AMERICAN Journal of Engineering, Mechanics and Architecture
Volume 01, Issue 07, 2023 ISSN (E): 2993-2637

Prospective Technology and Combined Aggregate for Crop Growing

D. Sh. Chuyanov
Karshi Engineering Economics Institute (Uzbekistan)

Abstract: This article presents the results of studies on the basis of a promising technology for the cultivation of rice crops and the construction scheme of the combined unit that implements it.

Keywords: technology, field crops, planting, soil, tillage without tiller, technological process, combined machine, ditch opener, soil preparation period, frame, construction scheme.

Introduction. All the operations and processes performed in world agricultural production are developing directly depending on the supply of energy, and on the basis of this, along with land cultivation, creation of resource-efficient methods and technical tools used in their implementation, improvement of existing ones, and designed for fertilizing, forming irrigation ditches and planting seeds. scientific-research works aimed at developing their scientific and technical basis are being carried out. "On the world scale, the cultivated area of poliz crops is 3.5 mln. hectare" [1], one of the important tasks is the development of machines and devices that perform high-quality and efficient and energy-resource-efficient soil cultivation, fertilizing, irrigation ditch formation and planting in one pass.

Therefore, at present, the development of the technology of preparing the soil for the planting of cash crops in one pass of the aggregate, as well as the introduction of the combined machine that implements this technology, is an urgent scientific issue to protect the soil, reduce the consumption of energy and materials.

Materials and methods. Based on the analysis of the literature and the results of the conducted research, a technology was developed for the preparation of the soil for the planting of cash crops and the minimal tillage of the soil during planting [2,3,4]. The proposed new method of soil cultivation and planting is protected by patents of UzR No. IAP 05360, UzR No. FAP 01125 and UzR No. FAP 00656 [5-8].

Theoretical mechanics, agricultural mechanics, laws and rules of mathematical statistics and the methods specified in the existing regulatory documents (TSt 63.04.2001, TSt 63.03.2001, RD Uz 63.03-98) were used in the research process.

Results and discussion. In the development of this technology, the following were taken into account: fertilization, basic soil processing and its preparation for planting polys crops, and timing of sowing seeds; the need to prepare the soil for planting rice crops in a short period of time; availability of powerful tractors for aggregating the combined unit; the possibility of carrying out all processes simultaneously with the help of working bodies.

The proposed promising technology is implemented as follows (Fig. 1): the distance between adjacent planting zones is softened to a depth of 12-15 cm, then the surface part of the planting zone with a thickness of 8-10 cm, that is, the surface part of the winter wheat stalks and weeds, is

divided into two and cut is laid on the sides, after which the soil of the planting area is deeply softened, and at the same time, an irrigation ditch is formed and local fertilizer is applied. The soil on both sides of the seedbed, i.e., the irrigation ditch, is crushed, leveled, and compacted, and then the seed is planted.

In order to implement the proposed technology, a combined machine was proposed that simultaneously cultivates the soil and prepares it for planting, applies fertilizer and plants poly crops [6-8].

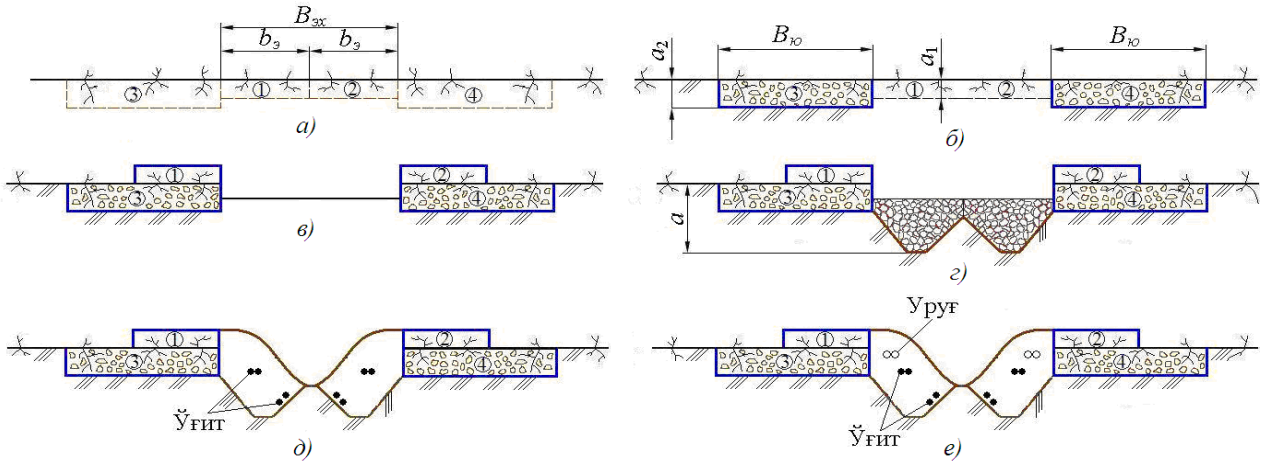

Figure 1. Tillage and planting method: a – cross-sectional view of the field before tillage; b and v – cross-section profile of the field after the surface has been softened between the planting areas and the plows have been turned to the right and left; g and d - cross-section profile of the field after deep softening between the planted rows, forming irrigation ditches with fertilizer; e – cross-sectional profile of the field after sowing

Combined machine frame 1, suspension device 2, disk blade 3, lister-type body with left and right overturning mounted on the axis of symmetry of the unit 4, softeners (flat) 5, deep softeners with tilting handle 7, fertilizer delivery device 8, softener-leveler roll 9, planting device 10 and support wheel 6 are included. The reel 9 and the planting device 10 are hingedly attached to the frame (Fig. 2).

The combined machine (Fig. 2 and 3) is mainly used to prepare the fields freed from winter wheat for planting polys crops. The technological operation of the combined unit is carried out as follows: softeners installed in a row soften the field on the side of the planting area, i.e., the field between adjacent rows to a depth of 12-15 cm and cut the roots of weeds. After cutting to a depth of 10 cm, it is rolled over the softened field to the right and left, and then the planting area is deeply softened with the slope handle softeners, and at the same time, fertilizers are applied to a specific place along the line where the seeds are planted. The soil between the rows is softened and compacted with the help of the softener-leveler roller 9, and the seed is sown with the sowing machine.

At the same time as overturning the plows, the soil is softened with deep looseners 7 and local fertilization is carried out in the area to be planted with sashniks. The planar roller 9, placed after the casings, crushes the lumps, compacts the soil, and forms a finely ground layer on its surface.

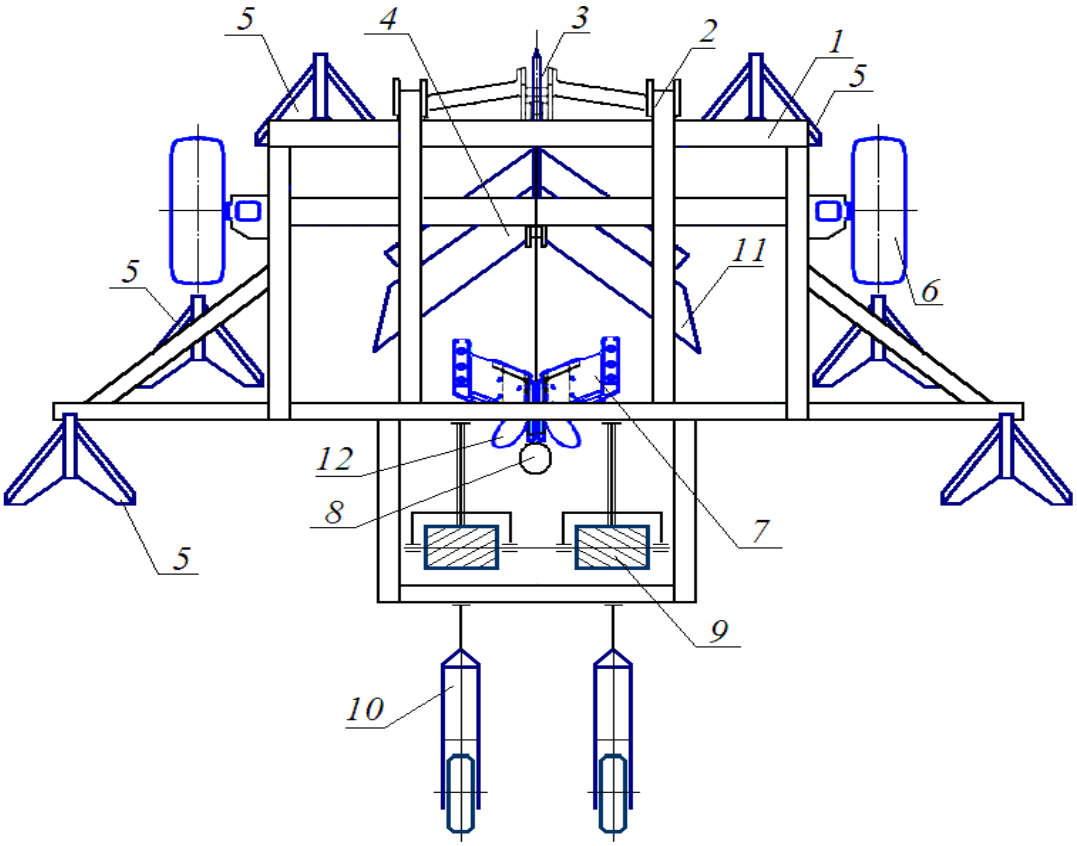

Figure 2. The structural scheme of the combined machine:
1 – frame; 2 – suspension device; 3 – disk-shaped knife; 4 - a double case with a guide plate in the form of a lister; 5 – flat chisel; 6 – support wheel; 7 – deep softener; 8 – fertiliser; 9 – reel; 10 – planting device; 11 – guide plate; 12 - slimmer

When polys crops are planted in the place of winter wheat as a repeated crop, turning the surface part of the field in the planting area 8-10 cm deep on the right and left sides on the surface softened strip allows to clean the planting area from plant residues.

The combination of tillage with and without tillage, as well as the formation of an irrigation ditch at the same time as deep loosening of the soil with belts, leads to a sharp reduction in energy consumption and prevents water and wind erosion. Applying fertilizer to a specific place in two layers increases the efficiency of using mineral fertilizers and productivity.

The use of the proposed technology ensures high-quality preparation of the soil for planting and planting of field crops in a short period of time, protects the soil from erosion and excessive compaction, reduces the cost of labor and money, and increases the yield of field crops.

Carrying out the above-mentioned operations in one go preserves the moisture of the fields where poliz is planted, saves material and energy resources in tilling the soil and preparing it for planting, that is, the minimum tillage is ensured due to the fact that the number of aggregates passes through the field is reduced by 3-4 times.

Figure 3. General view of the combined unit

Conclusion. In one pass of the unit for planting polys crops, it is intended to prepare the soil for planting and carry out the technological processes under the planting method: turning the surface part of the soil in the planting area to the right and left and forming an irrigation ditch at the same time with deep softening of its lower part, the left and right of the planting area shallow softening of the soil on the sides and application of fertilizers to a specific place, preparation of the soil for planting according to the planting row, and sowing of the seeds of field crops. The optimal scheme of the combined machine that implements this method consists of right and left overturning bodies (in the form of a lister body) located along the axis of aggregate symmetry, surface softeners, "paraplau" type deep softeners equipped with a ditch opener, fertilizing flaps and planting apparatus.

Reference

1. Литвинов С.С., Быковский Ю.А. Бахчеводство: стратегия и перспективы развития // Картофель и овощи. – Москва, 2013. -№4.
2. Mamatov F.M., Shodmonov G.D., Chujanov D.Sh., Ergashev G.X. New technology and combined machine for preparing soil for sowing gourds. Вена: European science review, 2018. – No.1-2. – pp. 234-236.
3. Mamatov F., Mirzaev B., Chujanov D.Sh., Ravshanov H., Shodmonov G., Tavashov R., Fayzullayev X. Combined machine for preparing soil for cropping of melons and gourds // IOP Conf. Series: Earth and Environmental Science. - № 403, 2019.
4. Chuyanov D., Shodmonov G.,Ismailov I., Ergashov G., Sadikov A. Traction resistance of the combined machine plough// CONMECHYDRO – 2021.E3S Web of Conferences 264, 04036 (2021).
5. Chuyanov D., Abduraxmonov U., Shodmonov G. Energy-saving technology and machinery for growing melons // Novateur Publication India's International Journal of Innovations in Engineering Research and Technology - IJIERT. – Indiya,2020.– pp 368-374

6. Патент № 1AP 05360. Тупроққа ишлов бериш ва экиш усули/ Маматов Ф.М., Мирзаев Б.С., Чуянов Д.Ш., Шодмонов Ғ.Д., Эргашев Ғ.Х., Тоштемиров С.Ж., Буранова Ш.У., Қузиев Н.М. // Расмий ахборотнома. – 2017. – № 4.
7. Патент РУз № FAP 01125. Уйғунлашган тупроққа ишлов бериш қуроли / Маматов Ф.М., Мирзаев Б.С.,Чуянов Д.Ш., Шодмонов Ғ.Д., Эргашев Ғ.Х., Қодиров У.И., Тоштемиров С.Ж., Буранова Ш.У. // Расмий ахборотнома. – 2016. – № 9.
8. Патент № FAP 00656. Ағдаргичсиз тупроққа ишлов бериш қуролининг ишчи органи / Маматов Ф.М., Мирзаев Б.С., Равшанов Х.А., Файзуллаев Х.А., Авазов И.Ж., Мардонов Ш.Х, Темирова Д.И., Шодмонов Г.Д. // Расмий ахборотнома. – 2011. – № 11.