RESULTS OF THE STUDY OF THE BENDING DYNAMICS OF EXPERIMENTAL ARROW-SHAPED CLAWS

[1]Nuriev Karim Katibovich, [2]Kuvandikov Yokub Tursunbaevich
[1]Doctor of technical sciences, professor
[2]Mechanic-engineer
Jizzakh politechnical institute
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Abstract. *This article analyzes the reasons that could lead to a change in the resource of the pointed paws. Based on the studied data, a high-resource pointed paw was created and the dynamics of its wear were studied. Based on the side profiles of the wings of the experimental paws, it was found that individual parts of the wings wear out less than the nose part.*
Keywords: *work tool; tine; front surface form; plant residues; cross-sectional shape; rounded and plain front part; ground frictional force.*

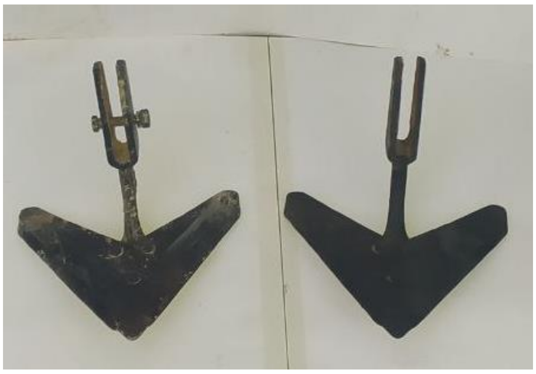
It should be noted that increasing the corrosion resistance of the working bodies of soil tillage machines leads to an increase in their reliability. That's why our research is to determine the laws of bending of the arrow-shaped claws of the cultivators used in our country, to analyze the causes of bending and to create resource-efficient technologies based on this to increase their resources.

Cotton cultivator KHU-4 produced in our republic in processing between rows of cotton using bullet-shaped claws is one of the most labor-intensive technological operations in agriculture. The bullet-shaped claws of the KHU-4 unit work in difficult soil and climatic conditions. Examples of them include dynamic loads that are constantly changing in direction and amount, soil moisture, and abrasive particles present in the working environment. These factors lead to the rapid deterioration of stilts, their frequent repair and replacement, and disruption of agrotechnical periods of cultivation as a result of stops.

For this purpose, a statistical analysis was made of the invalidity of the cultivator bullet claws used in our Republic, and samples of the bullet claws used in practice were taken and parameters such as the composition of the material (Stal 65G), the degree of heat treatment, physical and mechanical properties, the rate of abrasion in an abrasive environment, the condition of the surface layer, etc. was studied. On the basis of the studied data and using the available opportunity, the reasons that can lead to the change of the resource of the scaly claws were analyzed. Based on the obtained results, a bullet-shaped claw called "Rotating working body for a cultivator" was created in the laboratory of the department of "General technical sciences" of the Jizzakh Polytechnic Institute, and it was patented by the intellectual property agency under the Ministry of Justice of the Republic of Uzbekistan with the number FAP 01985 under the name "Rotating working body for a cultivator".

This utility model, numbered FAP 01985 "Rotary working body for cultivator", was prepared by JSC "BMKB-Agromash" and put to field test.

The main goal of the field tests is to compare the wear resistance of the useful model "Rotary working body for the cultivator" in field conditions and to determine the reliability of the KHU-4 cultivator unit due to the increase in the wear resistance of the arrow-shaped claws. Today, the cultivator claws made of Stal 65G steel at the Chirchikkishlokhojalikmash factory of our Republic were accepted as a sample for comparison in field trials. (Figure 1).

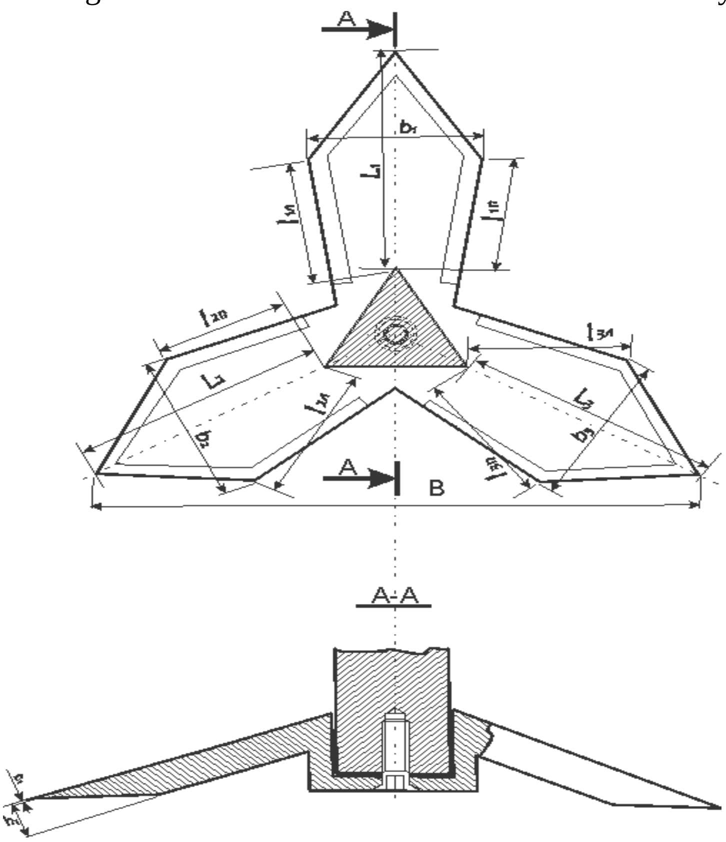


(1-Figure).

Field tests were carried out in order to study the dynamics of abrasive grinding of experimental claws of cultivators in the farms of Zafarabad district of Jizzakh region. Field trials were conducted between July and August in July and August in agrotechnical periods of summer cultivation between cotton rows 2 and 3.

Field experiments were carried out using a KHU-4M stubble cultivator attached to an MTZ-80X tractor. The mechanical composition of the soil is heavy loam. Soil moisture is 14.5...18.2%, hardness is 18.2...24.8 kg/cm2, depth of cultivation is 12-14 cm. The speed of the tractor in the second cultivation was 1.5 m/s, in the third cultivation it was 1.8 m/s.

Field tests on the bending dynamics of the parameters shown in Fig. 2 of the experimental bullet-shaped claws were carried out. It should be noted that increasing the corrosion resistance of the working bodies of soil tillage machines leads to an increase in their reliability.



2-Figure.

According to the parameters shown in Figure 2 above, during the cultivation of 86.5 hectares, the bending dynamics of experimental arrow-shaped claws was studied.

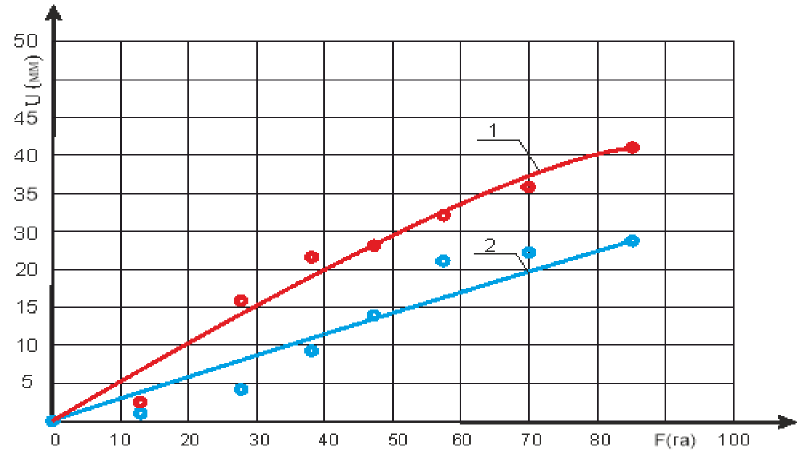
The resource of the currently used arrow-shaped claws was unusable after processing 47.5 hectares of cotton between the rows, after the beak part was cut by an average of 34.77 mm.

The resource of the currently used arrow-shaped pans was chronometered 4 times in the process of processing 47.5 hectares of cotton, while the new experimental pan was 7 times in the process of processing 86.5 hectares of cotton.

One KHU-4M stubble cultivator was installed in the currently used arrow-shaped plows and new experimental plows, timing works were carried out on the following working volumes of the arrow-shaped plows in hectares 1) 12 ha; 2) to 15(27); 3) to 10.5(37.5); 4) to 10(47.5); 5) to 8(55.5); 6) to 15(70.5); 7) to 16(86.5). During each micrometering operation, the comparable arrow-shaped claws were rotated clockwise along the KHU-4 cultivator, and the experimental working bodies were also rotated 1200 degrees clockwise around the installed column.

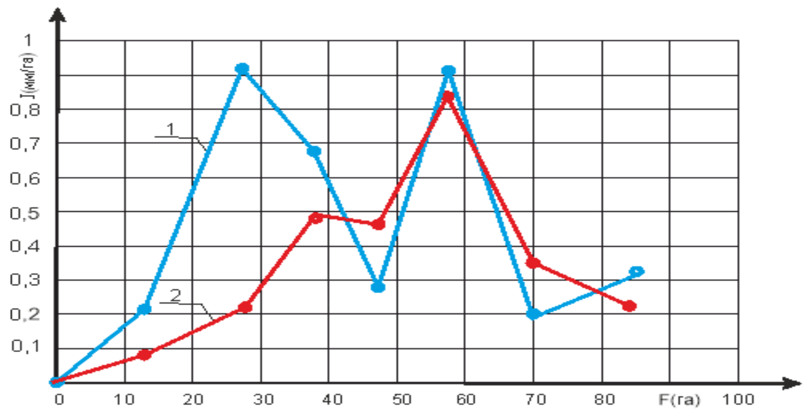
The results of the analysis showed the following.

The length of the beak of the experimental claws and the width of the range are almost uniform. The graphs of the linear deflection of the nose and the coverage widths of the experimental paws (Fig. 3) and the deflection speed (Fig. 4) and are shown:



3-Figure. Bending dynamics. 1. Linear curve of experimental paw coverage width. 2. Linear curve of experimental paw beak length.

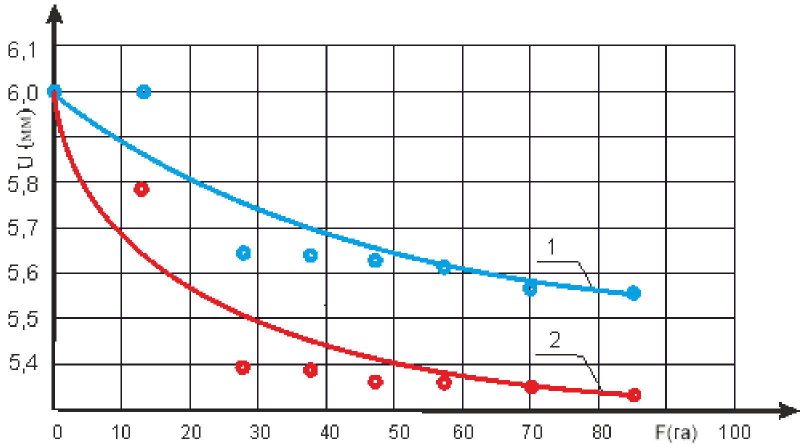
The linear deflection of the muzzle is 27.26 mm when processing an area of 86.5 ha, and that of the coverage width is 41.72 mm.



4-Figure. Speed of eating. 1. Experimental claw tip length bending speed. 2. The bending speed of the experimental arrow-shaped claw width.

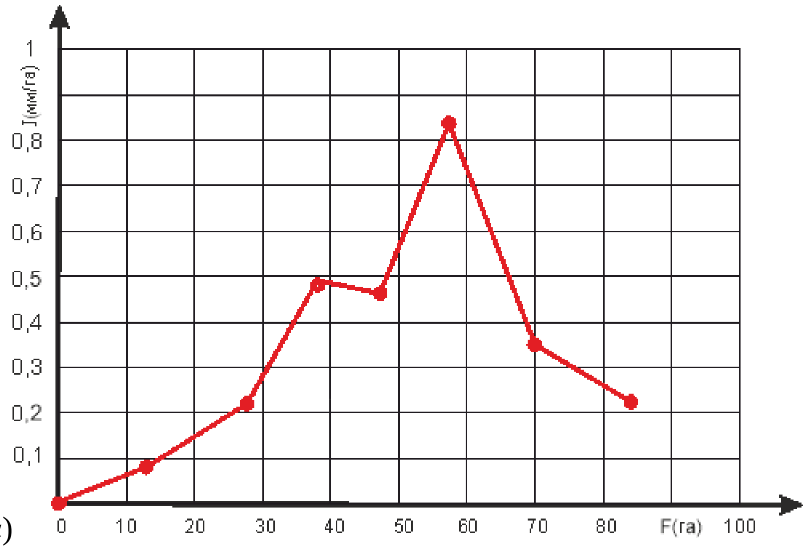
As can be seen from Figure 4 above, the spanwise warping velocity and the muzzle warping velocity are close to each other. We can obtain the following result for the speed of muzzle bending, that is, every time the muzzle is rotated 120^0 clockwise around the column, the coverage width does not decrease when the muzzle is bent at a higher speed. The range also decreases due to the bending of the muzzle.

The data representing the changes in the thickness of the flaps and the wings of the experimental wings (Fig. 5) show that the thickness is constantly decreasing.

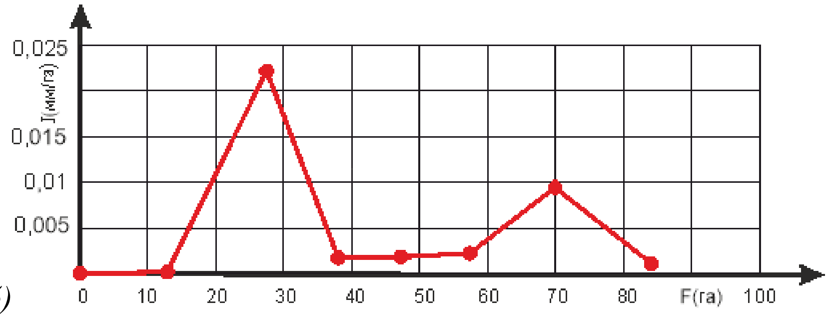


5-Figure. Bending dynamics. 1. Linear bending of the thickness of the experimental wing. 2. Linear bending of the thickness of the middle of the experimental paw tip.

The thickness of the experimental wing was 6 mm, the thickness of the beak decreased by 1.2 mm during the treatment of the 12-ha area, and the thickness of the wing was almost unchanged during the treatment of the 12-ha area. This can be seen from the linear deflection above (Fig. 5) with respect to the nose section, the middle parts of the wings have almost no deflection, with not much difference from each other, and after processing 86.5 hectares, the deflection of the nose section increases from 0.65 mm, the wing the thickness of the part is generally reduced to a maximum of 0.42 mm.



a)

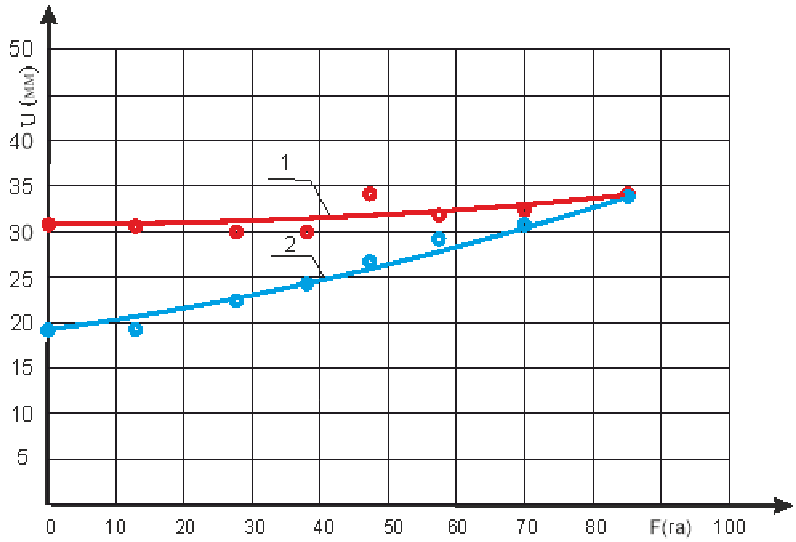


б)

6-Figure. The rate of decay. (a) Thickness shear rate of experimental claw tip razor blade. (b) Thickness shear rate of the experimental wing midblade.

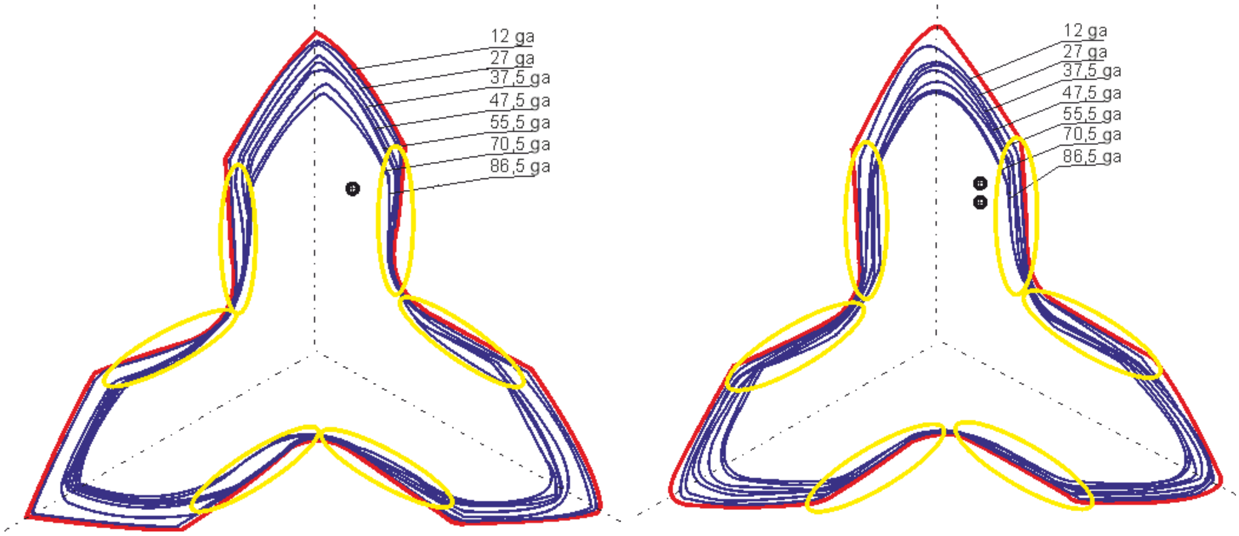
Before the experimental wings were put into operation, the thickness of the blades in the middle parts of the nose and wings was about 6 mm. The thickness of the middle parts of the wings is 0 mm/ha. The shear rate of the thicknesses of the experimental bullet claws at the razor tip increased from 0.5 mm/ha to 0.83 mm/ha during the treatment from 47.5 ha to 55.5 ha, and then the rate increased from 55.5 ha to 70.5 ha during the treatment. we can see in Figure 6.a) that it decreased from 0.83 mm/ha to 0.35 mm/ha. The shear rate of the mid-wing thicknesses of the experimental paws increased from 0 mm/ha to 0.022 mm/ha in the treatment from 12 ha to 27 ha, and then rapidly from 0.022 mm/ha to 0.002 mm/ha in the treatment from 27.5 ha to 37.5 ha. to, that is, it has decreased 11 times, we can see from Fig. 6.b).

During the treatment of 86.5 hectares of experimental paws, the average penetration of the corners of the blades was $54^{0}45/$ in the muzzle and in the middle parts of the wings, and it was the largest indicator in the muzzle. (Figure 7). As can be seen from the graph, the average nose section angle before launch was $18^{0}42/$ and the average wing center angle was $31^{0}36/$.



7-Figure. The dynamics of experimental claw blade angle slippage. 1. The transition of the angle of the middle blade of the experimental wing. 2. Experimental deviation of the angle of the tip of the beak of the paw.

Bend dynamics were first drawn in ink on A-3 hard paper with a red line at each timing, where the nose section was found to bend faster than the wings. Figure 8.



8-Figure. Views of the bent profiles of the experimental paws in the corresponding hectares.

a) New state of the experimental paw

b) The condition of the experimental pawpaw after cultivating the 86.5 ha area

9-Figure The condition of the experimental paw before and after the field test.

In the experimental paw shown in Fig. 9b above, the deflection is almost the same in all three beaks, from which we can determine that the deflection in all directions is occurring at the same rate. By working on 86.6 hectares, it showed that it has a higher resource than the current panja. From the deflection profiles of the experimental wings, it was found that the part shown in yellow in Figure 8 is less bent than the nose part of the wings.

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