrial complex, which covers agriculture and aggregate of sectors of the national economy that are involved in procurement, transportation, storage, processing and sale of its products, delivery of agricultural equipment, mixed feed, mineral fertilizers, other chemical and microbiological products, as well as rural and irrigation [or reclamation, ameliorative] construction, hold a special place with regard to raising the material and cultural standard of living. In the draft of the CC CPSU for the 26th Party Congress, there is formulation, for the first time, of the task of developing and implementing a unified food program: "There is to be implementation of unified planning, proportionate and balanced development of sectors of the agroindustrial complex, considerable strengthening of its material and technical base, improved ties between sectors, organization of proper interaction to build up agricultural production, improve its quality, transportation, processing and delivery to the consumer, for the purpose of successful fulfillment of the food program."

Development of interfarm cooperation and agroindustrial integration is manifested in various organizational forms. According to the data of the Central Statistical Administration of the USSR, as of the start of 1981 there were about 10,000 interfarm enterprises and organizations, over 500 agroindustrial production and

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agricultural associations.* There is ever increasing development of sovkhoz-plants, production-agrarian and agrarian-industrial associations that raise and process grapes, fruit, vegetables, essential oil and other crops. While associations of different types involved in production, procurement, storage, processing and sale of agricultural products operated only within the confines of Union republics until recently, at the present time, the USSR Union-Republic Ministry of the Fruit and Vegetable Industry was established, and it is a superior organizational form of agroindustrial integration.

There is intensification of specialization and concentration of production and introduction of industrial methods in agriculture, in the first place, and better utilization of material and labor resources, increased share of industrial labor in production of the end product, in the second place, and, such a major problem as raising the level of socialization of kolkhoz production, approximation of the two forms of socialist property, gradual elimination of the significant differences between urban and rural areas, in the third place, on the basis of interfarm cooperation and agroindustrial integration.

The food industry plays an important part in preserving and improving the effectiveness of using raw material resources, as well as improving the selection and quality of foodstuffs, and this refers particularly to the sectors dealing with primary processing of agricultural raw material. Under the 11th Five-Year Plan, there are plans to augment the output of the food industry by 23-26%.

This task will be performed as a result of continued development of agriculture, which will show a 12-14% increase in mean annual yield over the 5-year period, and grain harvest will reach 238-243 million tons per year.

Special attention is being given to increasing the output of products that are notable not only for nutritional and gustatory qualities, but ready for consumption. There will be rapid development of production of foods ready for consumption, convenience foods [or intermediate products], culinary products, products made of potatoes, fresh-frozen fruit and vegetables. There will be rapid increase in production of dietetic and children's foods. The growth in production of items ready for immediate consumption will increase the output of the food industry, reduce labor in the area of public catering and home cooking, save time for the buyers and thereby aid in optimum use of nonworking time for rest and comprehensive development of the individual.

It is particularly important to the food industry to develop complex processing methods and improve the use of raw material resources. This will assure an increase in output and more effective production, a decrease in food waste and environmental pollution, especially in cities and densely populated regions. Complex processing of raw material and utilization of waste are practiced widely at enterprises referable to the sugar, alcohol, wine-making, oil and fat, meat, dairy and other sectors. In the flour-milling industry and, first of all, at enterprises equipped with self-contained highly productive technological equipment, it is planned to augment high-grade flour production by about 24-27% by 1985, in accordance with the demand. The production of potato products, which is developing in our country, will open up new opportunities for optimum use of raw material resources. Just how great its importance to supply is, particularly for the northern regions

*PRAVDA, 24 Jan 81, p 2.

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of our country, can be seen from the following data: Less than 1 kg per capita potatoe products are manufactured in the USSR, whereas in the United States the figure is 25 kg where potatoes are consumed to a lesser extent.

The set targets of increasing labor productivity by 21-23% in the food industry, by 27-29% in the meat and dairy industries are also aimed at intensification of production. Consequently, the increase in production under the next five-year plan will be achieved with minimal involvement of additional manpower.

Considerable capital investments have been allocated for implementation of the food program. When distributing funds in different sectors of the food industry and different regions of our country, one must bear in mind the objectives of economic development beyond the 11th Five-Year Plan as well. Thus, in view of the low population density and high cost of moving manpower, the construction of food enterprises should be limited in the areas of economic development of Siberia and the North. In European USSR, one should increase production capacity mainly by means of remodeling and enlarging existing enterprises. Allocation of capital investments in the food industry is called upon to improve the geographic disposition and forms of public organization of production, to accelerate scientific and technological progress.

Development of science and technology will be governed, to an even greater extent, by the most important problems of continued progress of Soviet society, faster change of the economy to the road of intensive development.

Scientific and experimental design projects for sectors of the food industry are called upon to accomplish the following:

Consistently improve the quality, broaden the production of foodstuffs enriched with protein, vitamins and other beneficial ingredients.

Implement complex mechanization and automation of production processes, raise the unit capacity of equipment.

Introduce continuous systems and intensive modes of production, which would result in reducing the time thereof and loss of raw material.

Increase complexity of processing and optimum use of raw material, create waste-free production.

Expand the use of artificial cold for processing and storage of agricultural products, in particular, techniques for fast-freezing at low temperature with the use of nitrogen and other liquefied gases.

Increase bulk and containerized transportation of raw material and products.

Augment output of packaged merchandise, primarily in modern types of tin, polymer, film and cardboard containers.

To increase the effectiveness of research, it is imperative to reduce drastically the time it takes to adopt innovations in industry, intensify the tie-in of basic and applied research with the needs of sectors of the national economy,

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coordinate and use better the potential of scientific institutions and VUZ's of our country, generate effective interest in enterprises and production associations in utilizing the advances of science and technology.

To fulfill the tasks outlined under the 11th Five-Year Plan, there must be further improvement of management and political work, greater demands must be made of personnel, they should also be made more responsible, display initiative and a business-like attitude. The Soviet people, who approve heartily of the domestic and foreign policy of the CPSU, are fulfilling the scientifically substantiated program of the party, which turns another bright page in the building of a classless communist society.

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CHEMICAL AND TECHNOLOGICAL DESCRIPTION OF CITRUS FRUIT AND OLIVES OF AFGHANISTAN

Moscow KONSERVNAYA I OVOSHCHESUSHIL'NAYA PROMYSHLENNOST' in Russian No 3, Mar 81 pp 18-19

[Article by S. I.Kozenko, candidate of engineering sciences, and M. Z. Pokrovskaya, senior scientist, All-Union Scientific Research Institute of the Canning Industry and SPT (expansion unknown)]

[Text] The Dzhalalabad irrigation complex has been started up in Afghanistan, and the Soviet Union assisted in its construction. Thanks to the erection of this intricate complex it became possible to irrigate almost 25,000 ha [hectares] of virgin land and 62,000 ha of land referable to old irigation.

Large, mechanized state agricultural farms were created in this territory, and their main specialty is suptropical plant growing, in particular, commercial growing of citrus fruit and olives.

Olives are a new crop for Afghanistan, and previously they had been grown only in privately-owned orchards.

Olive seedlings were obtained from Azerbaijan SSR, Turkmen SSR, Egypt and Turkey. At the present time several thousand trees are already bearing fruit.

We made a chemical and technological evaluation of the citrus fruit and olives.

First, we sent to Afghanistan the method for selecting average specimens from citrus and olive trees, so that the specimens that were sent would represent objectively enough the variety to be studied.

The varietal specimens were collected from trees at the optimum time, at the period of large-scale harvesting on 1-4 December, and then they were flown to Moscow.

We tested Kenou tangerines, Jaffa oranges and the following varieties of olives: Azerbaijan Zeytun (universal cultivar, two stages of ripeness--green and black); Azerbaijan large (universal variety, at the biological stage of maturity--black) and Chemlyali (Arabian small olive grown for its oil, brown at the biological stage of ripeness).

The results of analyzing tangerines and oranges raised in Afghanistan and Georgian SSR (Table 1) revealed that the Afghanistan tangerines are somewhat larger than

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the Georgian ones and contain about 2% seeds, whereas there are usually none in Georgian tangerines. The Afghanistan tangerines are very similar to Georgian ones with regard to rind and pulp content.

The oranges from Afghanistan are of the same size as Georgian ones, but their skin is thicker.

Table 2 lists the results of technical analysis of olives raised in Afghanistan and Azerbaijan.

Table 1.

Location	Variety	Maximum fruit diameter, mm	Average fruit wt., g	%		
				pulp	rind	seed
		Tangerines				
Afghanistan	Kenou	62.0	128.6	74.1	24.2	1.7
Georgian SSR	Unshiu	60.0	90.0	75.0	25.0	None
		Oranges				
Afghanistan	Jaffa	71.4	167.5	70.0	29.7	0.3
Georgian SSR	Local	71.0	185.0	76.0	24.0	None

Table 2.

Variety	Ripeness stage, color	Location	Fruit diameter, mm		Mean wt. g	%	
			minimum	maximum		pulp	pits
Azerbaijan	Commercial, green	Afghanistan	1.4	2.1	3.2	79.4	20.6
Zeytun	Biological, black	Afghanistan	1.8	2.4	5.4	84.9	15.1
	Same	Azerbaijan	2.2	2.7	6.7	89.0	11.0
Azerbaijan large	"	Afghanistan	1.9	2.3	5.5	86.9	13.1
Chemlyali	Biological, brown	Afghanistan	0.95	1.4	0.8	67.0	33.0

As the olives mature from the commercial to biological stages of ripeness, they increase in size, as can be seen on the example of the Azerbaijan Zeytun variety. Their weight increases due to increase in mass of pulp. This is associated with a relative decrease in pit content.

Olives of the same variety raised in Azerbaijan SSR are somewhat larger than the Afghan ones.

Table 3 lists the results of chemical analysis of tangerines and oranges raised in Afghanistan and Georgia. There are some insignificant differences. The ascorbic acid content of citrus fruit raised in Afghanistan is somewhat lower.

Table 4 lists the results of chemical analysis of olives raised in Afghanistan.

An experimental batch of juice was prepared from Afghan tangerines and oranges, and the physicochemical parameters thereof are listed in Table 5.

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Table 3.

Material analyzed	Levels in raw material: dry substances	sugars, %: reducing	sugars, %: saccharose	sugars, %: total	acidity, by citric acid,%	pectins %	carotenoids mg/100 g	ascorbic acid mg/100 g
	Kenou tangerines, Afghanistan							
Pulp	12.6	3.4	4.0	7.4	1.2	0.34	0.52	15
Rind	26.3	7.1	1.3	8.4	0.3	3.60	0.58	Not assayed
	Unshiu tangerines, Georgia							
Pulp	12.8	2.5	4.9	7.4	1.0	0.65	0.43	38
Rind	25.3	6.6	1.3	7.9	0.2	3.87	0.43	131
	Jaffa oranges, Afghanistan							
Pulp	10.8	3.3	2.9	6.2	0.8	0.61	0.50	44
Rind	25.5	6.7	1.3	8.0	0.1	2.24	0.51	Not assayed
	Local oranges, Georgia							
Pulp	11.9	2.7	3.6	6.3	1.4	0.93	0.10	65
Rind	24.0	6.7	1.2	8.0	0.2	4.74	0.22	170

Table 4.

Olive variety	Ripeness stage, color	Levels in olives, %: dry subst.	sugars: reducing	sugars: saccharose	sugars: total	pectins: soluble	pectins: protopectin	pectins: total	ash	cellulose	fats	total N subst.	ph
Azerbaijan	Commercial, green	37.2	3.0	0.5	3.5	0.4	0.9	1.3	2.2	0.8	NA*	1.20	5.65
Zeytun	Biological, black	37.2	3.8	0.4	4.2	0.4	1.0	1.4	2.2	1.4	21.0	0.9	5.37
Azerbaijan, large	Same	32.4	3.4	0.5	3.9	0.3	0.5	0.8	1.6	1.1	21.5	1.0	5.30
Chemlyali	"	31.4	1.5	0.2	1.6	0.4	0.7	1.1	1.7	1.0	18.3	1.5	5.50

*NA--not assayed.

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Table 5.

Juice	Juice yield, % of initial raw material	Levels in juice			Density, kg/m^3
		dry subst., refractometry, %	ascorbic acid, mg/100 g	carotenoids	
Tangerine	53.0	12.7	8.8	0.4	1.053 10^{-3}
Orange	51.6	10.0	19.3	0.3	1.041 10^{-3}

The results of these studies warrant the belief that it is desirable to expand growing of citrus fruit and olives in Afghanistan, since they have good chemical and technological parameters.

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FOOD STORAGE PROBLEMS

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POLYMERS FOR GAS-SELECTIVE DEVICES USED IN STORING FOODSTUFFS

Krasnodar IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: PISHCHEVAYA TEKHNOLOGIYA in Russian No 1 (140), Jan-Feb 81 pp 60-63

[Article by V. Ye. Gul', S. V. Genel', V. P. Antropova and Ye. K. Balavintseva, Department of Chemistry and Technology of Polymers, Moscow Technological Institute of the Meat and Dairy Industry, submitted 6 Nov 80]

[Text] The last few years have been characterized by development and use in different sectors of the national economy of polymer film material, which has selective permeability for gases. Use thereof makes it possible to control processes where it is necessary to separate gas mixtures. In the food industry and agriculture, such processes could refer to storage of biologically active foods, including fruit and vegetables, aging of cheeses, meat, etc.

Most effective is storage in a modified gas environment, based on prolonging storage time for fresh agricultural products by slowing down biochemical processes occurring with respiration, in an environment with high carbon dioxide and nitrogen levels and low oxygen level.

It is possible to create a modified gas atmosphere for storage of fruit and vegetables in polymer film with specified gas, vapor and water permeability by means of natural accumulation of carbon dioxide and decline of oxygen content as a result of respiration of fruit and vegetables. Picked fruit and vegetables retain their vital functions, taking up oxygen and discharging carbon dioxide, fluid, heat and volatile organic substances. This physiological process of respiration is described in a simplified manner by the following equation:

$$C_6H_{12}O + 6\ O_2 = 6\ CO_2 + 6\ H_2O + 674\ \text{kcal}$$

However, the respiration process occurs in this manner only if there is free access of oxygen and oxidation proceeds to the end products. In the case of storage in a container with little permeability for air, access of oxygen to the product is more difficult, and oxidation may not go on to the end, and this leads to visible signs of physiological metabolic disorders. Consequently, one of the main prerequisites for polymer film used to store fresh agricultural products is absolute permeability to gases.

However, excessively high permeability to gases renders the film unsuitable for packaging fruit, because one cannot create in such film an atmosphere with high CO_2 content and low O_2 content. In film with low permeability for gases,

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the free oxygen in the package is used up for respiration within a short time, while the concentration of CO_2 could rise to levels that are dangerous to fruit and vegetables (over 6-10%). For this reason, such film is also unsuitable for packaging fruit and vegetables.

Development of a modified gas atmosphere by means of selectively permeable SPPM film merits special attention, since the use of this method of storage does not require construction of expensive, airtight warehouses or remodeling of refrigeration chambers. The method can be well-used in uncooled storage places (warehouses, cellars) also. The additional expense for polymer materials is not great, and it is entirely justified by the significant improvement of fruit and vegetables and diminished natural reduction of weight and loss. Use of this method makes it possible to allow the harvest to be stored in a modified gas atmosphere right at the site where it is grown and gathered.

The work of the Laboratory of Polymer Problems dealing with long-term storage of fruit, vegetables, potatoes and other products in a modified atmosphere, was conducted on a complex basis for a number of years, governed by the theoretical and applied research conducted jointly with the Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, the "Plastic" NPO [Scientific Production Association] of the Ministry of the Chemical Industry, TsELKhIM [Central Electrochemical Laboratory?] of the USSR Ministry of Agriculture, Kiev Economic Trade Institute of the Ministry of Trade and Moscow Cooperative Institute.

In manufacturing SPPM, polydimethyl siloxane rubber, brand SKT produced domestically, was used as the main ingredient of the polymer coating. It has good permeability for gas with regard to the main gases involved in vital functions of fruit and vegetables, namely oxygen and carbon dioxide. Products based on SKT are temperature-resistant in the range of -60 to +250°C, good resistance to aging, low moisture absorption, and they have no odor or flavor. The rubber is physiologically inert, so that with the proper choice of constituents one can use products made from it, provided the proper permission has been granted by the State Sanitary Inspectorate agencies, with respect to contact with foodstuffs. In addition, this rubber is manufactured in our country and in series. It is the cheapest and most available of the polyorganosiloxane polymers.

Low-temperature vulcanization with silicon alkoxy derivatives in the presence of organotin compounds was used to harden the rubber. This reaction of catalytic cross-linkage of polysiloxanes is based on condensation of alkoxy silane in hydroxyl groups of polysiloxane with separation of alcohol.

Since vulcanized products of SKT have low mechanical strength, while the thickness of the film material must be minimal, of the order of 100-200 μm, it is necessary to reinforce the rubber coating with rather sturdy fabric, the main specifications for which, in addition to adequate strength, uniform structure and smooth surface, include drapability and physiological inertness. The following were selected as the foundation: cotton lawn cloth, fabric made of caprone [nylon-6], lavsan [dacron], fiberglass, as well as sturdy types of paper.

The spreading method was used to produce SPPM for application to a polydimethyl siloxane base.

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By virtue of their good mechanical properties, the base fabrics for SPPM are characterized by adequate mechanical strength: ultimate tensile stress in one-axis stretching is 3.0-7.5 kH/m,relative elongation of 10-30%, resistance to repeated folding of 1000-1500, 4% moisture absorption in 24 h, vapor permeability 8.0 $kg/m^2 \cdot s \cdot 10^{-6}$, gas permeability 8.9 for O_2 and 33.0 $m^3/s \cdot H \cdot 10^{-11}$ for CO_2.

On the basis of studies conducted jointly with the Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman, permission was granted by the USSR Ministry of Health to use SPPM for manufacturing filters and membranes to be used for long-term storage of fruit and vegetables (permission No 123-4/104-7 dated 30 May 78).

The design of containers for fruit and vegetables may vary, depending on the specific item, loading volume and other factors. Insert packages in the containers are made primarily of polyethylene film, 80-150 μm in thickness, of the food grades.

Use of gas-selective GSU devices, designed and produced from the basic diagram developed jointly by the "Plastic" Scientific Production Association and Moscow Agricultural Academy imeni K. A. Timiryazev can be considered the optimum one for industrial use of the method that was developed.

Placement of the gas-selective membrane inside the device protected it reliably against mechanical injury and allowed for repeated use. The design of the GSU [gas-selective units] made it possible to introduce the membrane directly into the stored products, and this accelerates equalization of gas composition within the inserted packages.

The method of creating a modified gas atmosphere with the GSU, using sleeve-type polyethylene film, is economical, simple and available for practical use in nonsealed storage places of different types. The "Plastic" NPO has set up the production of GSU.

One of the typical signs of ripening of fruit is discharge of ethylene when it reaches a certain degree of maturity. At the same time, ethylene has very vivid biological action: if it is added in a chamber with fruit they ripen rapidly. Upon ripening they emit so-called volatile substances: esters, aldehydes, acids, which cause physiological damage to fruit and formation of which is related to impairment of their metabolism. In a modified gas environment, discharge of volatile substances and ethylene from fruit is slower; however, when stored in insert packages of polymer film only an insignificant amount is removed.

Fruit is also subject to bacterial damage when stored. Use of substances that depress the development of microorganisms is considered to be one of the principal means of preventing this.

Addition of activated carbon [charcoal] and any of the antibacterial agents in the package makes it possible to remove the excess ethylene and volatile substances discharged by the fruit, as well as to retard processes of microbial damage.

The Moscow Technological Institute of the Meat and Dairy Industry developed a container design for storing fresh agricultural raw material which, along with creating a modified gas environment, makes it possible to add the above-mentioned materials into the packages.

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The results of production testing summer varieties of apples and Jonathan apples confirmed that the maximum storage time is 7-9 months, and loss of weight when stored in a modified gas atmosphere is 5-6 times less than in the control, while there was 10 times less spoiling.

In accordance with the technical and economical estimates approved by the organizations under the USSR Ministry of Agriculture, with the industrial introduction of the newly developed method of storing agriculture products with the use of gas-separating devices equipped with SPPM membranes, the economy per ton product constitutes 180-200 rubles for late ripening varieties of apples, 160-180 rubles for early ripening ones, 190-210 rubles for pears, 200-220 rubles for garlic, 40-60 rubles for carrots and onions, 6-7 rubles for potatoes.

The estimated saving from using the described method for long-term storage of the fruit and vegetables sold in Moscow during the spring will be 10 million rubles.

Conclusion

According to the results of experimental studies, the use of gas-selective devices equipped with membranes and placed in insert-packages made of film should be deemed effective for long-term refrigerated storage of fruit and vegetables, as well as other biologically active foodstuffs.

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PLANT GENETICS

CEREAL CROP SELECTION INSTITUTE'S PROGRESS SUMMARIZED

Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 3, Mar 81 pp 1-5

[Article by Twice-Awarded Hero of Socialist Labor, Academician V. N. Remeslo, director, Mironovskiy Scientific Research Institute of Wheat Selection and Seed Growing, and Candidate of Agricultural Sciences L. A. Zhivotkov, assistant director, Selection Center: "Achievements and New Goals in Scientific Research"]

[Text] The great and responsible tasks posed by the party and government to the country's farmers in the 11th Five-Year Plan necessitate creation of high-yield, high-quality, nonlodging, disease and pest resistant varieties of agricultural crops satisfying modern farming requirements. In organic combination with other measures, this should insure solution of one of the fundamental problems upon which the Soviet people's standard of living depends--improving the food supply.

During the 10th Five-Year Plan the selection center's scientific research institutions submitted 32 varieties of winter and spring wheat, winter rye, spring and winter barley, peas, millet, and oats for state strain testing. Twelve of them have already been regionalized. They include Mironovskaya 25 winter wheat, Mironovskaya 808 improved, Belotserkovskaya 177, Belotserkovskaya 47, Vinnitskiy 6 spring barley, Verkhnyachskaya 32 winter rye, Niva, Cherkasskiy 1 oats, and others.

But breeding a good strain is only the first prerequisite of success in the struggle to achieve high and stable yields. The payoff from the work of breeders depends to a decisive degree on how quickly and broadly it is introduced into the fields of the kolkhozes and sovkhozes. This in turn depends primarily on the productivity and ecological flexibility of the strain. Graphic confirmation of the merits of strains produced by the selection center's institution is their recognition by farmers, which represents a noticeable advance in production. In 1980 all regionalized strains of agricultural crops produced by the selection center's institutions were sown over large land areas in the USSR. The largest proportion of these fields are occupied by Mironovskaya 808 winter wheat, Mironovskaya jubilee, Il'ichevka, Mironovskaya 808 improved, and Mironovskaya 25.

Pea strains created by the Uladovo-Lyulinetskaya Experimental Selection Station (Uladovskiy 6, Uladovskiy jubilee, Uladovskiy 8, Uladovskiy 303, etc.) occupy one of the leading places in the USSR. Thus in 1980 they were sown over a land area of 1.2 million hectares in the country (30.7 percent) and an area of 785,300 hectares in the Ukraine, which is about 72.6 percent of the republic's farm fields.

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Millet strains Mironovskoye 51 and Mironovskoye 94 occupy significant farming areas. Growth of the latter occurred mainly in the 10th Five-Year Plan.

The main criteria of scientific research are high effectiveness and the fastest possible compensation of outlays. Selection provides a great economic benefit for the st[illegible]. Here are a few figures. Just from growing strains of winter wheat and millet bred by our institute, last year the country received additional net income totaling 231.6 million rubles, while in the 10th Five-Year Plan as a whole it received more than 1 billion rubles. Cultivation of pea strains produced by the Uladovo-Lyulinetskaya Experimental Selection Station is also highly effective--more than 90 million rubles annually. The income significantly exceeds the outlays on selection efforts.

The most important feature of the research being conducted by the institute is its integrated nature. Physiologists, phytopathologists, biochemists, and agrotechnologists take part in the creation of winter wheat strains. Selection of this crop is aimed at breeding strains with a yield of 80-85 c/ha and exhibiting high winter-hardiness (at the level of Mironovskaya 808 and higher), high resistance to lodging and to infection by fungal diseases, good grain processing qualities, and drought resistance.

Implementing our selection program, we devote special attention to developing and improving the methods for creating the starting material, to studying the genetic, physiological, and biochemical principles of winter-hardiness, and to developing more-effective methods for selecting and diagnosing winter-hardy grain with good processing and biochemical indicators, and rust-resistant forms, in the early stages of selection.

The experience of domestic and foreign breeders has shown that new intensive wheat strains can be obtained only through the use of the most diverse genetic material, in combination with progressive selection methods. Thus by hybridizing strains and lines obtained by altering spring forms into winter forms with strains and lines of hybrid origin, we can create winter wheat strains close to ones such as Bezostaya 1 and Mironovskaya 808, which are adapted to large-scale farming.

The institute collective is doing a great deal of work to expand and deepen its ties with scientific research institutes in the GDR and Czechoslovakia. Research on selection of winter wheat and winter barley, started in 1970 jointly with the Institute of Cereal Crop Research at Bernburg-Hadmersleben (GDR), ended in 1980 with submission of winter wheat strains Druzhba 1 and Druzhba 2 and winter barley strains Bemir 1 and Bemir 2 for state testing.

During the years of competitive testing at the institute, strain Druzhba 1 surpassed the grain yield standard by 16 c/ha (the yield was 79.9 c/ha). In 1980 the increment in yield was 4.1 c/ha over the standard yield. The new strain produced its highest yield in 1976--89.4 c/ha. The strain is distinguished by very high resistance to lodging (stem height 95 cm), and it is relatively weakly affected by brown and stem rust. It is close to the standard in its crude protein content (13.97 percent). The overall industrial score of the grain is 0.5 points lower than the standard. Good results were also obtained in production tests of this strain at the Kolkhoz imeni Fedorenko, Kanevskiy Rayon, Cherkasskaya Oblast. In 1979 and 1980, which were years of unfavorable weather, it surpassed the yields of the regionalized strains by 4 and 7 c/ha respectively.

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During the years of testing at the institute, strain Druzhba 2 surpassed the standard grain yield by 11.4 c/ha. Its maximum yield was 79.6 c/ha, in 1977. A distinguishing feature of this strain is its high resistance to lodging. The plant height is 26 cm less than the standard. It is weakly infected by brown rust. It contains the same quantity of crude protein and crude gluten as in the regionalized strain Il'ichevka. Its baking qualities are good.

Winter barley strains Bemir 1 (Pallidum 4515/77) and Bemir 2 (Pallidum 3633/77) were created in a relatively short period of time owing to the use of the institute's climate chambers and hothouses at Bernburg-Hadmersleben (GDR) in the first stages of selection. In the years of competitive testing (1978-1980), the average grain yield from the new strains attained 48.8-48.0 c/ha, which was 5.7-4.9 c/ha more than of the standard Oksamyt. Maximum yields (65.8 and 64.2 c/ha respectively) were obtained in 1978. The strains are distinguished by high resistance to lodging and to infection by mildew and leaf rust.

Spring wheat selection efforts expanded significantly during the 10th Five-Year Plan. Two varieties--Mironovskaya early and Mironovskaya 3--were submitted for state testing. Mironovskaya early strain is distinguished by early ripening (it matures 10 days earlier than the regionalized Mironovskaya spring strain) and high resistance to lodging (plant height is 78 cm), and to infection by brown rust, mildew, and covered smut. Its maximum grain yield in the institute's agrotechnical experiments was 55.5 c/ha. Mironovskaya 3 (Eritrospermum 465) exceeds the standards by 8.2 c/ha in its grain yield. It is distinguished by high indicators for the weight of 1,000 grains and for the concentration of the crude protein raw gluten. Its milling and baking qualities are high.

Mironovskaya spring strain, which was submitted for state testing in 1974, is now being introduced into production successfully. It was first regionalized in 1978 in Kiev Oblast, and in later years in Vinnitskaya and Sverdlovskaya oblasts and the Tuva ASSR, and it was recognized to be promising in the Bashkir ASSR. In 1980 the Bashkirsortsemprom Association's special seed farms harvested 26.5 c/ha of grain from an area of 8,800 hectares, while "Rodina" Kolkhoz of Davlekanskiy Rayon harvested 34.6 c/ha from an area of 1,052 hectares.

The collective of the feed crop selection laboratory finished off the five-year plan with good results. Mironovskaya 36 Sudan grass and Mironovskiy 47 red clover were submitted for state strain testing.

Mironovskaya 36 Sudan grass has been undergoing testing in the state strain testing network since 1978. During the years of its study in the institute (1976-1980), the vegetation yield was 527 c/ha, or 50.8 c/ha more than that of the regionalized strain Mironovskaya 10. According to data of the State Commission for Agricultural Crop Strain Testing, in 1979 Mironovskaya 36 surpassed the regionalized strains of Sudan grass in terms of the yield of vegetation and hay from 20 strain testing plots of the RSFSR, the Ukrainian SSR, and other republics.

Mironovskiy 47 red clover produced a vegetation yield of 535 c/ha and a hay yield of 108.5 c/ha in the institute's competitive tests; this was correspondingly 47.0 and 13.5 c/ha more than the yield of the regionalized strain Mironovskiy 45.

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One of the most important directions in selection is creation of strains exhibiting integrated resistance to aggressive diseases and pests. As a result of joint research by the Scientific Research Institute of Grain at Bernburg-Hadmersleben (GDR) and the Scientific Research Institute of Cereal Crop Selection at Kromeriz (Czechoslovakia), the problem of finding donors for resistance of winter wheat to mildew and root rot is being solved successfully. Selection programs foreseeing creation of the initial breeding material and comprehensive testing of new, promising lines of winter and spring wheat resistant to brown rust have been developed and are being successfully carried out.

Study of winter wheat monoculture in relation to the spread of cercosporosis has been finished. Analysis of 6 years of data established the nature and extent of accumulation of the disease agent in soil with plant remains. This property of accumulation may be utilized successfully to create a provocative background with the purpose of testing the resistance of selection materials to diseases. The experience accumulated in this area can be recommended for broad introduction in the selection center's zone of activities.

The tolerance of the new regionalized strain Mironovskaya 25 to root rot in comparison with the standard has been established. On the average in 4 years of experiments organized especially for this purpose, the grain yield of Mironovskaya 25 was 4.7 c/ha higher than that of Il'ichevka, being 41.2 c/ha.

The plant physiology department has studied the frost resistance of 154 strains in competitive tests and 342 strains in preliminary tests, and it isolated 51 strains superior to the standard in this property.

An industrial system for growing selection material for winter and spring wheat in artificial climate chambers and hot houses was developed with the purpose of hastening reproduction of such selection material. Four hundred fifty specimens of selection material for these crops were reproduced, which made it possible to reduce the time required to breed winter wheat strains by 1 to 2 years, and spring wheat by 2 to 3 years.

Experiments conducted by the strain agrotechnology department revealed a significant dependence of winter wheat productivity on the doses and balance of the basic nutrients. The highest grain yield with the best quality indicators was obtained with full or partial use of nitrogen fertilizers on the background of a main phosphorus-potassium fertilizer application. Thus when phosphorus is applied at a dose of 120 kg/ha and potassium is applied at a dose of 90 kg/ha (prior to sowing), fractional application of nitrogen (40 kg/ha in the stem extension stage, 40 kg/ha in the heading stage, and 70 kg/ha during flowering) resulted in the greatest yield increment: 11.8 c/ha for crops grown after peas, and 22 c/ha for crops grown after silage corn.

In addition to developing selection methods and improving the procedures for evaluating the starting material, the institute is implementing a broad complex of measures associated with production testing and introducing strains into production, and providing high-quality seeds to scientific research institutions, kolkhozes, and sovkhozes. The network of experimental farms in Kiev, Cherkasskaya, Vinnitskaya, Khmel'nitskaya, Zhitomirskaya, Ternopol'skaya, Volynskaya, and Chernigovskaya

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oblasts, at which the institute tests and reproduces promising strains of winter and spring wheat, winter barley, millet, and feed crops, has expanded significantly.

The institute's elite experimental farm successfully reached its targets in raising and selling elite seeds. During the 10th Five-Year Plan the cereal crop seed sales plan was 123.7 percent completed, while the winter wheat seed sales plan was completed by 109.5 percent.

The country's farmers face important problems in the 11th Five-Year Plan associated with raising the yield and gross harvest of grain. Science must make a major contribution to solving these problems successfully. The scientific research institutions must significantly accelerate their theoretical development, raise the effectiveness of their scientific research, and hasten creation and introduction of new, higher-yield strains into production.

Implementing a broad program of measures to raise the effectiveness of research, the collective of the Mironovskiy Scientific Research Institute of Wheat Selection and Seed Growing is already preparing to submit a winter wheat, a spring wheat, and a winter barley strain for state testing in the very first year of the 11th Five-Year Plan; it also intends to direct all of its energy at promoting solution of the key problem of agricultural development--increasing the country's grain production.

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