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TECHNOLOGICAL PROCESSES OF OPENING A DITCH AND MANUFACTURING
A GARDEN-BED AND PRINCIPLES OF FORMING A GARDEN-BED

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Annotation: *In this article, information is given on the results of ditch opening and garden-bed forming processes to prevent water erosion in bound soils placed on sloping fields.*

Keywords: *Slope, garden, fruit tree, erosion, ditch, sheared soil, garden-bed.*

Introduction: Briefly speaking about water erosion, water flows downslope of a slope. As a result, the fertile layer of the soil is washed away, and as a result of the soil being washed away, the roots of the trees are exposed. This process leads to negative consequences on sloping land with a large amount of soil leaching compared to flat land. One of the measures to eliminate such negative consequences is to ensure perpendicular direction of the water flowing on the downhill side of the slope. Then the intensity and quantity of the water flowing towards the landing will be reduced, and the soil will be prevented from flowing together with the water.

The main part. There are many ways and solutions to reduce the speed and direction of water flowing rapidly downslope in sloping fields. In this work, the authors also used the well-known method of opening a transverse ditch. The difference between the opened ditch and the existing ones is that the garden-bed was placed only on the right, that is, on the downhill side of the slope, instead of on both sides of the ditch.

The opening of the ditch and the size of the garden-bed depend on whether the year is wet or dry. From this point of view, it was considered appropriate to choose the dimensions of the ditch and the garden-bed on the basis of the results obtained from the experiments conducted in field conditions.

It was found out from the field experiments that the slope of the sloping fields where the gardens were established in our republic, especially in the Tashkent region, is in the range of 7-12°. Prevention of water erosion on such slopes depends on the dimensions of the opening ditch, that is, the width and height of the garden-bed formed from the soil removed from it.

In order to determine the dimensions of garden-bed, garden-bed of different cross-sectional surface shapes and sizes were formed using hand tools in the autumn months of 2021-2022.



1 – picture. In sloping gardens, the shape and size are different the process of forming garden-bed with the help of hand tools.

The created ditches and garden-bed were kept in their natural state until the garden was ready for inter-row planting in the spring. Data were collected on garden-bed that had maintained their initial state despite being affected by rainwater, and the figures were subjected to static processing to determine the shape of the garden-bed and its cross-sectional surface (Fig. 2).

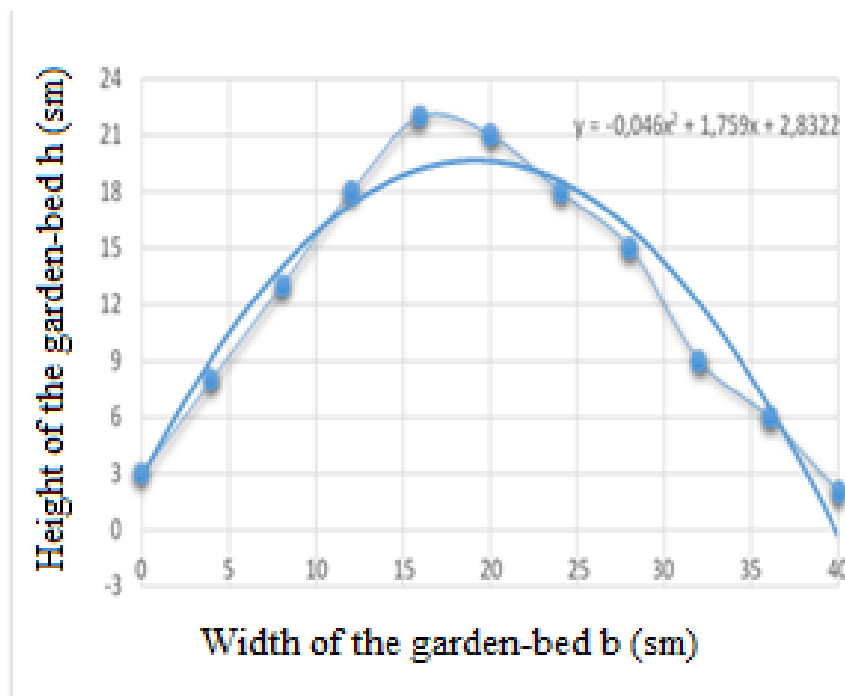


Figure 2. The shape and dimensions of the garden-bed proposed to be formed between the rows of a sloped garden



Based on the average values, the garden-bed shape was determined based on the computer Excel program, and its empirical expression was obtained.

$$h_{\bar{y}} = -0,046b_{\bar{y}}^2 + 1,759b_{\bar{y}} + 2,832 \quad (1)$$

To determine the surface $S_{\bar{y}}$ of the proposed garden-bed cross-section, an exact integral with lower limit b_0 and upper limit b_1 was used [1].

$$S_{\bar{y}} = \int_{b_0}^{b_1} y dx = \int_{b_0}^{b_1} (-0,046 b_{\bar{y}}^2 + 1,759 b_{\bar{y}} + 2,832) db_{\bar{y}} \quad (2)$$

$$\begin{aligned} S_{\bar{y}} &= -0,046 \int_0^{40} b_{\bar{y}}^2 \cdot db_{\bar{y}} + 1,759 \int_0^{40} b_{\bar{y}} \cdot d_{\bar{y}} + 2,832 \int_0^{40} db_{\bar{y}} = \\ &= -0,046 \frac{b_{\bar{y}}^3}{3} \int_0^{40} + 1,759 \frac{b_{\bar{y}}^2}{2} \int_0^{40} + 2,832 \cdot b_{\bar{y}} \int_0^{40} = \\ &= -0,046 \frac{(40)^3}{3} + 1,759 \frac{(40)^2}{2} + 2,832 \cdot 40 = \\ &= -981,3 + 1407,2 + 113,3 = 539,2 \text{ cm}^2 \end{aligned}$$

It was found that the surface of the garden-bed is 539.2 cm² when calculated according to the expression (2) according to the values of the lower $b_0=0$ and upper $b_1=40$ cm limits. In the process of formation of the garden-bed, taking into account the scattering of soil removed from the ditch, if we reduce this number of 539 cm² to an average of $k = 1.3-1.4$ (k is the volume expansion coefficient), the cross-sectional surface of the opening ditch is obtained [2]. According to it, the surface of the ditch cross-section should be 415 cm² on average.

Summary. The cross-sectional surface of the ditch can have various geometric shapes. Choosing the shape of the groove is the basis for determining the type of working part convenient for opening it. Above, it was determined that the cross-sectional surface of the ditch opened based on the dimensions of the garden-bed is 415 cm², and in practice, that of the ditch opened by hand is 350 cm². The surface of the cross-section of the opening ditch is at most 415 cm², it makes it possible to drain rainwater and melted snow without overflowing.

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