

**SOME ASPECTS OF SOIL PROPERTIES
AT projecting Soil Processes
and tools**

**VI Vetohin, PhD
National Technical University of Ukraine "Kyiv Polytechnic
Institute"**

A link between Agrotechnological operation "crushing soil "system properties "the ability to form and restore the structure under the influence of natural and anthropogenic factors "and the physical and mechanical properties of soil. The concept "property "as the characteristics of the system's ability to change or conservation status and proper process. To include the parameters of the proposed indicators and characteristics that quantified current status.

The properties of the soil, design, Soil processes, tools, communications features and manufacturing operations, the parameters of state.

Formulation of the problem. Improvement of tillage equipment in connection with the transition to new technologies requires a fundamental study on the interaction of soil and tillage implements. These issues include soil properties that determine the quality and energy performance.

Analysis of recent research. Analysis of soil properties due to its cultivation devoted a significant amount of research. Thus, VP Horyachkyn early last century attributed to the properties of soil specific weight, moisture content, connectivity, deformation resistance, friction coefficient [1]. He suggested using various parameters, modes and geometric parameters of tools depending on soil separation on the "hard, brittle, soft and medium". [1]

"Fundamentals of the theory and calculation ..." [2] include modern definition of technological operations, methods of cultivation and properties of soil. But subsequently laid calculating machines and tools used for cultivation almost exclusively corners of internal and external friction soil.

PV Sysolin with a group of authors [3], looking at the ground as the object of machining, identifies the following soil properties: porosity, moisture content, stickiness, hardness (density) by friction

metal and friction resistance shift and clutch, abrasive properties. However, further analysis of the process steps of the wedge of all these

© VI Vetohin, 2015

parameters is only friction wedge on the ground and in the example of building a working surface casing moldboard plow apply only geometrical ratio. This shows the complexity of the design tools used for data on the properties of the soil in the form in which they are treated by modern science.

In work [4] at justification forms and settings hlybokorozpushuvacha and machinery crushing strength ratio of the soil used for soil compression and stretching. Later, in [5] analyzed the physical and mechanical processes of transformation of local compression wedge slices under a tensile strain amount chunks. Confirmed that the physical and mechanical processes are not determined by absolute values of soil strength to different types of stress, such as their ratio. It should be noted that the ratio of soil strength at compression and stretching of the theory of Coulomb-Mohr determines the angle of internal friction of soil. Thus there is a link with the provisions of the source [3]. A number of publications focus Agrotechnological observed that "among the most important indicators agrophysical density structure of the soil" [6]. Further, the same source: "Most technological methods of cultivation are intended to bring the density of the soil to its optimal size - within 1,12-1,27 g / cm³. From the value of this index is known to depend almost all water-physical soil properties, porosity, permeability, moisture, moisture reserves, resistance to soil erosion "[6].

A common way of existing studies have not tracked how soil properties determine the process parameters and tools studied or used.

This publication [7] proposed system properties of the soil, but it needs improvement. So there is not only conceptual and terminological inconsistency, but different target orientation using properties of soil.

The purpose of research - Clarify value category "property" and "setting status" regarding the design processes and tools for cultivation.

Results. The first step is to determine which task is the implementation processes of agricultural technologies change of the system to achieve a number of indicators, including productivity.

Ahroinzheneriyi task - to design hardware that will provide processes of change of the system according to agricultural technologies and expected values of the state system.

Philosophical Dictionary gives this definition: "The property - a philosophical category which expresses one point identify the nature of things in relation to other things; that characterizes its similarity to other objects or different from them"[8].

In understanding the system property, a characteristic process changes and / or preservation of the system. For example, strength - the ability to resist penetration from the outside, refers to properties. The density of the soil, a measure of its current state, and the corresponding

feature - the ability to change / store density. Soil temperature is not property. Appropriate and related measure "temperature" characteristics is the ability to accumulate properties and keep warm.

An example from another area - setting electricity, it iselychyna that quantifies any property electricity. When the electrical energy to understand the voltage, frequency, curve form of electrical current) [9]. Important in this is defined quantitative parameters of expression.

It should be noted that moisture and density in the terminology of the standards referred to physical parameters that characterize the state of the soil [10].

Summary of definitions from a number of sources and their own research allowed to give a definition of the term "parameter state." Parameters condition -physical quantities that have an objective quantitative measure and characterize the current state of the system, such as temperature, density, concentration of components, modular structure, and so on. p.

Agricultural technologies in properties usually understand the parameters and status indicators. Ahroinzhenerya engaged in the process of changing the state in the "source of energy and materials - tools - cultivated environment." Therefore, identification of soil properties that determine the possibility and process parameters is crucial. But, for example, the most common Agrotechnological operation "crushing ground" in modern scientific literature does not contain even the names of the properties of the soil, which enable such an operation. Unlike other materials that irreversibly destroyed, the soil is able to establish / restore structure and structuring under the influence of natural factors. The soil has a different strength tensile deformation and compression can deform plastically and kryhkovyдно at different ratios of volume loading (Fig. 1 a). These features are based on the model of interaction with dolotovyдноho deformatora chunk (Fig. 1b) and the phenomenon of auto-form tool [11, 12].

There is also dependent modules deformation coefficients of friction modes load and soil moisture. These features indicate areas of soil properties conserve resources in its cultivation. The analysis of the proposed transaction Agrotechnological correspondence between the "crushing of the soil" and soil properties (Fig. 2). The properties of the soil in the system, namely the ability to form a structure based on the basic physical and mechanical properties. Quantitatively, the properties are characterized by performance and status options. These numbers depend on other indicators of the state. For example, the proportion of the strength in compression and tension, the ratio fate and kryhkovyдnyh plastic deformation depends on soil moisture, contact pressure, speed,

load, vibration modes and more. Said enables control modes, use the following depending on the design of technologies and tools.

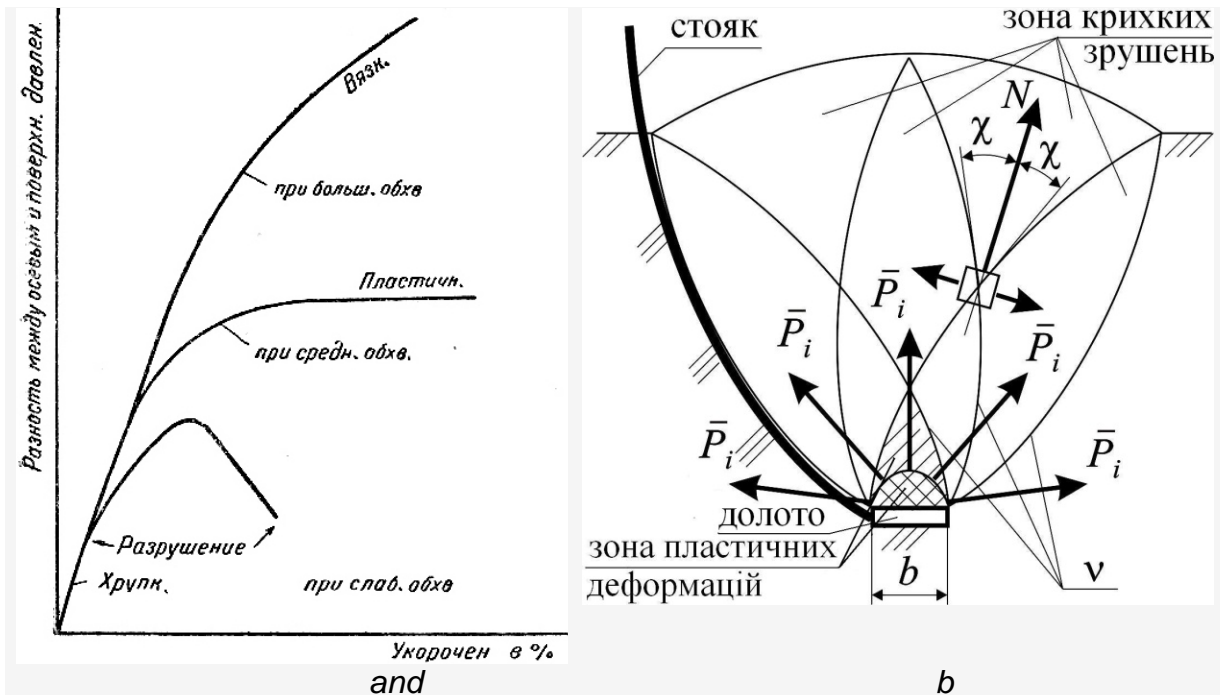


Fig. 1. Display the deformation properties of the soil in various forms of stress state and the phenomenon of auto shape tool: and - dependent on soil type fracture stress state (by VP Horyachkynym) [1]; b - scheme of formation of several areas in the layer of soil in different stress-deformed state. [12]

The above properties (Fig. 2) indicate the possibility of the conversion process condition of the soil, choice resource-saving mode. A measure of the efficiency of the numerical value of the defined parameters of the relevant and involved in the process of soil properties.

In connection with the unresolved issues and future research is to establish a settlement dependencies that tie into one system parameters tillage implements and soil properties.

<u>ОПЕРАЦІЯ</u>	<u>ВЛАСТИВІСТЬ</u> <u>Вищого рівня</u>	<u>ВЛАСТИВОСТІ</u> <u>Фізико-механічні</u>	<u>ПАРАМЕТРИ</u> та <u>ПОКАЗНИКИ СТАНУ</u>
Кришення ґрунту	<ul style="list-style-type: none"> •Здатність утворювати структуру під дією природних та техногенних чинників •Здатність відновлювати структуру під дією природних та техногенних чинників 	<ul style="list-style-type: none"> •Різна міцність при деформаціях різного виду •Крихкість •Пластичність •Залежність модулів деформацій від режимів та вологості •Адгезія внутрішня/ зовнішня •Липкість •Залежність коефіцієнтів тертя від режимів навантаження •інші 	<ul style="list-style-type: none"> •Співвідношення міцності при стисканні та розтягуванні •Міцність при стисканні та розтягуванні •Модулі деформації •Діапазон швидкості навантаження при крихкості •Коефіцієнти тертя •Та інші

Fig. 2. Correspondence between Agrotechnological operation "Crushing soil" and soil properties.

Conclusions

Design and improvement of tillage implements insufficiently based on the properties of the soil. There is also a conceptual inconsistency of the terms "property of the soil" and "parameter state."

It is advisable to take a general recognition properties as the characteristics of the system's ability to change or save the state and the processes involved. To state parameters include the performance and characteristics quantified current state.

In further studies, it is expedient to determine whether certain transactions agrotechnological list of properties of soil.

The second area for further research - the establishment of a list of properties of soil and beyond their geometric and dimensional parameters tillage tools.

List of references

1. *Horyachkyn VP* At the physical and mechanical properties of soil and ahrotehnycheskyh / VP Horyachkyn // Coll. cit .: In 7 t. - M .: Selhozhyz, 1940. - T. 4. - P. 237-244.
2. *Agricultural cars. Basic theory and calculation: textbook / DG Voytyuk, V. Baranovsky, V. Bulgakov etc. ; Ed. DG Voytyuk. - K .: Higher Education, 2005. - 464 p.*
3. *Sysolin PV* Farm equipment, theoretical foundations, design, design / PV Sysolin, VN Salo VM Krapivny; Ed. MI Chernovola. - Kn. 1: Machinery for agriculture. - K .: Harvest, 2001. - 384 p.
4. *Vetohyn VI* Rationale forms and parameters ґihlytelnyh workers bodies with a view to enerhoztrat Reduction obrabotku soil: Dis. ... Candidate. Sc. Science / VI Vetohyn. - M .: VYSHOM, 1991. - 236 p.

5. *Vetohyn VI* K theory pochvoobrabatyvayuscheho wedge / VI Vetohyn // Design, production and operation of agricultural machinery. - Kirovograd: KNTU, 2011. - Vol. 41 (1). - S. 301-308. - Access: [http://nbuv.gov.ua/j-pdf/Zmntz_2011_41\(1\)__48.pdf](http://nbuv.gov.ua/j-pdf/Zmntz_2011_41(1)__48.pdf).
6. *Petrychenko VF* Impact of zero tillage on its physical properties in the right-bank forest-steppe of Ukraine / VF Petrychenko, S. Kolesnik, OJ Panasiuk, MM Ermolaev, VS Hahula // *Agrobiology*.- 2013 - Vol. 11. - P. 183-187. - Access mode:http://nbuv.gov.ua/j-pdf/agr_2013_11_50.pdf.
7. *Vetohyn VI* As soil properties Systematyzatsyya element theory Designing soil-cultivating leadership and technology / VI Vetohyn // Technical and technological aspects of the development and testing of new techniques and technologies for agriculture Ukraine. - Research: UkrNDIPVT them. L. Pogorelogo, 2009. Vol. 13 (27), kn.2. - P. 30-38.
8. *Philosophical dictionary* / Ed. VI Shynkaruk. - 2nd ed., Revised. and add. - K. : Home Ed. Ur, 1986. - 800 p.
9. *GOST* - Enter. 01/07/89 [Text] / GOST 23875-88. - M. : Izd standartov, 1989. - 15 p.
10. *GOST* Hrunty 5180-84. Methods for determining fizycheskyh laboratory characteristics. - Instead of GOST 5180-75, 5181-78, 5182-78, 5183-77; Intr. 01/07/85 [Text] / GOST 5180-84. - M. : Izd standartov, 1985. - 24 p.
11. *Vetohyn VI* On the surface forms dynamics workers organs pochvoryhlyteley / VI Vetohyn // Тракторы and SH machine. - 2010. - № 6. - P. 30-35.
12. *And Vetohin V.* Design hlybokorozpushuvachiv considering some aspects of soil deformation / VI Vetohin // Technology in agriculture, industrial engineering, automation. - Kirovograd, 2008. - Vol. 20. - P. 104-109.

Proposals Communications Between ahrotehnolohycheskoho operations "kroshenye soil" systemnyy properties "Ability obrazovnyvat and vosstanavlyvat pod structure and action pryrodnyh tehnohennyh factors" and the physical and mechanical properties of soil. Opredeleno concept of "properties" As for system specifications abilities Changed Or STATUS Saving and sootvetstvuyuscheho process. K STATUS parameters predlahaetsya otnesty indicators and characteristics kolychestvenno opredelyayut PRESENT STATUS system.

Properties soil, pochvoobrabatyvayuschy processes, Designing, orudyya, Communications tehnohnycheskyh properties and operations, parameters of state.

It suggested a link between agrotechnological operation "crumbling of the soil" system properties "ability to form and retrieve the structure under the influence of natural and anthropogenic factors" and the physical mechanical properties of the soil. The concept of "property" as the characteristics of the system to change or retain the status and the process. The parameters include the proposed state indicators and characteristics, quantified the current state of the system.

Properties of soil, tillage processes, tools, connection properties and technological operations, parameters of state.