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Research Article

PECULIARITIES OF THE BASIC TILLAGE TECHNOLOGY

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ABSTRACT

This article describes the specific features of tillage technology, its importance in agriculture.

KEYWORDS

Agricultural machines, viscosity, fluidity, structure, soil hardness

INTRODUCTION

Cultivated soil differs from ordinary soil by its composition, hardness, humus content, that is, its fertility. Agricultural machines work only on fertile soil.

In order to choose a method of cultivating fertile soil, it is necessary to know its technological properties. The main of these properties are as follows: soil hardness, structure, fluidity, viscosity, moisture, relative resistance to processing, friction properties.

The hardness of the soil is its resistance to the sinking and crushing of foreign objects (working part of the machine, wheels, etc.). The hardness of the soil determines the amount of force (power) spent in its

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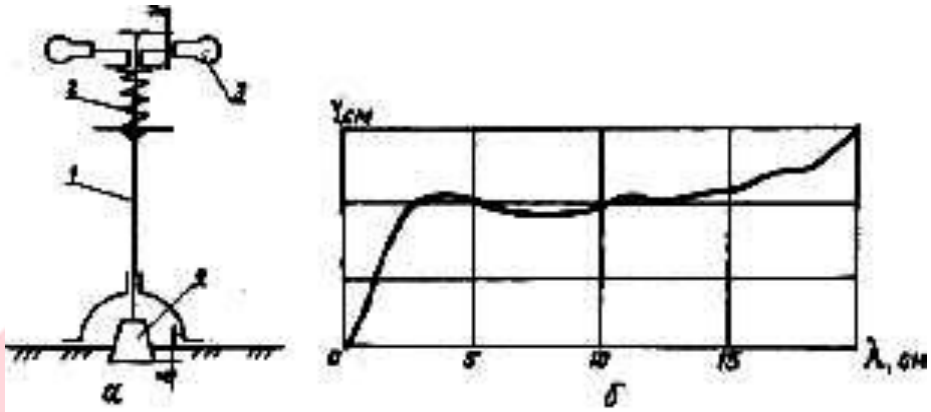
deformation and what material and shape the working part is made of. The hardness of the soil is determined using a special measuring device (Fig. 1-a). Measuring tool rod 1, spring 2, lever 3, triple (plunger) consists of 4 and support 5. When the lever is pressed down with the ash, overcoming the resistance of the spring, the triple sinks into the ground, the base area of which is defined as S.

Depending on the hardness of the soil, the compression of the spring is different. The force corresponding to its amount is determined and written on a paper tape in



the form of a diagram (Fig. 1-a). The ordinate Y of the diagram indicates the amount of compression of the spring, and the abscissa (indicates the depth of penetration of the triple into the soil. If the compression caliber of the spring is Kn (n/cm), the resistance of the soil to the penetration of the triple is calculated as R q KnY.

It follows from formula (1) that the determined value of (depends on the area of the part of the tool tip that sinks into the ground, that is, the shape of the tip. Therefore, it is not appropriate to compare and analyze the amount of hardness determined by the tips of different sizes.

When defining the soil, it is possible to use another indicator that more fully captures its crushing resistance. The soil volume V q S((cm3) crushed by the above tool that measures the hardness of the soil is found, and the proportionality coefficient, the volume crushing resistance coefficient of the soil q (n/cm3), which indicates the crushing resistance of each cm3 volume of the soil, is determined.

The amount of V depends on the soil composition, humidity, volume density, similar to 90 n/cm3.

The structure of the soil, together with the amount of humus in its content, is one of the factors that ensure the fertility of the planted crop. In fertile soil, it is recommended that the size of small particles is 0.25...10 mm (2...3 mm is the best), because when working on such soil, they soften well and allow good development of crop roots. Infertile soil is made up of fine dust particles smaller than 0.25 mm. Therefore, it does not keep moisture in a cone, it does not have the necessary air for the development of beneficial aerobic microorganisms, and its resistance to the parts of the machine being processed is large. Dusty particles show a tendency to weathering of the soil under the influence of water and wind, and can lead to a bad state of ecology. Therefore, when working the soil, it

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is necessary to avoid excessive crushing and pulverization of lumps.

The relative resistance of the soil during plowing (n/cm2) is one of its most important technological properties, which strongly affects the amount of energy spent on plowing. It depends on the composition, density and moisture content of the soil, as well as the properties of the plow (geometric shape and dimensions of the body surface, mass, sharpness of the ploughshare, the condition of the support board and wheels, the order of connection to the tractor, working speed, etc.).

The properties of the field soil, where crops are sown every year, are almost the same up to a certain depth, and its resistance k (even if the amount of a changes) changes with a linear law in this depth range. And in the lands that are being newly reconciled, the contour of the k botic curve line will change accordingly.

Under certain field conditions, resistivity k is mainly a function of soil moisture. For example, if the relative resistance of the soil that has become dry (moisture 16-18%) is minimal, the resistance of the soil that has dried up (5-6%) can increase by 2 times. If such land is plowed with a plow, large lumps are formed, and for their further grinding, a lot of expenses are spent. Even if the amount of moisture exceeds the norm, the resistance of the soil increases, because the wet soil adheres to the surface of the body and improves its surface smoothness.

The resistance increases because the coefficient of friction between the soil and the soil is greater than that between the soil and the steel.

When growing crops on irrigated land, doing multiple cultivation of crops, fighting against diseases, tractor wheels compact the soil. When plowing such compacted lands, the relative resistance of the soil increases.

The stickiness of the soil is also of great importance, because the stickiness sticks to the body of the soil plow, cultivator teeth, seeder seeds and increases the resistance to the sliding of the soil layer over the working part during movement. Sticky soil also slows down the work of car wheels. The stickiness of the soil mainly depends on its composition and moisture content.

In order to increase the productivity of any crop, it is necessary to cultivate the soil before planting it and bring it to a state of ash. In tillage, the main focus should be on protecting the soil and restoring its fertility. For this purpose, traditional and resource-saving methods of tillage are used. Which method to use is chosen according to local conditions.

In the traditional method, the soil is plowed deep (more than 20 cm) with a plow and the main cultivation is done. Later, the land is cultivated shallowly with various machines such as harrows, cultivators, milling machines. When working with a plug, the upper layer of the soil is broken off and moved to the side, turning to a certain angle.

As a result of plowing, the layer of crushed slag is deformed and crushed, the structure of the soil is restored, weed seeds and remains, and insects are buried, and the lower layer of the soil, i.e. humus, is added to the surface of the earth. Using the traditional method, deep and deep plowing (27 cm and more) can dramatically reduce weeds. Overturning the land has a negative effect on the soil, because the organic matter that has been brought to the surface of the earth is decomposed under the influence of sunlight and other factors, the carbon contained in it can fly into the

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atmosphere, and soil erosion can increase. This reduces soil fertility.

Intensive tillage technology is used to get a 2-3 times crop on irrigated lands. This leads to the introduction of machine-tractor units, including plow units, into the field many times. As a result, the upper layer of the soil rots and turns into dust, and the density of the lower layer increases. In addition, when plowing the soil at the same depth for several years, dense "birch heel" appears at the bottom of the plow, which hinders the development of plant roots and water absorption. It will not be possible to get a high yield from such lands. The effect of mineral flour applied to the ground is also low. Therefore, resource-saving methods of tillage and soil protection technologies are widely spread around the world.

Resource-saving technology is called zero, chemical, minimal, alternative technology, mulching, browning technology by some experts. Their main indicator is not to use a plow every year in tillage. Therefore, it is desirable to prevent soil com paction by performing several technological operations in one operation of a complicated, combined (combined) aggregate.

In order to plant a repeated crop from grain in the above technology, it is necessary to cut the stalks from a height and add 30% of their mass in the form of seeds. For planting, only the place where the seed is to be sanded is softened with the help of various chisels, cultivators, deepeners, and soil softeners. A good result is the use of a toothed "paraplau" type pit softener mounted on a ten-sided bent pole.

A deep softener is used once every 3...4 years to a depth of 0.5...0.6 m, with a 1.5...2.5 m interval. As a result, the place where the root develops expands. This method is called "passage" processing. Zero technology is also called no-tillage or direct seeding. In this method, only 25% of the field is mechanically cultivated, and the remaining weeds are killed with the help of herbicides. When resource-saving technology is used, large amounts of money spent on preparing the soil for planting crops are saved, soil moisture increases, earthworms multiply, as a result, soil fertility increases and productivity increases.

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