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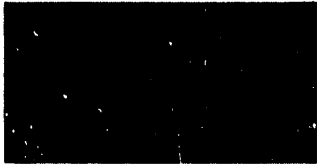
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JPRS L/8472

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U S S R



TRANSLATIONS ON USSR AGRICULTURE  
(FOUO 4/79)

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FURTHER DEVELOPMENT OF GRAIN ECONOMY IN KAZAKHSTAN

Alma-Ata AGITATOR KAZAKHSTANA in Russian No 4, Feb 79 pp 6-9

[Article by A. Barayev, VASKhNIL Academician and director of the All-Union Scientific Research Institute of the Grain Economy: "Reserves of a Grain Field"]

[Text] The development within a brief interval of time of millions of hectares of virgin land is without parallel in the history of farming throughout the world. It confronted the farmers with very complicated tasks associated with the skilful use of this land. A need arose for developing measures for protecting the soils against wind erosion and, to be more precise, for developing a virgin land system of farming. It was for this reason that, based upon the initiative displayed by Comrade L.I. Brezhnev, oblast experimental stations were organized in each oblast and in the former Akmolinskaya Oblast -- a scientific-research institute of the grain economy.

The collective of scientists at the All-Union Scientific-Research Institute of the Grain Economy concentrated their principal studies on developing methods for protecting soils against wind erosion and, in creative collaboration with engineering institutes and the design bureaus of machine building plants, developing special anti-erosion equipment. As a result of fundamental studies carried out, a soil-protective system of farming was developed. In the book entitled TSELINA [Virgin Land], Comrade L.I. Brezhnev approved the work carried out by the collective of scientists at our institute; they developed and actively participated in introducing the soil-protective system of farming into operations.

The essence of the methods employed in the soil-protective system of farming consists of the following: 1) a radical change in the soil cultivation system, with soil cultivation and sowing operations being carried out using special anti-erosion equipment rather than plow, toothed harrows and the usual disk drills; 2) the introduction and development of scientifically sound grain-fallow crop rotation plans, with a brief rotation and a clean fallow field; 3) the application of appropriate

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fertilizers to the crop rotation fields; 4) sowing the crops using stubble field drills and scientifically sound sowing norms and during the best periods; 5) replacing obsolete grain crop strains with new, more productive and higher quality ones.

In the extremely dry regions of the republic, a principal condition for obtaining high and stable yields is that of making maximum use of the natural precipitation. This is achieved by means of the recommended flat-cutting cultivation, by means of which the soil is able to absorb more effectively the late summer and autumn precipitation. The stubble which remains following flat cutting cultivation protects the moisture against evaporation from the soil. Flat cutting cultivation is of special importance with regard to the retention and accumulation of winter precipitation on the fields. Extended studies carried out by scientists of the institute have underscored the importance of carrying out snow retention work using tractor snowplows on fields on which flat cutting cultivation was carried out. It is wrong to assume that one flat cutting cultivation will accumulate a snow cover of a field that is adequate for moistening, in the form of thaw waters, the entire root zone soil layer. This is convincingly borne out by a 5-year study carried out by the institute's Department of Farming from 1973 to 1977.

	Autumn flat cutting cultivation without snow retention (control)	Autumn flat cutting cultivation with subsequent snow retention
Thickness of snow cover at end of winter (in cm)	26.8	46.2
Supplies of water in snow (in tons per hectare)	804	1432
Supplies of productive moisture in soil prior to sowing (in tons per hectare)	1118	1520
Spring wheat yield (in quintals per hectare)	11.3	16.3

Thus flat cutting soil cultivation must necessarily be combined with subsequent winter snow retention work. Such a combination will bring about a considerable increase in the thickness of the snow cover and in the moisture supplies in the soil and, as a result, the spring wheat yield will increase by 5 quintals per hectare. In the case of flat cutting cultivation, the snow ridges are installed at the very beginning of winter. They must be positioned crosswise to the blizzard winds at a distance of 3.5-4.5 meters from one another. Only if this is done will a wind shadow be created between the ridges making it possible for all of the snow to be retained on the field.

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Over the past 8 years, snow retention work has been carried out on an area of 28,000-33,000 hectares at an experimental farm of our institute. During these 8 years the average thickness of the snow cover was 39.3 cm and it contained approximately 1,200 tons of water per hectare. During the past few years the sovkhoses and kolkhozes in the northern oblasts have been following our recommendations and they have been accumulating a snow cover ranging in thickness from 35 to 40 cm by the end of the winter. It bears mentioning that with flat cutting cultivation the spring thaw waters are absorbed very well by the soil and it is only rarely that a run-off occurs on such fields.

As a result, the grain crop yields following autumn flat cutting cultivation increase substantially compared to autumn plowing carried out using plows. Tests carried out by our institute have shown that on the average for a period of 10 years, the spring wheat yield was 4.8 quintals more per hectare than that obtained following plowing. At the Kustanay Experimental Station -- 3.8 quintals higher, at Turgay -- 3.5, over a period of 11 years at the Severo-Kazakhstanskaya Station -- 2.8, during 5 years at the Ural'skaya Station -- 2.7 and over 8 years at the Aktyubinskaya Station -- higher by 2.3 quintals per hectare.

The grain crop yields being obtained at sovkhoses and kolkhozes following flat cutting cultivation are 2.5-3.5 quintals more than that following plowing. The task is one of ensuring that flat cutting implements are employed in all areas in Kazakhstan for cultivating the soil in behalf of grain crops. This represents a substantial reserve for increasing the gross yield of grain on each farm.

In the book TSELINA, Comrade L.I. Brezhnev approved our proposals with regard to introducing clean fallow into use on virgin lands. The grain-fallow crop rotation plans developed by the scientists of our institute ensure that the fields are cleansed of malicious weeds. Spring wheat furnishes the highest yields on the whole during rotation on fallow fields. For example, the highest yield of wheat grain per hectare of arable land is obtained from a four-field grain-fallow crop rotation plan and on the farms -- the highest gross yield of wheat grain. For example, during special four field grain-fallow wheat crop rotation plans at an experimental farm, the grain yield per hectare of arable land during the past 8 years amounted to 12.5 quintals. In five field crop rotation plans, where one field was clean fallow, three fields were occupied by spring wheat sowings and one by barley sowings, a higher grain yield per hectare of arable land was obtained -- 13.5 quintals. When developing such crop rotation plans, the effectiveness of all of the other methods of soil-protective farming is raised substantially. Such crop rotation plans must be developed in the steppe regions of the republic.

The use of the entire complex of methods for soil-protective farming ensures reliable protection of the soils against wind erosion and it serves as a reliable base for obtaining higher and more stable yields and, even more

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important, it makes it possible to overcome droughts or at least to reduce sharply their harmful effects. A sharp drought occurs in Kazakhstan every 2 out of 5 years and sometimes 3 years. The worst droughts occur in June, at which time, owing to an absence of precipitation, the upper soil layer dries out and the roots of the spring wheat do not form from the tillering node. The yields fall sharply during such years.

Following the development of the soil protective system of farming, there were 2 years in which no precipitation fell in June: 1975 and 1977. However, with an accumulation of snow at the end of the winter on the entire area under crops at the experimental farm of 53 cm in 1975 and 45.4 in 1977, a grain crop yield was obtained from the entire area of 25,500 hectares of 10.9 quintals in 1975 and 12 quintals per hectare in 1977 even without the formation of roots from the tillering node. In 1976 and 1978, normal moisture was available in June as a result of the precipitation which fell. Thus the powerful system of roots which formed from the tillering node and the supplies of moisture in the upper soil layers ensured the formation of large ears and the powerful development of leaf surface. Despite sharp droughts in July and August, good grain crop yields were obtained: 20.2 quintals in 1976 and 20.9 quintals per hectare in 1978. Thus the introduction of the soil-protective system of farming not only protected the soil in a reliable manner against wind erosion, but it also guaranteed complete overcoming of a drought and it ensured an average yield of 16 quintals over a period of 4 years, two times higher than the yield planned at the commencement of development of the virgin and long-fallow lands.

Studies carried out by scientific institutes and zonal agrochemical laboratories have established the high effectiveness of applications of phosphorus fertilizers. Even when just 1 quintal of superphosphate is applied per hectare, the yield increases by 2.5-3 quintals. In view of the fact that strong wheat is mainly sown in Kazakhstan and the republic is the country's principal supplier of this wheat, special importance is attached to ensuring that all of the kolkhozes and sovkhoses are supplied with phosphorus fertilizers at the rate of 1 quintal of superphosphate per hectare. Through the use of fertilizers alone, its production can be increased by 3.7-4.5 million tons for the entire area of 15 million hectares of strong wheat plantings. Great importance is attached to increasing the production of strong wheat, since it is used for improving the baking qualities of flour obtained from wheat grown in the European part of the country and for export.

Of the country's overall requirements for strong wheat -- 11 million tons -- the republic could supply no less than 90 percent of the overall deliveries within the next few years. Phosphorus fertilizers, by raising the spring wheat and other grain crop yields and simultaneously accelerating the ripening of the grains by 5-7 days, are making it possible to carry out the harvest operations under more favorable conditions and to reduce grain losses during the harvest work.



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In connection with the soil-protective system of farming, great importance is attached to carrying out the spring wheat sowing in the northern oblasts during the optimum calendar periods, between 15 and 25 May. When sown during this period the spring wheat furnishes 3-3.5 more quintals per hectare than are obtained from earlier sowing periods. This is explained by the best use by such plantings of the summer precipitation and by the possibility of carrying out pre-sowing cultivation for the purpose of destroying the wild oats seedlings.

Of 25 million hectares of grain crops in the republic, SZS-2.1 stubble field drills are used for sowing 20 million hectares. The inter-row spacings for these drills are 23 cm, compared to only 15 cm for the disk grain drills. Thus the sowing norms employed earlier of 4-4.5 million germinative seed per hectare are extremely high and cause overcrowding of the seedlings in the rows. This results in lowered yields and excessive expenditures of seed. Extended studies carried out at our institute have shown that the highest yields are obtained mainly when 2-2.5 million germinative seed are sown per hectare. It is obvious that a need exists within the republic for organizing a zonal study of the sowing norms to be used when carrying out sowing work using these drills at all of the experimental stations, state strain testing stations and at leading sovkhoses in each rayon.

When developing a complex of methods for soil-protective farming which will ensure considerable improvements in soil moisture by means of natural precipitation, special importance is attached to replacing obsolete grain crop varieties with varieties which are new, more productive, of a higher quality and more adaptable to local conditions. The plant breeders of our institute have bred a number of such varieties, newly regionalized or of a promising nature, for the northern oblasts of Kazakhstan. The Shortandinka-25 spring wheat variety has been regionalized and is being propagated successfully in Turgayskaya Oblast. The Tselinnaya-20 spring wheat variety has been regionalized in Vostochno-Kazakhstanskaya Oblast and in Altayskiy Kray and is considered to be promising for Semipalatinskaya and Pavlodarskaya oblasts. The Tselinnaya-21 spring wheat variety has been regionalized in Tselinogradskaya and Kokchetavskaya oblasts and is considered promising for Severo-Kazakhstanskaya Oblast. In terms of their yields and adaptability to local conditions, all of these varieties surpass the Saratovskaya-29 variety and they are classified as strong varieties. In terms of forage crops, the Tselinnyy-5 barley variety has been regionalized in the northern oblasts and it surpasses to a considerable degree all other varieties in the yields being obtained. The rapid propagation and dissemination of these varieties represents an important reserve for increasing the production of grain.

The complex and general introduction into production operations of the soil-protective farming methods represents the very foundation for increasing substantially the grain crop yields and raising the gross yields of grain on each farm in the immediate future. Rather significant in this regard are the yields obtained in Tselinogradskaya and Kokchetavskaya oblasts following introduction of the soil-protective farming methods and compared to the Seventh Five-Year Plan, at which time these methods were still not in use.

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Average Annual Grain Crop Yields  
(in quintals per hectare)

	Average for 5 years (1961-1965)	Average for last 8 years (1971-1978)	Including 1978
Tselinogradskaya Oblast	6.1	9.8	11.8
Rayons: Shortandinskiy	7.7	12.8	15.8
Makinskiy	7.0	13.5	14.7
Balkashinskiy	7.5	13.2	14.6
Farms in Shortandinskiy Rayon			
Sovkhoz imeni KazTsIK	7.5	14.5	15.8
Kolkhoa imeni 18 Let Kazakhstana	9.5	14.9	17.5
Experimental farm of VNIIZKh	11.2	16.9	20.9
Kokchetavskaya Oblast	6.0	11.8	12.0
Rayons: Kzyltuskiy	4.4	11.3	10.8
Ruzayevskiy	5.7	14.6	14.9
Bidaikskiy Sovkhoz			
Kzyltuskiy Rayon	4.5	14.9	14.0
Kamenobrodskiy Sovkhoz			
Volodarskiy Rayon	6.0	14.3	16.1

Despite the incomplete complex development of the soil-protective farming methods, the yields in Tselinogradskaya Oblast increased by a factor of 1.6 over the past 8 years (in 1978 -- a factor of 1.9). In Shortandinskiy, Makanskiy and Balkashinskiy rayons, the yields increased by factors of 1.7 and 1.9 (in 1978 -- 1.9-2.1). In Kokchetavskaya Oblast the yields increased by almost twofold. In Kzyltuskiy and Ruzayevskiy rayons the yields increased by a factor of almost 2.6 and at the Bidaikskiy Sovkhoz -- 3.2.

Grain production in the republic has increased considerably owing to the development of the virgin and long fallow lands. During the pre-revolutionary period, grain production in Kazakhstan during the most productive year of 1913 amounted to 2.1 million tons. In 1953 -- 6 million tons.

Average annual grain production for 1961-1965	--	14.5 million tons
"	1966-1970	-- 20.6 "
"	1971-1975	-- 21.6 "
"	1976-1977	-- 23.7 "
"	1978	-- 27.8 "

Grain production increased considerably throughout the republic following the March (1965) Plenum of the CC CPSU, at which time it became possible for the virgin land workers to introduce the scientifically sound soil protective farming methods into their operations. If these methods are introduced in a general and complex manner and if the sovkhoses and kolkhozes are adequately supplied with mineral and particularly phosphorus fertilizers, it will be

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possible to raise the average yields to 16-17 quintals per hectare, to the level called for during the July (1978) Plenum of the CC CPSU.

The scientists at VNIIZKh [All-Union Scientific Research Institute of Grain Farming] are carrying out further studies aimed at improving the soil-protective system of farming in conformity with the soil-climatic conditions found in each oblast of the republic. In creative collaboration with other scientific institutions throughout the republic and special design bureaus for anti-erosion equipment in Tselinograd, studies are being conducted for the purpose of improving the anti-erosion equipment and creating new machines and implements for the powerful K-700 and K-701 tractors.

Basic studies are being carried out at the Institute of the Grain Economy in connection with mastering solonetz soils and making more productive use of alkaline lands, creating modern machines and implements, developing crop rotation plans for alkaline soils in the virgin land, selecting more productive crops and developing agricultural techniques for their cultivation. It is believed that the collective of scientists at the Institute of the Grain Economy should direct the coordination of all studies concerned with this most important problem. The development of solonetz and alkaline lands could provide a tremendous increase in the production of feed for livestock husbandry and make it possible to plant grain crops on the best of such land.

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IMPROVED DISTRIBUTION OF GRAIN CROPS IN KAZAKHSTAN

Alma-Ata SEL'SKOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 1, Jan 79 p 20

[Article by B. Kaimov and O. Kislov, scientific workers at NIEIPIN for Gosplan of the Kazakh SSR: "Rational Distribution of Grain Crops"]

[Text] Studies carried out by workers at the Kazakh Branch of the Scientific Research Institute of Agricultural Economics and Organization in Northern Kazakhstan have made it possible to isolate five natural-economic zones for the distribution of grain crops: I -- forest-steppe, II -- moderately dry, III -- dry steppe, IV -- arid-steppe and V -- semi-desert steppes.

Grain is produced most efficiently in zone I. This is explained mainly by the fact that the soil here is more fertile and a greater amount of precipitation falls in this area.

What crops are sown? On the average, spring wheat occupies 81.5 percent of the areas sown in grain crops in the six oblasts of northern Kazakhstan; in Turgayskaya Oblast the proportion of spring wheat is 90.1 percent. It is our opinion that such a structure is not altogether rational (the amounts of forage, feed and particularly pulse crops are too low).

Analysis reveals that grain production is more profitable if the earnings from the sale of its marketable products amount to 50-60 percent on farms in Kokchetavskaya and Tselinogradskaya oblasts, 60-70 percent in Kustanayskaya Oblast, 40-50 percent in Pavlodarskaya and Severo-Kazakhstanskaya oblasts and 70-80 percent in Turgayskaya Oblast. Thus a definite dependency of grain production efficiency upon the natural and economic conditions found in a zone is revealed. A branch of KazNIEIOSKh developed a long-range plan for the structural use of arable land by zones in northern Kazakhstan. Consideration was given to the possibility of this plan being improved by good predecessor arrangements for the grain crops, particularly clean fallow, and by the mastering of correct crop rotation plans.

It was developed in conformity with the crop rotation plans recommended by VNIIZKh [All-Union Scientific Research Institute of Grain Farming] and it

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encourages the proper utilization of land, it improves the culture of farming and, even more importantly, it promotes an increase in the production volume and improvements in the quality of all agricultural crops. This derives from the fact that the wheat will be grown following fallow and the best predecessor arrangements. In individual rayons of northern Kazakhstan which are subject to wind erosion of soil, up to 30 percent of the arable land should be set aside and used for clean fallow.

Structure of Future Use of Arable Land by Zones of Northern Kazakhstan  
(according to data from a branch of KazNIEIOSKh)

Types of Land and Sowings	Zones				
	I	II	III	IV	V
Arable land (thousands of hectares)	196.9	6684.2	9269.2	2195.2	1212.6
including grain crops (thousands of hectares)	133.9	4354.9	6256.7	1317.1	545.6
in % of arable land	69.9	68.0	67.5	60.0	45.0
Feed crops (thousands of hectares)	23.6	768.5	695.2	439.1	545.7
in % of arable land	12.0	12.0	7.5	20.0	45.0
Clean fallow (thous. of hectares)	59.3	1280.8	2317.5	439.0	121.3
in % of arable land	20.0	20.0	25.0	20.0	10.0

The recommended structure for arable land calls for a general reduction in the feed crop areas with the deficiency in such areas being compensated by an expansion in the areas of radically improved meadows and pastures. This change is associated with the fact that the zone possesses large areas of natural feed lands, with radical improvements scheduled to be carried out on a large portion of these lands. Whereas the feed balance will be regulated by means of radical and surface improvements in the meadows and pastures, an expansion in the fallow land areas will make it possible to raise the soil fertility and culture of farming and increase the productivity of the agricultural crops.

In addition, the peculiarities of moisture availability for the soils in zones I and II must be taken into account. Since extensive use will be made from year to year of chemical agents and measures for combating weeds, a portion of the clean fallow can be used as occupied fallow. This will promote a strengthening of the feed base.

A change in the structure of use of arable land is also taking place in zone V. Here the ratio between the grain and feed crops is the same. This is explained by the fact that the soil is subjected to wind erosion to a greater degree. It is recommended that a crop rotation plan with a strip placement of crops be employed here; alternation of the grain crop and perennial grass strips.

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One of the principal economic indices for the distribution of the branches of agriculture is the structure of its gross output. Analysis reveals that during the past 5 years grain crops constituted 73 percent on the average of the gross output of crop husbandry in northern Kazakhstan, vegetables and potatoes -- 8.4 and feed crops -- 17.5 percent. Technical, fruit and other crops constituted the remaining percentage.

One of the principal reserves for grain production is that of distributing its sowings on land that has been radically improved in terms of more fertile soil. According to data supplied by the Main Administration for Land Management of the Ministry of Agriculture for the Kazakh SSR, there are more than 29 million hectares of pasture and haying land that are suitable for radical improvements in the republic. The drawing of these massive tracts of land into economic use will make it possible to utilize each hectare of land in a more rational manner and to obtain high economic results. The most productive haying and pasture lands suitable for radical improvements could be used for grain feed crops and the more valuable crop -- spring wheat -- could then be grown on newly released areas in field crop rotation plans. (It bears mentioning that the plans call for such lands to be developed gradually with increasing results).

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ABSTRACTS FROM JOURNAL 'DOKLADY VASKHNIL' NO 8, AUG 78 PP 45-46

UDC 633.11:631.523

INHERITANCE OF PRODUCTIVITY AND GRAIN QUALITY IN SHORT-STEMMED HYBRIDS  
OF WINTER WHEAT WITH IRRIGATION

Moscow DOKLADY VASKHNIL in Russian No 8, Aug 78 pp 8-9

[Article by A. P. Orlyuk and I. Yu. Gorbatenko]

[Text] While taking into account the variability of inheritance and the recombination of qualitative indicators it is possible to develop dwarf and semi-dwarf hybrids characterized by a complex of valuable properties and features. Short-stemmed forms with a large potential yield (up to 100 quintals per hectare) and a high content of proteins and irreplaceable amino acids have been isolated.

Tables--1, bibliography--4 titles.

UDC 633.11"324":581.116

EFFECT OF TEMPERATURE GRADIENT ON INTENSITY OF TRANSPIRATION IN WINTER  
WHEAT UNDER PHYTOHRONE CONDITIONS

Moscow DOKLADY VASKHNIL in Russian No 8, Aug 78 pp 10-11

[Article by A. K. Lyashok]

[Text] It was demonstrated that there was a periodicity in the daily course of transpiration with a negative temperature gradient of 5-7°C that was absent with a positive or zero gradient. Moreover, with the creation of such a gradient water consumption became more economical.

Illustrations--1, tables--1, bibliography--3 titles.

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UDC 635.21:631.52

USE OF WILD POTATO SPECIES SOLANUM COMMERSONII DUN IN BREEDING

Moscow DOKLADY VASKhNIL in Russian No 8, Aug 78 pp 17-19

[Article by M. A. Vavilova]

[Text] It was determined that Solanum commersonii breeds well with wild diploid and hexaploid species. A description of the inter-species hybrids that were developed is given and their value to breeding is shown.

Tables--2, bibliography--7 titles.

UDC 633.31:575.12

POLYPLOIDY IN INTER-SPECIES CROSS BREEDING OF HETEROPLOIDAL SPECIES OF ALFALFA

Moscow DOKLADY VASKhNIL in Russian No 8, Aug 78 pp 20-22

[Article by Ye. G. Chernenko]

[Text] This article presents the results of experiments on the development of new stock through inter-species distant hybridization of diploid alfalfa species from wild flora and cultivated varieties. The polyploidization of diploid species was employed to improve the success of crossing diploid species with tetraploid species.

Tables--4, bibliography--2 titles.

UDC 631.432.31

CAPILLARY METHOD OF FLUSHING SALINATED LANDS

Moscow DOKLADY VASKhNIL in Russian No 8, Aug 78 pp 37-39

[Article by S. V. Sanoyan]

[Text] A new capillary method for flushing saline soil is described. A system of thermodynamics equations is presented and the role of individual parts of the equations are evaluated on the basis of experimental data. This can be applied practically when calculating the individual parameters of flushing.

Formulas--4, illustrations--1.

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ABSTRACTS FROM JOURNAL 'DOKLADY VASKhNIL' NO 9, SEP 78 PP 45-46

UDC 633.11:631.559

WINTER-HARDINESS, WATER CONSUMPTION AND PRODUCTIVITY OF WINTER WHEAT PLANTS OF DIFFERENT AGES

Moscow DOKLADY VASKhNIL in Russian No 9, Sep 78 pp 5-8

[Article by V. I. Bondarenko and V. G. Nesterets]

[Text] This article presents the results of experiments on the effect of the age of winter wheat plants Bezostaya-1 and Mironovskaya-808 on their winter-hardiness, water consumption and productivity. It was demonstrated that the overwintering of crops is determined mainly by the conditions of fall vegetation and by the special characteristics of the variety. It was determined that water consumption was most efficient when the plants were sown at the optimal time.

Table--4, illustrations--1, bibliography--6 titles.

UDC 636.086:631.559

EVALUATION OF PRODUCTIVITY OF ANNUAL FEED CROPS CULTIVATED AS BASIC AND INTERMEDIATE CROPS

Moscow DOKLADY VASKhNIL in Russian No 9, Sep 78 pp 18-20

[Article by M. I. Andrushkiv, S. V. Begey and M. S. Bezdushnyy]

[Text] The results of 3 years of experiments have established that in early sowing the leguminous-oats and peas-rye grass mixtures were most productive. In sowing after winter crops for green feed corn and lupine were best. Peas-sunflowers and lupine-corn mixtures were best for hay crops and white mustard-peas mixtures were best for postharvest sowing.

Tables--3.

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ANALYSIS OF MATHEMATICAL DATA ON MULTISPECTRAL SCANNING OF AGRICULTURAL CROPS OF THE FERGANSKIY KEY PLOT

Moscow DOKLADY VASKhNIL in Russian No 9, Sep 78 pp 22-24

[Article by B. V. Vinogradov and Ye. V. Glushko]

[Text] This article analyzes the statistical distribution of the intensities of the long-range signal at different spectral intervals -- 0.40-0.45; 0.50-0.55; 0.60-0.68; and 0.72-0.82 mkm using materials of the multispectral aeromagnetic survey of a plot of irrigated land planted in cotton, of alfalfa before and after irrigation, and of boundary complexes.

Illustrations--1, bibliography--5 titles.

UDC 633.11"321":631.67

EFFECTIVENESS OF UTILIZING IRRIGATION WATERS FOR SPRING WHEAT IN DIFFERENT NATURAL ZONES OF THE CENTRAL REGION

Moscow DOKLADY VASKhNIL in Russian No 9, Sep 78 pp 42-44

[Article by A. P. Demin and V. B. Mestechkin]

[Text] Irrigation norms for spring wheat are determined according to a bioclimatic methodology using basic data for the years 1900-1972. The juxtaposition of a chart on increases in grain productivity due to irrigation and a chart of the optimal irrigation norms enabled the authors to draw conclusions concerning the more productive (by 40-50 percent) utilization of irrigation water for spring wheat in the northern part of the irrigation zone as compared with the semi-desert zone.

Illustrations--2, bibliography--6 titles.

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ABSTRACTS FROM JOURNAL 'DOKLADY VASKhNIL' NO 10, OCT 78 PP 44-46

UDC 633.11"321":631.53.048

FORMATION OF LEAVES AND GRAINS BY SPRING WHEAT PLANTS DEPENDING UPON THE AREA OF NUTRITION

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 7

[Article by A. I. Barsukov]

[Text] Experiments with spring wheat of the average-maturation regionalized variety Saratovskaya-29 in Kulunda demonstrated that using SES-9 and SZS-2.1 counter-erosion sowers and decreasing the sowing rate from 4 to 2 million germinating seeds per hectare resulted in an increase in the area of the leaf of each plant and in the growth of the grain yield.

Tables--1, bibliography--10 titles.

UDC 633.11"321"(470.40/.43)

THE BEST SHORT-STEMMED SPRING WHEATS FROM THE VIR WORLD COLLECTION AND THE POSSIBILITIES FOR INTRODUCING THEM ON IRRIGATED LANDS IN THE CENTRAL VOLGA REGION

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 9

[Article by A. M. Medvedev]

[Text] This article presents the results of a 12-year study of 15,000 samples of spring wheat on dry-farming land and on irrigated land. Short-stemmed, high-quality wheats that are resistant to lodging and to brown rust such as Nadadores-63, Nainari-60, Tobari-66 and others may be used as stock for the development of new varieties for irrigated lands. Some samples dependably passed on their characteristics to hybrids during cross breeding with varieties of Volga selection.

Tables--1, illustrations--2, bibliography--2 titles.

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UDC 633.1:017

THE PRINCIPLE OF COMPILING THE DETERMINANTS OF GRASSES ACCORDING TO  
PROLAMINE FORMULAS

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 12

[Article by P. A. Gandilyan]

[Text] The principle of compiling the determinants of grasses according to prolamine formulas presented in this article reflects a new stage in the work on the very urgent problem of registering plant genetic resources according to protein for breeding and plant growing.

Tables--3, bibliography--4 titles.

UDC 633.11"324":581.144.9

DEPTH AT WHICH TILLERING NETWORK AND APICAL CONE ARE FOUND IN WINTER WHEAT  
PLANTS DEPENDING UPON GERMINATION CONDITIONS

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 14

[Article by A. I. Mitropolenko]

[Text] The tillering network does not remain in an unchanged state of converged stem nodes after the cessation of growth of the epicotyl. Subsequently there is a differentiation of nodes and internodes. The depth at which the tillering network is located expands significantly and the function of the subsurface layer of soil decreases, especially in early crops.

Tables--2, bibliography--6 titles.

UDC 626.8:631.4

USE OF MATHEMATICAL MODEL FOR PREDICTING THE EFFECT OF HYDROTECHNICAL  
AMELIORATION ON SOIL MOISTURE

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 17

[Article by T. A. Romanova, G. A. Pisetskiy, T. N. Puchkareva and  
Zh. A. Kapilevich]

[Text] On the basis of a determination of quantitative parameters of moisture in the sandy soil of the Belorussian Poles'ye and of the established typical combinations of soil varieties creating a quasi-balanced natural system a series of mathematical equations were developed to characterize the distribution of moisture within such a system and its ties with the depth of ground waters. A functional mathematical model of soil combinations was created and a computer program was elaborated.

Tables--2, illustrations--3, bibliography--6 titles.

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UDC 664.727:632.954

THE BIOLOGICAL VALUE OF GRAIN CULTIVATED WITH THE USE OF HERBICIDES

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 20

[Article by M. S. Raskin, N. G. Miroyubov, and A. V. Fomin]

[Text] This article shows that the use of herbicides in the recommended doses has a considerable effect on the composition of amino acids during the vegetative period within the limits of a "normal" metabolic reaction. This is confirmed by the production of a harvest with an unchanged chemical composition and without residual quantities of preparations used. In tests in which the grain was fed to rats the authors noted that less grain than was cultivated with the use of herbicides was eaten.

Illustrations--1, bibliography--5 titles.

UDC 63-.2:636.085.57+637.323

EFFECT OF GRASS MEAL IN THE RATIONS OF DAIRY CATTLE ON THE PRODUCTION PROCESS AND QUALITY OF KOSTROMA CHEESE

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 23

[Article by N. I. Kleyenov and V. I. Skobelev]

[Text] An experiment was conducted on the effect of various doses of grass meal instead of mixed fodder in the rations of dairy cows on the production process and quality of Kostroma cheese. It was found that there was a prevailing development of an aromatic microflora, an increase in vitamin A and an insignificant increase in the pace of sour-milk fermentation in samples of cheese processed from the milk of cows that were fed rations containing grass meal.

Tables-1, illustrations--1.

UDC 636.2:636.084

MANAGEMENT OF THE PROCESSES OF DIGESTING NUTRITIVE SUBSTANCES DURING THE INTENSIVE FATTENING OF YOUNG BULLS WITH FULL-RATION MIXTURES

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 28

[Article by A. Z. Stolyarchuk]

[Text] This article develops the composition of dry full-ration feed mixtures. Feeding them to feeder cattle encourages the maximal use of production wastes (straw, pulp, poultry litter) to effect a high intensity

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of growth in animals and a good quality beef.

Tables--3, bibliography--7 titles.

UDC 636.2:636.081

USE OF COWS ONCE TO INCREASE BEEF PRODUCTION

Moscow DOKLADY VASKhNIL in Russian No 10, Oct 78 p 30

[Article by G. S. Azarov and B. M. Gutsunayev]

[Text] The use of non-replacement Simmental heifers for the one-time production of calves enables us to increase meat resources noticeably. The article presents the technology of this method, the indicators on the productivity of cows and their progeny and the economic effectiveness.

Tables--3.

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ABSTRACTS FROM JOURNAL 'DOKLADY VASKhNIL' NO 11, NOV 78 P 45

UDC 633.11:581.167

COMBINATIONAL CAPABILITY OF VARIETIES OF SPRING WHEAT IN GRAIN SIZE  
UNDER CONDITIONS EXISTING IN WESTERN SIBERIA

Moscow DOKLADY VASKhNIL in Russian No 11, Nov 78 pp 1-3

[Article by R. A. Tsil'ke and O. T. Kachur]

[Text] This article demonstrates that the total combinational capability of varieties in batches of 1,000 seeds is exhibited with relative stability for varying vegetative conditions and various densities of the crop stand. It was established that the new variety Grekum-114 is characterized by the highest and most relatively stable OKS [total combinational capability].

Tables--2, bibliography--6 titles.

UDC 633.11''324'':631.527.823

THE ACCELERATED DEVELOPMENT OF WINTER WHEAT AS AFFECTED BY ORGANIC ACID  
TREATMENT OF SPROUTS DURING VERNALIZATION

Moscow DOKLADY VASKhNIL in Russian No 11, Nov 78 pp 3-6

[Article by V. I. Babenko, S. V. Biryukov and V. P. Komarova]

[Text] It is possible to produce spiking crops 72-75 days after the germination of seeds by using solutions of organic acids as a nutritive substrata during the 25-day vernalization in light of 5-day old winter wheat shoots. The utilization of this method under artificial-climate conditions encourages the production of three yields of winter wheat in the course of the year.

Tables--2, bibliography--11 titles.

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UDC 633.11"324":631.55

EFFECT OF THE LODGING OF WINTER WHEAT CROPS ON THE YIELD AND QUALITY OF GRAIN IN THE UKRAINIAN FOREST-STEPPE REGION

Moscow DOKLADY VASKhNIL in Russian No 11, Nov 78 pp 6-8

[Article by G. M. Kovbasenko and N. I. Blokhin]

[Text] It was established that the yield, the physical properties of the grain and the output of flour fall sharply as a result of the lodging of crops during the phase of milky ripeness.

Tables--3, bibliography--4 titles.

UDC 631.67:632.935

AUTOMATED INTRA-SOIL IRRIGATION AS A MEANS OF COMBATTING COTTON WILT

Moscow DOKLADY VASKhNIL in Russian No 11, Nov 78 pp 13-14

[Article by S. V. Nerpin, L. N. Stepanov and T. Kh. Khudoyerov]

[Text] Vegetative and field experiments have demonstrated that with intra-soil irrigation a complex of conditions are created that are unfavorable for the development of the pathogenic organisms causing wilt.

Tables--2, bibliography--8 titles.

UDC 631.585:551.521.1

UTILIZATION OF SOLAR ENERGY BY HAY LANDS AND PASTURES IN THE NON-BLACK EARTH REGION

Moscow DOKLADY VASKhNIL in Russian No 11, Nov 78 p 5

[Article by N. G. Andreyev and V. V. Kolomeychenko]

[Text] In the southern half of the Non-Black Earth Region of the RSFSR the feed lands are basically eroded ravine-bog meadows. Their productivity is extremely low--3-4 quintals of feed units per hectare, and the coefficient of utilization of photosynthetic active radiation (FAR) equals only 0.1-0.2 percent. The replacement of the natural phytocoenosis with awnless brome grass and the optimal doses of mineral fertilizers enabled the authors to produce 95.3 quintals of hay per hectare on the same meadows on the average for 1971-1976 and to raise the KPD of FAR consumption to 1.81 percent.

Tables--1, bibliography--11 titles.

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ABSTRACTS FROM JOURNAL 'DOKLADY VASKhNIL' NO 12, DEC 78 PP 38-39

UDC 633.22"324":632.111

THE EFFECT OF LOW AND HIGH TEMPERATURES DURING SPRING ON THE LENGTH OF  
THE VEGETATIVE PERIOD AND THE YIELD OF WINTER WHEAT

Moscow DOKLADY VASKhNIL in Russian No 12, Dec 78 pp 1-3

[Article by A. I. Korovin and G. I. Kozlov]

[Text] The effect of low or high temperatures on new vegetation in winter wheat is evident as soon as 5 days after the start of the action. Low temperatures lengthen the vegetative period and raise the yield and high temperatures shorten the vegetative period and lower the yield. The positive effect of low temperatures and the negative effect of high temperatures is greater on the yield of grain than on that of straw.

Tables--3, bibliography--6 titles.

UDC 636.086.15:631.8

THE EFFECT OF THE AREA OF NUTRITION AND THE FERTILIZER BACKGROUND ON THE  
QUALITY OF GREEN MASS OF CORN UNDER CONDITIONS EXISTING IN SIBERIA

Moscow DOKLADY VASKhNIL in Russian No 12, Dec 78 pp 6-7

[Article by A. I. Vasil'yev]

[Text] This article demonstrates that with a decrease in the area of nutrition the output of feed units and digestible protein per hectare increases. The provision of 1 feed unit with digestible protein decreases and as a result the green mass is not balanced in protein content.

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UDC 633.12:631.527.3

THE DEVELOPMENT OF STOCK IN THE BREEDING OF BUCKWHEAT FOR THE PRODUCTION OF NECTAR

Moscow DOKLADY VASKhNIL in Russian No 12, Dec 78 pp 7-9

[Article by G. V. Kopel'kievskiy, Ye. G. Cheplik]

[Text] It has been determined that buckwheat plants that have been selected by means of the freezing of shoots and on the basis of the degree of development of the root system develop more intensively and surpass the parent form in height, the number of blooms and the area of the leaf surface. In addition, the basic indicators of buckwheat productivity--the nectarousness of the flowers, the nectar productivity and the plant yield--rose reliably in the selected plants in comparison to the parent forms.

Tables--2, bibliography--5 titles.

UDC 633.26/29:636.085.2

THE CONTENT OF ENERGY AND PROTEIN IN GRASS AND ITS CORRESPONDENCE TO THE NEEDS OF A HIGHLY PRODUCTIVE DAIRY HERD

Moscow DOKLADY VASKhNIL in Russian No 12, Dec 78 pp 14-16

[Article by Kh. M. Older]

[Text] The energy and protein content of cereal grasses and leguminous-cereal grass mixtures were studied. It was determined that the concentration of exchange energy in grasses depends primarily upon the phase of their development and their variety. The protein requirements of dairy cattle are satisfied if the grasses are harvested during the booting phase (with a moderate dose of fertilizer) or at the beginning of the tillering phase (with a high dose). It is important to cut clover before it blooms.

Tables--3, bibliography--6 titles.

UDC 636.2:637.127+637.323

THE COMPOSITION OF MILK AND QUALITY OF CHEESE DEPENDING UPON THE BIRTHING SEASON OF COWS

Moscow DOKLADY VASKhNIL in Russian No 12, Dec 78 pp 23-24

[Article by B. F. Galat]

[Text] When lactating cows of the Simmenthal breed were fed various feeds that were of full-value for all nutritive and mineral substances under normal conditions of upkeep, the birthing season did not have any significant effect on the milk and its technical properties. The cheese produced from the milk of cows that bore their young at different periods of the year was evaluated as being of high quality.

Tables--1, bibliography--3 titles.

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UDC 631.354.2(470.2)

TESTING OF WORKING PARTS OF GRAIN-HARVESTING COMBINES FOR THE NON-BLACK EARTH REGION OF THE RSFSR

Moscow DOKLADY VASKhNIL in Russian No 12, Dec 78 pp 30-32

[Article by V. G. Antipin]

[Text] This article presents the results of theoretical studies and experimental research on the special working parts and attachments of grain-harvesting combines which it would be expedient to utilize for modifications in the grain-harvesting combine for the Non-Black Earth Region of the RSFSR.

Formulas--9, bibliography--3 titles.

UDC 631,585:631.84

EFFECTIVENESS OF DOSES OF NITROGEN FERTILIZER DURING THE INTENSIVE USE OF FLOOD-PLAIN HAYLANDS

Moscow DOKLADY VASKhNIL in Russian No 12, Dec 78 pp 33-34

[Article by I. P. Takunov]

[Text] This article presents the results of experiments on the effect of various doses of nitrogen fertilizers and irrigation on the productivity of natural grass stands in flood-plain haylands during the second, third and fourth harvests. The greatest effectiveness of nitrogen fertilizers was demonstrated when the haylands were harvested three times.

Tables--2, bibliography--2 titles.

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ABSTRACTS FROM JOURNAL 'DOKLADY VASKhNIL' NO 1, JAN 79 PP 46-48

UDC 632.93:632.7

ON THE PHYSICAL-BIOCHEMICAL EVALUATION OF THE DANGERS OF CEREAL FLIES

Moscow DOKLADY VASKhNIL in Russian No 1, Jan 79 pp 13-14

[Article by P. I. Susidko, V. N. Pisarenko and N. Sh. Vygonnaya]

[Text] It was determined that the infestation of winter wheat with the larva of cereal flies has a significant effect on the nature of the synthesis and breakdown of plastic substances in the plants. The damage thresholds of cereal flies are not the same for plants of different varieties of winter wheat.

Tables--2.

UDC 631.42:577.17.049

THE CONTENT OF MICROELEMENTS IN IRRIGATED MEADOW SOILS OF THE CENTRAL AMUDAR'YE CURRENTS

Moscow DOKLADY VASKhNIL in Russian No 1, Jan 79 pp 15-16

[Article by I. S. Rabochev and L. G. Ibragimova]

[Text] A study was made of the content of zinc, copper and manganese in meadows soils irrigated at various times in the past and of silt fractions from them. The gross zinc and copper content in irrigated meadow soils is above the clarke; the manganese--below. The content of microelements in the silt fraction is higher than in the soil.

Tables--2, bibliography--6 titles.

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UDC 636.2:637.517.2

BEEF QUALITY IN VARIOUS CATEGORIES OF CATTLE

Moscow DOKLADY VASKhNIL in Russian No 1, Jan 79 pp 29-31

[Article by D. L. Levantin and A. I. Mglinets]

[Text] It was determined that the hydrothermal resistance of collagen in the meat of adult cattle is twice as great as in the meat of calves. The optimal indicators of meat productivity and the meat quality of calves are presented. It is shown that the meat of non-castrated bulls differs from the meat of castrated bulls in its structural and mechanical properties.

Tables--1, bibliography--5 titles.

UDC 628.322

THEORETICAL BASES FOR THE PROCESS OF THERMAL PURIFICATION OF WASTE WATERS

Moscow DOKLADY VASKhNIL in Russian No 1, Jan 79 pp 34-36

[Article by V. A. Kokurin, I. A. Bakulov and V. M. Kotlyarov]

[Text] A heat-balance equation was used to determine the laws of temperature changes during the sterilization of liquids. Six basic stages in the purification process were established. A formula was developed enabling the authors to determine the time necessary for heating the liquid to the temperature that inactivated the microorganisms.

Formulas--17, bibliography--7 titles.

UDC 633.15:581.167

THE CROSS-BREEDING OF CORN AND THEOSYNTH

Moscow DOKLADY VASKhNIL in Russian No 1, Jan 79 pp 34-36

[Article by A. P. Podol'skaya]

[Text] This article presents the results of the cross-breeding of theosynth with various lines and varieties of popping corn previously isolated as homozygotes according to various alleles of the gametophytic factor of the fourth chromosome. Theosynth was used as a pollen donor in cross-breeding. It was found that it was completely compatible with the lines and varieties of popping corn regardless of its origin and genotype according to the Ga-factor of the fourth chromosome.

Tables--1, bibliography--3 titles.

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UDC 631.626.3

THE SOIL PRODUCTIVITY METHOD OF DETERMINING THE DISTANCE BETWEEN DRAINS

Moscow DOKLADY VASKhNIL in Russian No 1, Jan 79 pp 44-46

[Article by E. A. Soovik]

[Text] This article recommends a new soil-productivity method for determining the distances between ceramic drains used to drain boggy soils. Data covering a 6-year period is presented and deals with the effect the distance between drains has on the productivity of field crops. A nomogram is presented based on this data for the practical determination of "E" under conditions existing in the Estonian SSR and also based on the filtration coefficient, the gleization index and the depth at which the drains are placed.

Tables--1, formulas--1, illustration--1, bibliography--6 titles.

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ABSTRACTS FROM JOURNAL 'DOKLADY VASKhNIL' NO 2, FEB 79 PP 46-48

UDC 633.11"324+321"

THE TRANSFORMATION OF WINTER-FLOWERING TO SPRING-FLOWERING AS A METHOD OF DEVELOPING HIGHLY PRODUCTIVE VARIETIES OF SPRING WHEAT

Moscow DOKLADY VASKhNIL in Russian No 2, Feb 79 pp 3-6

[Article by V. I. Glushchenko]

[Text] This article shows that the essence of the transformation of winter-flowering to spring-flowering is an alteration of genetically-based physiological-biochemical processes that determine the pace of development. A method of cross-breeding spring wheat from winter wheat using experimental environmental conditions has been developed. The measured amount of initial vernalization differs for various varieties. With the development of parent breeding material through the method of transformation of the developmental rhythm there is no free redistribution of discrete fixed genetic characteristics.

Tables--2, bibliography--3 titles.

UDC 633.11(470.4)

SOME PHYSIOLOGICAL INDICATORS OF DROUGHT-RESISTANCE IN SPRING WHEAT UNDER THE CONDITIONS EXISTING IN THE VOLGA REGION

Moscow DOKLADY VASKhNIL in Russian No 2, Feb 79 pp 6-8

[Article by V. F. Dorofeyev, A. M. Medvedev and I. I. Razumova]

[Text] An evaluation was made of the drought resistance of a number of varieties of spring soft and hard wheats according to the permeability of the protoplasm using an electrolytic method and the water-retention capability of the leaves during wilting. Samples were isolated to be used as parent material for the development of drought-resistant varieties of the intensive type.

Tables--2, bibliography--9 titles.

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UDC 633.511:546.135+546.46

THE EFFECT OF DEFOLIANTS ON THE OPENING OF COTTON BOLLS

Moscow DOKLADY VASKhNIL in Russian No 2, Feb 79 p 9

[Article by A. Zhurakulov and I. Imamaliyev]

[Text] It was determined that defoliants had various effects on the opening of cotton bolls of the Tashkent-1, Tashkent-3 and Tashkent-4 varieties according to the time of treatment. The optimal time to defoliate these cotton varieties is the period when from 2-3 to 3-4 bolls are opening up on the plant.

Tables--1, bibliography--4 titles.

UDC 633.511:631.675

THE REACTION OF RADIATIVE COTTON VARIETIES ON THE WATER REGIMENT

Moscow DOKLADY VASKhNIL in Russian No 2, Feb 79 pp 10-12

[Article by N. N. Nazirov and G. Satipov]

[Text] On serozem soils where ground waters are relatively close the optimal water regiment for radiative varieties is a vegetative irrigation scheme of 0-3-1 with the first irrigation scheduled for the beginning of blooming phase. For the industrial variety Tashkent-1 the corresponding scheme is 1-3-1 with the first irrigation schedules for the appearance of 4-5 real leaves. Among the new varieties the most promising turned out to be AN-402 and AN-408.

Tables--2, bibliography--5 titles.

UDC 633.11:628.93

ON THE SENSITIVITY OF MEXICAN WHEATS TO THE EFFECT OF THE PHOTOPERIOD

Moscow DOKLADY VASKhNIL in Russian No 2, Feb 79 pp 15-16

[Article by R. S. Limar']

[Text] It was noted that Mexican wheats thrive on long days and form ears better under natural-lighting conditions. Under the conditions of a 10-12 hour day ear-formation was held back, but not uniformly. The photoperiodic sensitivity of plants changes according to weather conditions.

Tables--1, bibliography--6 titles.

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UDC 633.491:551.524.37

THE DEGREE OF DAMAGE TO POTATO HAULM DEPENDING UPON THE DEGREE OF FROST

Moscow DOKLADY VASKhNIL in Russian No 2, Feb 79 pp 24-25

[Article by V. P. Dmitriyev]

[Text] The increased degree of damage to potato haulm during intensified artificial frosts is graphically approximated by the logistical function. The parameters that determine the slope and point of reversal of the logistical line of regression reflect five types of functions of haulm damage as a result of the intensity of frost. Resistant species of potatoes differ from non-resistant species by the parameters and the slope of the line of regression.

Tables--1, illustrations--1, bibliography--6 titles.

UDC 631.372:65.011.4

THE EFFECT OF THE RESILIENT DRIVE OF THE FRONT WHEELS OF A TRACTOR ON THE QUALITY OF AGRICULTURAL OPERATIONS

Moscow DOKLADY VASKhNIL in Russian No 2, Feb 79 pp 38-39

[Article by T. I. Makarova]

[Text] Resilient drive raises the effectiveness of the operation of wheeled tractors--the loading regiment is stabilized, there is a reduction in the fluctuation of the forward movement of the unit and the slipping of the propelling agent decreases.

Illustrations--3.

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ABSTRACTS FROM JOURNAL 'DOKLADY VASKhNIL' NO 3, MAR 79 P 46

UDC 633.11:631.527

IMPROVING THE METHODS OF EVALUATING GRAIN QUALITY FOR THE BREEDING OF  
SOFT WHEAT IN THE USSR AND CHSSR

Moscow DOKLADY VASKhNIL in Russian No 3, Mar 79 p 46

[Article by A. A. Sozinov, M. G. Parfent'yev and V. Nemets]

[Text] During the first decisive stages of selection it is possible to evaluate the weight of 100 seeds, the hardness of the seed, its form and protein content, to determine the amount of sedimentation and to obtain a mixogram. A bread-baking test and other complicated tests can be made only at the final stages of breeding and during the final evaluation of promising varieties.

Tables--5, bibliography--3 titles.

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