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 FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT
 CD NO.

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50X1-HUM

COUNTRY USSR
 SUBJECT Economic; Technological - Agricultural machinery, rubber
 HOW PUBLISHED Monthly periodical
 WHERE PUBLISHED Moscow
 DATE PUBLISHED May 1951
 LANGUAGE Russian

DATE OF INFORMATION 1951
 DATE DIST. 2 Jul 1951
 NO. OF PAGES 3
 SUPPLEMENT TO REPORT NO.

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SOURCE Sel'khoz mashina, No 4, 1951.

NEW SOVIET MACHINES FOR HARVESTING RUBBER-BEARING CROPS

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Seed Collection

The seed-bearing period of kok-sagyz plants lasts 45-60 days, and the seeds do not ripen simultaneously. When the pod is fully opened, the seeds remain on the plant several hours, not several days, as is the case with other plants. This makes it necessary to collect seeds two to three times a day.

The SKS-4 seed collector is based on a combination of mechanical action and an air current. Beaters mounted on the front of the machine rotate in opposite directions and comb the ripened kok-sagyz seeds. Axle blowers create a suction, which draws the seeds into the receiving chamber.

The SKS-4V seed collector, built by VISKHOM (All-Union Agricultural-Machine-Building Institute) works on the same principle as the SKS-4, but it is somewhat different in design. Four beaters with spiral brushes are mounted on the machine, and a single axle blower extends across the breadth of the machine, which covers four rows when intervals between rows are 445 millimeters.

The UKP-2 two-row hand seed collector made by VISKHOM from plans developed by the Belorussian Institute for Mechanization of Agriculture works on the mechanical principle alone and does not have a blower.

These machines gather approximately 60 percent of the seed as compared to hand collection.

A number of original machines built by UNDIM [Ukrainian Scientific ... Institute for Mechanization?] and by individual inventors have appeared in the Ukraine.

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Complete testing of the seed collectors was not possible in 1950 owing to unfavorable weather conditions. It is interesting to note that references to unfavorable weather conditions have been made yearly, at least for the past 5 years, in reports on the testing of kok-sagyz seed collectors. It is clear that more than climatic conditions are involved.

Existing agricultural instructions and regulations for cultivating kok-sagyz unequivocally cite the necessity of gathering seeds from pods which have taken on a cylindrical form and a yellowish color but have not yet opened. This applies to hand picking; for machine picking the pods must be open. However, the wind carries off a considerable quantity of seed from opened pods during the collection period.

A new technological approach to collecting kok-sagyz seeds, based on the principle of mowing the pedicels bearing the pods in layers, is called for at this time. This method is feasible because kok-sagyz pods can be ripened after harvesting by drying them in the sun. Mowing must be done in layers, so that the first mowing will be conducted at a height of 15-20 centimeters from the ground. It is not improbable that the period of ripening in the remaining pods will be accelerated, and so a second mowing at a height of 10-15 centimeters from the ground will be necessary. If necessary, a third mowing may be conducted at the end of the seed-bearing period. The first mowing must be carried out no earlier than 6-8 days after seed bearing begins, that is, 1-2 days before mass ripening begins. The figures cited are approximate and depend on local climate.

Once the pods are dried, they are threshed and cleaned just as after hand picking. Large-scale research on this proposed process of mowing in layers will make it possible to evaluate its economic expediency and efficiency.

The GSU-2K guayule seed collector, designed by VISKHOM, works on a mechanical principle. Guayule bushes are from 30 to 100 centimeters high, the seeds do not ripen simultaneously, and ripened seeds scatter easily. Periodic collections of guayule seeds must be made at intervals of 2-3 days. The GSU-2K is drawn by one horse and processes two rows when the intervals between rows are 700 millimeters. An arrangement of brushes on a drum removes the seeds from the guayule bushes. The machine weighs 230 kilograms and processes 3.2 hectares a day. The GSU-2K was found satisfactory at the Zaka saz (Transcaucasus) Machine Experimental Station.

Cleaning Seeds

The TK-415 hand grinder, used to thresh kok-sagyz seed, is operated by two men. The seed pods should be dried before threshing until they have a moisture content of 15-20 percent. The TK-415 produced completely satisfactory results when tested at the Tsentral'naya-Chernozemnaya (Central Black Earth) Machine Experimental Station. The grinder threshes 25-30 kilograms of seed pods per hour and gives a seed purity of no less than 90 percent.

VISKHOM has constructed an experimental model of the OTS-700 tau-sagyz seed cleaner. This machine is simpler and more effective than the old machine, which was composed of 16 different aggregates and required 20 men to operate it. Tests of the new machine at the Sredneaziatskaya (Central Asia) Machine Experimental Station in 1949 and 1950 showed that the output of pure seed was 54.2 percent of the starting material, seed purity was 91.9 percent, and productivity was 30-35 kilograms per hour. The machine, which has been recommended for series production, is driven by a 0.16-horsepower motor and is operated by two workers.

VISKHOM has built a similar machine for cleaning guayule seeds which has also been recommended for series production.

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Harvesting

1. The KUKS-1 single-row machine is designed for harvesting kok-sagyz roots in mineral soils; it is drawn by the KDP-35 tractor. The roots are picked by hand by workers who follow the machine.

2. The UKK-2 two-row machine is also designed for harvesting kok-sagyz roots in mineral soils and is drawn by the KDP-35 tractor. This machine cuts the stems off the roots.

Both the KUKS-1 and the UKK-2 satisfactorily harvested one- and 2-year-old crops of kok-sagyz. Roots gathered were 16-18 centimeters long. Losses were 5-8 percent.

3. The TUKM-2 two-row machine harvests kok-sagyz roots from peaty soil; it is drawn by the KDP-35 tractor. The roots are gathered and the stems cut off by hand. The TUKM-2 was tested by the Zapadnaya (Western) Machine Experimental Station in 1949. With the digging plowshare set to penetrate the ground 30 centimeters, most of the roots harvested (82 percent by weight) were 20 centimeters or more long. Loss of roots was from 2.6 to 4.35 percent.

In 1950, the Belorussian Institute for Mechanization built and submitted for testing the TUKM-2M machine, which has two narrow (270 millimeters wide) digging shares in front with narrow elevators mounted behind them. This arrangement reduces the amount of soil fed to the separating units of the machine. The TUKM-2M is designed to harvest plantings with between-row intervals of 600 millimeters.

4. The K-1.4 mower, fitted with a medium cutter, is used to harvest seedlings and sets of guayule. The gathering of seedlings consists of two operations, mowing the part above ground and digging up the seedling. VISKHOM, together with the Special Design Bureau of the Lyubertsy Agricultural-Machine-Building Plant imeni Ukhtomskiy, has fitted the K-1.4 mower with a medium cutter, which cuts 89.4 percent of the guayule shoots to a height of 5 centimeters above the ground. A sugar-beet lifter fitted with a digging hoe whose cutting edge is 25-30 centimeters wide is used for digging up seedlings.

VISKHOM has also developed, for use with the U-2 tractor, the GUS-2 machine, which cuts the above-ground part of guayule bushes and lays them in rows. Tests conducted in 1950 showed that the machine cuts no less than 93.3 percent of the guayule bushes to within 2-6 centimeters off the ground. As a result of tests made in 1950, the Zakavkaz Machine Experimental Station recommends building a group of these machines and devising a stacker for the cut guayule bushes.

Normal conditions for testing machines for rubber-bearing crops must be established at machine experimental stations. Up to now, not one station has had its own sowings of rubber-bearing plants. As a result, tests are held on sowings of various farms not interested in the experiments. Up to this time, the machine experimental stations have not been manned with cadres of skilled specialists. Outdated programs and methods of testing hinder a correct, reliable evaluation of a machine's performance.

Agrotechnicians and biologists specializing in selective breeding should devote more attention to investigating varieties of rubber-bearing plants, especially kok-sagyz, that will facilitate the use of harvesting machinery.

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