eISSN: 2229-3213 pISSN: 2229-3205
The Journal of Applied Science and Social Science
Volume 16,Issue 05 May, 2026

PNEUMATIC PROTECTION SHELL FOR THE CULTIVATOR-FUTURIZER.

Mamirov Y.T
Andijan State Technical Institute
Assistant of the Department of "Technological Machines and Labor Protection

Abstract. This article describes the role of pneumatic protective sheaths for cultivator-feeder in cotton growing and their advantages. The shortcomings of the existing sheaths are shown. Information is provided on the structure and advantages of the proposed pneumatic protective sheath.

Key words: cultivator, cotton flower, cotton branches and stems, pneumatic protective sheath.

The development of the agricultural sector is the primary factor and source of Uzbekistan's economic development. The share of agriculture in national income exceeds 35%, and in the volume of exports, it exceeds 60%. The agricultural sector accounts for a quarter of the country's gross domestic product, and more than half of the production and intellectual potential is directly linked to this sector. Therefore, the development of agriculture is of paramount importance today.

In agriculture, the problem of combating any losses and preserving crop yields has always occupied one of the central places. The fight against losses at all stages of cotton cultivation and harvesting is currently of particular relevance.

The most important link in the complex of agrotechnical measures aimed at obtaining high cotton yields and reducing labor costs is the technological processes of cotton cultivation. The high-quality implementation of these processes and the rational use of mechanization tools in cotton processing is an important national economic task that cannot be solved without in-depth scientific research aimed at improving technological processes.

Production in agriculture is carried out through soil cultivation. The soil is first mainly cultivated, prepared for sowing, seeds are planted in it, then the soil is further cultivated and the crop is grown. Prior to the mechanization of these processes, farmers used the simplest tools—a plow, a harrow, a hoe, a shovel, and a rake. In the past, the land was plowed once or twice with a plow because the latter was plowed deeper than the previous one, and the depth was increased. The sowing was done entirely by hand. In 1910, there were 135,000 ploughs in Uzbekistan, 1,100 metal horse-drawn ploughs, 137 metal harrows, and 12 seeders[1]. Horses, oxen, camels, and mules were used to haul these tools. These tools required the cultivation of 423,000 hectares of land. Providing agriculture with such a large amount of machinery, it was impossible to obtain high yields of cotton and other crops. The agricultural implements of European countries would bend or break, making them unsuitable for cultivating our soil, which was heavy and had high resistivity.

Starting from 1914, agricultural implements for cultivating cotton and other crops began to be imported into our country, and agrotechnical requirements for these crops began to be formed [2].

As a result of numerous studies and scientific research, the mechanization of agriculture developed. Currently, great attention is paid to the production of resource- and energy-saving machinery. Also, improving the quality and efficiency of products is a priority task. From this perspective, certain metal working parts of soil-cultivating tractor units cause damage to cultivated crops. This leads to a decrease in yield. Specifically, as a result of tractor movement between cotton rows, the cultivator damages the new cotton bolls.

Various types of protective agents are used during the cultivation process to reduce crop damage. In cotton cultivators manufactured in our country by the "Chirchikselmash" plant, to

ensure that cotton and its bolls and flowers are not damaged, a protective tool consisting of 3 sheets of steel material and a corner was used for tractor wheels, and 5 sheets of steel material were used as covers for the working parts.

It is known that during the growing season, when the cotton plants develop and reach a certain period, the branches of the plants in the adjacent rows approach each other. Under these conditions, during the operation of the cotton inter-row cultivation unit, plant branches break and tear, flowers, tubers, and bolls fall off, which ultimately leads to a decrease in yield [3].

In KXU-4L-01 cultivators, a protective device consisting of 5 elements is used. In this case, the protective equipment consists of parts made of special material and a metal frame. The special material is installed on a special frame and secured to the cultivator using bolts and nuts. The main disadvantages of such tools are that installation and removal take a relatively long time, they are not vibration-resistant, crack easily, and the protective device does not contain elements for tractor wheels and cultivator rods [4].

The agrotechnical requirements for a cultivator used for inter-row cultivation of cotton indicate the prevention of plant damage and fractures, as well as the shedding of tubers and bolls [4].

In addition, homemade protective devices are currently known for cotton cultivators. In this case, various materials (rubber, bags, cellophane, etc.) are wrapped around the cultivator section to prevent the cotton from breaking.

In the conditions of our republic, when treating cotton inter-rows with cultivators, to avoid breaking cotton branches and damaging its productive elements, the cultivator sections are equipped with special, i.e., industrial and artificial protective barriers (cases). However, existing protective barriers cannot protect cotton branches and fruit elements from damage by cultivator sections at the required level, and during inter-row cultivation with a cultivator, a large number of cotton buds, flowers, and bolls are shed, and branches are broken. To prevent this, inter-row cultivation during the growing season is carried out at low speeds, which leads to a decrease in labor productivity and an increase in labor, working time, and other costs. It should also be noted that existing and artificial protective barriers have an unsightly appearance.

Based on the above, we have developed a pneumatic cover for the sections of cotton cultivators (see figure).

The proposed pneumatic casing comprises an internal cylindrical-conical shell made of an elastic material, such as rubber, equipped with a nipple 2 for air pumping. A cylindrical-conical protective case (cap) is located on top of the shell, the shape of which is identical to its shape. It consists of a cylindrical part and the connected conical parts 4 and 5. Anti-erosion tires 6 made of ribbon rubber are located diametrically on both sides of the cylindrical part. A pair of perforated pockets is attached to its upper and lower parts to connect the casing to the cultivator section. To accommodate the protective cover of the casing, it has a longitudinal section equipped with a "Flash" type lock 9.

The inner shell can be manufactured from industrial rubber by vulcanization (heating films, sports ball chambers, and automobile chambers). The outer protective cover, consisting of a cylindrical part and conical parts 4 and 5, is made of rubberized technical fabric, such as nylon or trevira.

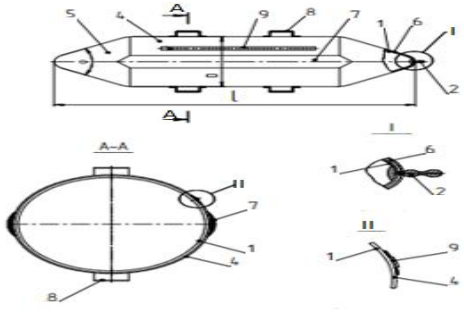

Figure 1. Proposed cover for cultivator-feeder.

The protective case works as follows.

Before inter-row machining, the pneumatic protective covers are prepared for operation. To do this, the cylindrical-conical shell 1 is inserted into the protective cover through a longitudinal section, and the nipple

2 must protrude through the conical parts 5 or 6. The lock of cross-section 9 is closed, and then the shell is filled with air to a pressure set at 1, so that the coating has the shape of a cylindrical cone. Then, through pockets 8, it is installed in the cultivator section. After that, the inter-row processing begins.

During the movement of the cultivator, the protective covers move the cotton bushes sideways and upward without damaging the cotton bolls, flowers, bolls, or the entire bush.

Pneumatic protective covers can be used from the beginning of the growing season until harvest.

Conclusion. The proposed pneumatic protective casing has the following advantages over existing ones:

- does not use metal in parts other than the chest;
- several times lighter than metal cases;
- does not require special tools for installation;
- easy to produce;
- works for a long time.

Tests have shown that the use of the developed pneumatic cover reduces the fracture of cotton branches and the shedding of buds, flowers, and bolls by 3–4 times.

Literature.

1. Khamidov A. Design of agricultural machinery. Tashkent, 1994. P. 245.
2. Khudayarov B.M., Dzhabriev A.N. "Fundamentals of Agricultural Engineering" Publishing House "IJOD-PRESS." - Тошкент, 2019. P. 145.
3. Адилов Т.Т. Разработка и обоснование параметров защитных устройств к агрегату для междурядной обработки хлопчатника: Автореф. дисс. ...канд. техн. наук. – Tashkent, 1997.
4. Adjustment and efficient operation of cotton and grain farming machinery. – Tashkent: Fan, 2012. – 200 p.