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EFFECT OF THE CRUST FORMED AFTER PRECIPITATION ON COTTON SEEDLINGS AND ITS ELIMINATION TECHNOLOGY

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Annotation: *This article focuses on agricultural mechanization and aims to assist farmers by softening post-rainfall silt crusts using an energy and resource efficient aggregate softener.*

Keywords: *crust, technical device , technology, softening fingers, aggregate.*

INTRODUCTION

Structural soil crusts are relatively thin, dense, somewhat continuous layers of non-aggregated soil particles on the surface of tilled and exposed soils. Structural crusts develop when a sealed-over soil surface dries out after rainfall or irrigation. Water droplets striking soil aggregates and water flowing across soil breaks aggregates into individual soil particles. Fine soil particles wash, settle into and block surface pores causing the soil surface to seal over and preventing water from soaking into the soil. As the muddy soil surface dries out, it crusts over.

Structural crusts range from a few tenths to as thick as two inches. A surface crust is much more compact, hard and brittle when dry than the soil immediately beneath it, which may be loose and friable. Crusts can be described by their strength, or air-dry rupture resistance.

Recent rain brings another challenge for farmers, especially in fields conventionally tilled last fall or early this spring. In addition to potential soil erosion and damages to soil structure rainfall can cause, there are after effects of the rain when the soil surface starts to dry. The potential problem is soil crust. Soil crust is a product of a weak soil structure and the absence of residue or cover crop to protect soil surface from the intensity of rainfall.

This could occur especially in intensively tilled fields where residue cover is not adequate, as well as with fine texture soils and soils with low organic matter content. These conditions could increase the potential for soil crust formation. Residue cover plays a significant role in reducing soil crust by absorbing the impact of rain drops that destroy soil surface structure. The destruction of soil structure impacts plant germination and seedling emergence for both cotton and soybean.

Soil crusting can also result in poor growing conditions and reduced water infiltration. Cotton seedling emergence can be a problem if a dense surface crust forms. In this situation, hypocotyl is broken when pushing up against a solid crust. Monitor high-

risk fields for soil crusting, especially where plant emergence has not yet occurred, in order to avoid damage to seedlings.

This crust will be broken up just before planting time. When seed is placed into the ground, the surface of the soil is generally thoroughly tilled using various pieces of equipment so that the seedlings can have the best possible start. Just when the seeds are about to emerge, the crust over the top of the seed bed is again broken up so that the new seedlings can pop through the surface of the soil to the sunlight and air so valuable to the new plant.

Figure 1: The process of breaking the crust of cotton seedlings.

Crust is a hard layer that forms on the soil surface after heavy rains and irrigation. In Central Asia, almost all soils in irrigated farming areas are prone to hardening. The main reason for this is the extremely low granularity of these soils and the fact, that the soil aggregates are very resistant to water. After rain or irrigation, the top layer of soil thaws, hardens when it dries, and the surface cracks. Hardening has a negative effect on soil properties and the development of agricultural crops, slows down water permeability and air exchange in the soil, as well as accelerates the evaporation of soil moisture (up to 20-30%). In fields with very thick loam, the germination of grass is delayed for 3-5 days and the number of seedlings decreases.

The process of sediment formation depends on the mechanical composition, type, cultural condition, salinity, and so on. The sediment is mostly formed in irrigated gray and desert soils. Its thickness and hardness depend on the severity of the mechanical composition of the soil. Particularly in heavy sandy, loamy, salty brown soils and bald soils with a mechanical composition, the layer is thick and very hard. Salinization and salinization increase the tendency to form crusts. The thickness of the layer is 0.3-0.5 cm in light gray soils with light sand and loam, 0.8-1.5 cm in light and dark gray soils, 2.4-4.5 cm in weakly saline sandy and loamy soils; The weight of a layer of soil on one m2 reaches 50-

70 kg. Applying organic fertilizers to crops, sowing of siderite crops, chemical reclamation, crop rotation, granulation of soils, use of artificial polymers and mulching materials, etc. Implement measures to improve the physicochemical properties of soil, prevent stratification. Takes before the seedlings emerge, the field is softened with the help of light storms or rotary mowers. To minimize the effect of tillage, the crop should be treated (mowing or cultivating) with soil compaction between rows.

PROCEDURE OF RESEARCH

Research work is being carried out around the world to develop new scientific and technical bases of resource-saving technologies and technical means for softening the crust in the fields planted with agricultural crops. One of the important tasks in this direction is the development of a constructive scheme of working bodies and substantiation of technological processes, quality of work and development of resource-saving working bodies in the process of interaction with the soil. At the same time, it is necessary for the cotton cultivator to develop disk working bodies that soften the layer at the required level without damaging the cotton seedlings. Extensive measures are being taken in the agricultural production of the Republic to save resources, cultivate agricultural crops on the basis of advanced technologies and develop high-efficiency agricultural machinery [1, 2]. The Action Strategy for the further development of the Republic of Uzbekistan for 2017-2021 includes, among other things, "Modernization and accelerated development of agriculture, further improvement of the reclamation of irrigated lands, development of reclamation and irrigation networks, intensive methods of agricultural production, especially water and resources. Introduction of modern saving agro-technologies, use of high-yielding agricultural machinery, one of the important tasks in the implementation of these tasks. In particular, the maintenance of agricultural crops and the technical and technological renewal of mitigation equipment after rainfall is a topical issue today. [3].

Figure 2: The negative effect of crust on cotton seedlings.

Irrigated lands in cotton-growing areas are focused on natural-climatic and soil conditions, mechanical composition of soil, tillage technology, machine types and agro-technical requirements. In the early development of agricultural crops should be provided with soil, air, heat environment for the growth of young seedlings. The onset of spring rains prevents the young seedlings from growing, developing, and sprouting, that is, the rain turns the soil into a muddy layer and prevents the sprouting seedlings from developing by squeezing the roots. Our farmers try to create a comfortable environment by mowing the lawn, but it takes a lot of time and physical effort. Mechanized complex cultivation, on the other hand, takes a long time and prevents the fine compaction of the resulting hard soil, as well as the formation of lumps.

RESULTS OF RESEARCH

The proposed utility model applies to the field of agricultural mechanization, in particular the process of primary processing between rows. The structure of the new device will consist of the following. A metal profile with a total length of 3.5 meters (1), 4 handles (2) are welded, one (3) working body is mounted on each handle. This means that when each working body processes cotton seedlings sprouted from one row, it is possible to further increase the number of rows with a total processing capacity of up to 5 rows. We determine the width of the unit depending on the power of the tractor. Tractors with 80-100 horsepower can handle up to 8 rows. The main part of the working body is mounted on small frames prepared by welding (4) with soil softening fingers (5). The softening fingers are attached to the small frame by means of rotating hinges or bearings. From the forward motion of the traction tractor, the softening fingers rotate and rub the fold (Figure 2).

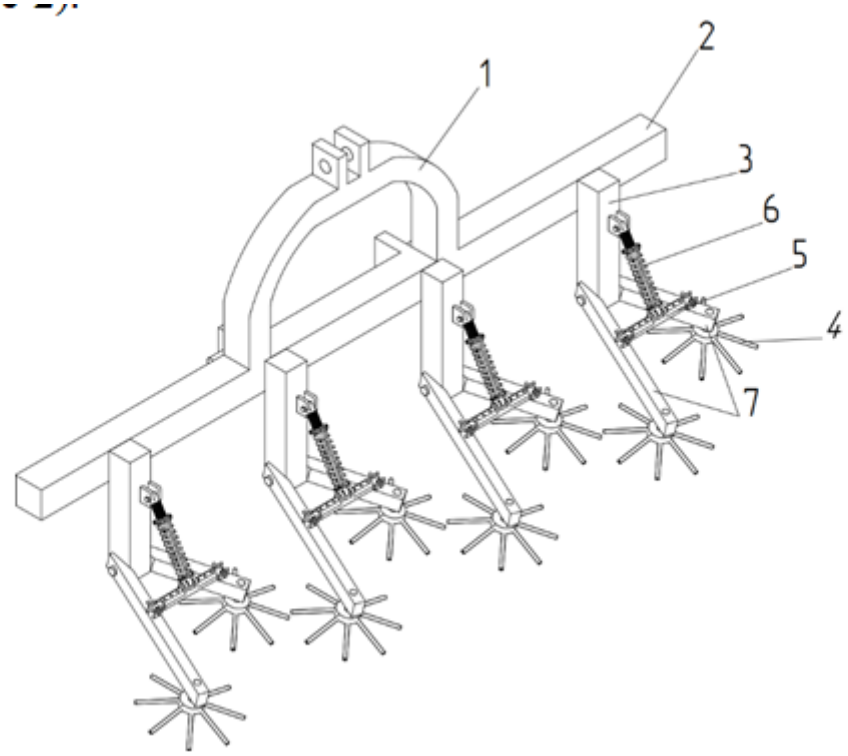

Figure 3: Resource-efficient crust softener device.

As for the technology of operation of the unit, the device aggregated on the tractor TTZ-80 is adjusted for processing the grids by means of adjustable traction. It is necessary to ensure that the working body is parallel to the grid and lies flat on the ground, otherwise the quality of the processed field will not be good.

It should be noted that the range of 0.18-0.48% damage to cotton seedlings meets the initial requirements. Therefore, on the basis of the above data, it can be said that the diameter of the toes should be in the range of 200-250 mm for quality softening of the layer at the required level with minimal damage to cotton seedlings. (Figure 3)

a)

b)

Figure 4: Initial field test process of crust softener device.

CONCLUSION:

By using this device, the quality of work can be improved by reducing the consumption of metal, energy and fuel consumed in the process of softening the coating.

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