The curve equation that describes the minimum resistance share blade is:

$$y = 0{,}083 \cdot (x - 0{,}04) + \left((x - 0{,}04)^2 \cdot \frac{0{,}17}{0{,}0064} + (x - 0{,}12) \cdot 4{,}0498 - 5{,}518\right)$$

Thus, the substantiation of the profile of the plowshare with minimum traction resistance was carried out, which allows to reduce energy costs and improve the quality of the tillage machine.

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Abstract. *A tillage machine is considered, where the installation of a plowshare is provided. In order to minimize the traction resistance of the tool as a whole, the profile of the plowshare is substantiated using the method of direct variational calculus. As the initial conditions, the angle of entry of the plowshare into the soil and the final angle at the point of contact of the plowshare to the rack are taken.*

Key words: soil, share, share profile, interaction, boundary conditions, energy, tillage

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IMPLEMENTATION OF ENERGY-SAVING TECHNOLOGIES IN SPRING IRRIGATION

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Aspects of stable development of agriculture in the southern region of Ukraine based on irrigated agriculture are considered, analyzed and shown. Advantages and disadvantages of modern irrigation systems in production are given. It was determined that modern sprinkler systems require the introduction of energy-saving technologies based on the automation of the irrigation process and autonomous renewable power sources.

Key words: *regional development, agriculture, irrigation, energy conservation.*

Agriculture in Ukraine is a key sector of its economy. The main branch of specialization of the country's agriculture is plant growing, especially technical and fodder (sugar beet, sunflower, etc.). According to their physical, mineralogical, chemical, agrochemical properties, Ukrainian chernozems are considered the best in the world. In Ukraine, chernozems occupy an area of 60.4 million hectares, of which almost 42 million hectares (about 69%) are agricultural lands, of which about 33

million hectares of chernozems are plowed in the country, i.e. one third of arable land in all of Europe [1,2].

The main factors include the development, improvement and implementation of irrigated farming management systems, modern methods of irrigation, new agricultural and irrigation equipment, competitive crops, high-yielding varieties adapted to irrigation conditions, fertilization and plant protection systems, control of soil moisture and timely irrigation, etc. [3].

Scientific research on the improvement of energy-, resource- and nature-saving technologies and optimization of irrigation systems are priority areas of scientific research in the Mykolaiv region, namely at the Mykolaiv National Agrarian University.

The existing irrigation systems in Ukraine, the area of which is currently 2.17 million hectares, are outdated and do not meet modern requirements for technological and operational reliability [1-4]. Existing irrigation systems use mostly morally outdated types of multi-part sprinkler machines that have exceeded their planned service life by 2 times. Today, there are about 5,500 sprinklers in working condition that can provide irrigation on an area of about 600-700 thousand hectares. Today, foreign companies have begun to actively operate on the Ukrainian market: Sigma (Czech Republic), R. Bauer (Austria), Valley (USA). Among the proposed models are stationary sprinkler systems with circular and frontal trajectories of movement, a wide range of drum sprinkler machines. Such systems are characterized by wide functionality, provide sprinkler with low water pressure, pipeline supply with the intake of water resources from an open or closed network, as well as the use of a diesel generator or electric drive makes the systems independent in use and allows to reduce the use of energy resources.

At the same time, along with the positivity of solving this issue, there are also negative factors: the high cost of the latest sprinkler systems and complexes; lack of regional centers for providing information on agro-ecological quality of rain, uniformity and quality of irrigation, organization of erosion-safe irrigation; lack of specialists in land reclamation and optimization of water resources in the south of Ukraine; lack of own production of competitive energy-efficient sprinklers.

These shortcomings lead to the ecological problem of irrigation, unregulated use of natural resources, energy consumption, increase in the cost of agricultural products and decrease in guaranteed productivity.

Sprinkler complexes are a significant reserve for reducing water consumption, energy saving and fertilizer application, as losses in the irrigation system amount to more than 30%. Therefore, increasing the energy efficiency of sprinklers even by 10% is justified. One of the directions for solving the issue of reducing the cost of production is the introduction of energy-saving systems and complexes into the irrigation system.

A promising direction is the creation of new irrigation systems and sprinkler machines of a new generation based on autonomous renewable power sources, automated watering systems. Such systems and machines should be low-pressure, ensure high-quality irrigation due to the optimization of the water supply algorithm

with the simultaneous supply of water, fertilizers and chemical meliorants for soil structuring.

Conclusions. Sustainable development of the agro-industrial complex in the southern region of Ukraine is possible if the following conditions are observed: stimulation of higher education institutions to train high-quality specialists to work in the agro-industrial complex; creation of regional consultative centers to provide information to agricultural producers about the latest technologies for growing agricultural products, agro-ecological quality of rain, uniformity and quality of irrigation, organization of erosion-safe irrigation, which will provide an opportunity to increase yield and quality of products; creation of own production of competitive, energy-efficient equipment for sprinkler irrigation systems; implementation of automated irrigation systems and energy-saving technologies based on autonomous renewable energy sources.

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