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FROM THE PERSPECTIVE OF OUR NATIONAL INTERESTS: WHICH MACHINE SHOULD WE PREPARE FOR FARMERS?

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This year, we witness that cotton harvesting in a great number of farming enterprises across our Republic is being carried out when 80–90% of cotton bolls have opened in fields where cotton plants have been defoliated and at least 70–80% of green leaves have been shed.

Field area where 80-90% of cotton bolls in our republic's farms have opened

Due to the growing cultivation of early-maturing and high-yielding cotton varieties in Uzbekistan, for many years the farming enterprises and cotton clusters of our Republic have been using high-performance and efficient horizontal spindle cotton picking machines (HSMs) manufactured in the USA and China to harvest cotton in defoliated fields. These machines are mainly engaged in harvesting operations in fields where 80–90% or more of cotton bolls have opened and the cotton yield is 35–45 centners per hectare. When cotton raw material is harvested by these machines, the harvest completeness indicators are very high, reaching 90–95%. Under such conditions, the cotton harvest is collected at low costs, and these machines justify themselves.

However, considering the very large mass of these machines and that we import them at very high prices, that they do not fully meet environmental requirements (the specific pressure of the wheels on the soil does not comply with state standards), and that technological materials and servicing cost very much — it becomes apparent that their use in our Republic is not always economically optimal.

John Deere brand horizontal-spindle cotton harvesting machine (made in the USA) in cotton picking

Case brand horizontal-spindle cotton harvesting machine (made in the USA) in cotton picking

The weather conditions and climate changes in Uzbekistan do not always guarantee that 80–90% of cotton bolls will have opened by the start of the harvesting season. Therefore, it is regrettable that HSMs are also being used to harvest cotton when only 50–60% of bolls are open (at the beginning of harvest) or 60–70% open (at the end of harvest), and when the cotton yield

in the field is 25–30 centners per hectare or less. Analyses show that this is economically unprofitable. In such situations, harvesting costs increase significantly and the quality of the harvested cotton fiber decreases (it does not meet state standard requirements, though this issue is not reported anywhere), causing losses to clusters and farming enterprises.

Cotton field with 50-60% opened bolls

In 2024, our study of HSM operations during cotton harvesting in farming enterprises showed that in fields where cotton plant height is 35–45 cm, yield is 25–30 centners per hectare (and in some cases even lower), and boll opening is 50–70%, the harvesting costs when collecting cotton with HSMs are not covered. As a result, farmers are not interested in harvesting their crop with these machines and are abandoning HSM harvesting on their fields.

For this reason, under such conditions and circumstances, farming enterprises in our Republic are hand-picking the harvested cotton. In certain regions, the cotton harvest is being collected using MX-1.8 type vertical spindle cotton picking machines (VSMs) produced at the Tashkent Tractor Plant in our Republic during 2010–2016. Observations of their operation in farming enterprises are being assessed positively.

MX-1.8 brand cotton harvesting machine

MX-1.8 cotton picking machine in harvesting operation

For example, a working group led by the Minister of Agriculture of our Republic studied cotton harvesting in farming enterprises of Navoi province and witnessed the improvement in cotton harvest quality and a reduction in financial costs for collecting cotton. As a result, they emphasized the need to develop measures to increase the participation of MX-1.8 type cotton picking machines in harvesting operations in the coming years.

As previously noted, due to the growing cultivation of early-maturing and high-yielding cotton varieties in our Republic, MX-1.8 type cotton picking machines have for many years been engaged alongside HSMs manufactured in the USA and China in harvesting operations in defoliated fields with 80–90% open bolls and cotton yields of 30–40 centners per hectare.

Analysis of the technological processes and agrotechnical performance indicators of the MX-1.8 type cotton picking machine in field conditions where 80–90% of bolls are open and the cotton yield is 30–40 centners per hectare or more reveals that its harvest completeness does not exceed 80–85%, the amount of cotton falling to the ground is 5–10% or more, and the

contamination of cotton collected in the bunker reaches 10–12%. At such agrotechnical indicators, the quality of work performed and the cost of harvested cotton do not satisfy farming enterprises, since collecting the valuable cotton residues remaining at the base of plants and fallen to the ground is not economically feasible. This situation reduces the efficiency of the MX-1.8 type vertical spindle cotton picking machine when used in high-yield fields with 80–90% or more open bolls. For this reason, farmers used the MX-1.8 type machine only in certain cases or out of necessity.

In order to eliminate the above-mentioned shortcomings, professors and teachers of the "Ground Transport Systems" Department of the Faculty of Mechanical Engineering at Tashkent State Technical University named after Islam Karimov, led by Academician S.M. Turabjonov, have developed a cotton picking apparatus designed to be installed on the domestically produced MX-1.8 type vertical spindle cotton picking machine. This apparatus is intended for harvesting cotton in farming enterprise fields where boll opening is 80–90% or more and the yield is 30–40%. It processes open cotton bolls three times (using six drums in a single row), ensures harvest completeness of 93–95%, does not allow cotton residues falling to the ground to exceed 3%, and does not allow contamination of cotton collected in the bunker to exceed 8% (per state standards). A utility model patent for this picking apparatus was granted by the Intellectual Property Center under the Ministry of Justice of the Republic of Uzbekistan (Khajiev M.Kh., Karimov V.U. Cotton picking apparatus. UZ FAR 02366 / Tashkent State Technical University / Ministry of Justice of the Republic of Uzbekistan. Bulletin No. 12. 29.12.2023).

Preparing the MX-1.8 type VSM equipped with this picking apparatus for industrial production and its widespread use in cotton harvesting offers an opportunity to improve the economy of farming enterprises. It provides the opportunity to reduce imports of very expensive HSMs with very high operating costs. New jobs will be created in industrial enterprises of our Republic. Most importantly, our homeland's textile industry will be supplied with high-quality and affordable cotton fiber.