

CURRENT PROBLEMS OF AGRICULTURAL PRODUCTION MECHANIZATION

Prof. PhD. M. Mihov, Prof. Kr. Georgieva, Assoc. Prof. N. Ivanova
Institute of Soil Science, Agrotechnology and Plant Protection N.Pushkarov, Sofia;
Technical University, Faculty of Engineering and Technology – Yambol

Abstract: The report focuses on the current problems of mechanization of agricultural production, and agrarian science is seen as a subsystem of the national economy and as a continuously evolving system, characterizing the objectives of its functioning, composition and structure of its elements, as well as the way of interaction and interconnection Between its elements.

From a system point of view, mechanized technologies in agricultural production, based on agricultural mechanics, are inseparable from the processes of their organization and management.

KEYWORDS: AGRICULTURAL PRODUCTION, MACHINE TECHNOLOGY, MACHINE SYSTEM, NATURAL RESOURCES, IMPACT OF TECHNOLOGY.

The current problems of the mechanization of agriculture are as follows:

- Rational use of natural resources; Increasing environmental requirements for agricultural machinery;
- Development of resource-economical ecological machinery for agriculture. .
- Intensification of agricultural production;

- Developing a strategy for the development of agrarian science.

Natural resources - these are the means of existence for people which are not created with human labor, but are found in nature. These include water, soil, plants, animals, minerals that are used either directly or in a processed form and can be exhaustible and inexhaustible (Fig.1).

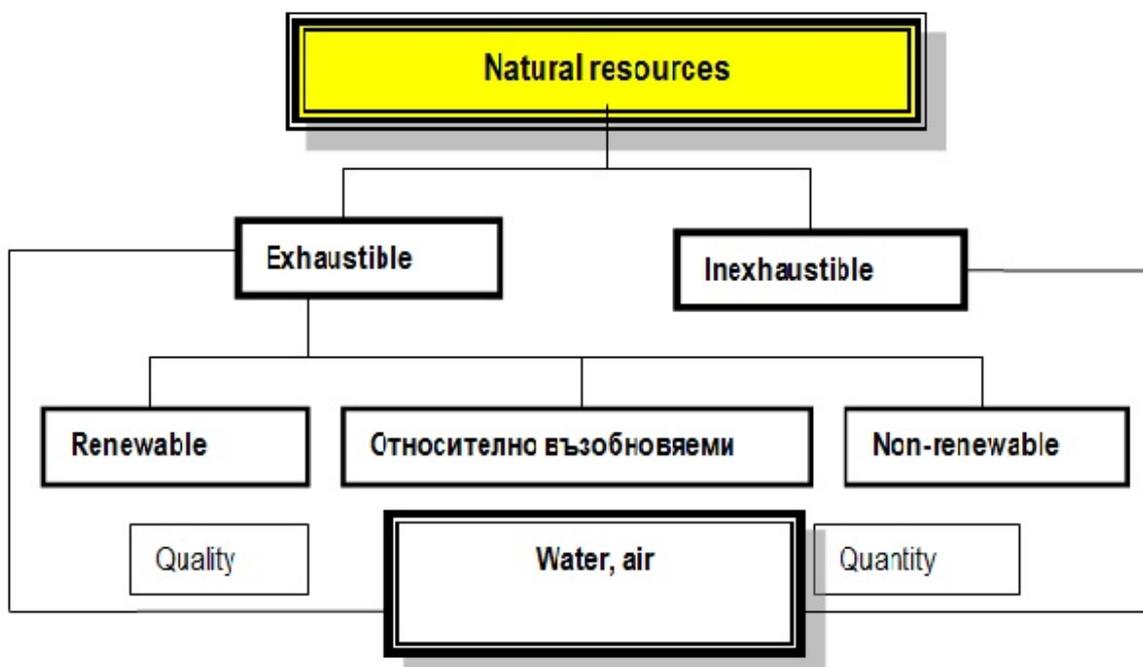


Fig 1. Classification of natural resources based on exhaustiveness and renewability.

Exhaustible resources are divided into renewable, relatively renewable and non-renewable.

Non-renewable resources - these are resources that do not recover or recover very slowly than they are used by humans in the foreseeable period of time. To them belong the riches of the bow, ie. Useful minerals. Using these resources inevitably leads to their exhaustion. Preserving these resources is based on their rational use. Soil can be attributed towards **relatively renewable resources** - the soil surface on land, where plant and forest resources grow. Soil is one of the most valuable and scarce resources.

Renewable resources include vegetation, the animal world and some mineral resources, such as salts that settle down from lakes and lagoons. The recovery of these resources goes at different speeds. The rate of the renewable resources should be in line with

the rate of renewal. Otherwise, renewable natural resources may become non-renewable.

Space, climate and water resources are **inexhaustible resources**.

In agriculture, where the soil is the basis of all material goods, the main wealth on which the existence of man depends, agricultural machinery is used, which, if it does not meet certain requirements, can cause environmental pollution.

Modern highly mechanized agricultural productions create a whole range of anthropogenic factors that have a negative impact on the environment. Particularly significant and multifaceted are the impacts of the operation of mobile machinery in direct contact with soil, plants, moisture, air and other components of the biosphere.

Dangerous and irreversible processes of disturbance of the ecological state of the environment arise as a result of the impact of the machine - tractor aggregates (Fig.2).

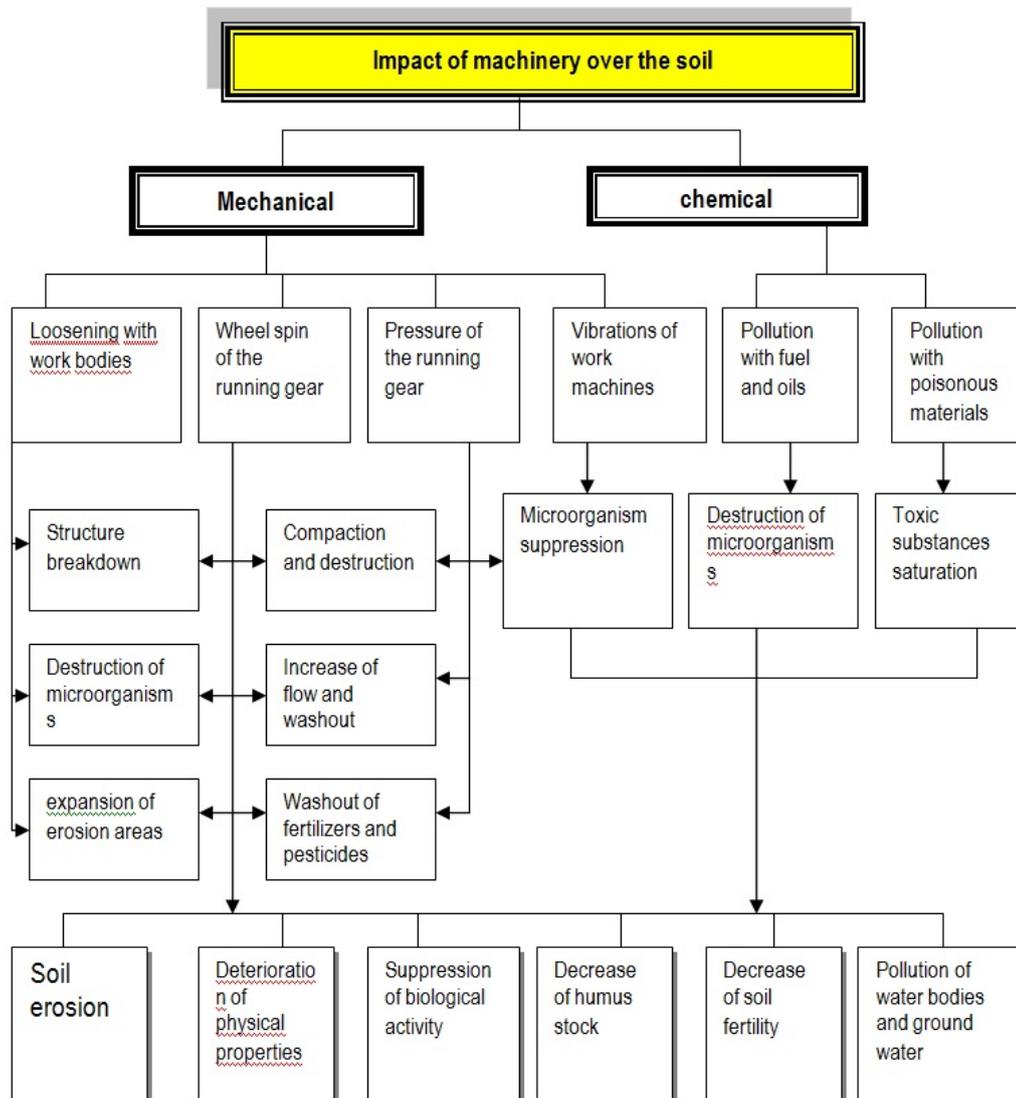


Fig.2.. Impact of mobile machinery on the soil.

The analysis of the results of the multi-annual research as well as the study of the international experience allows to formulate the basic requirements for the mobile agricultural machinery. It should be characterized by:

- High structural reliability and high efficiency in performing technological operations in accordance with agrotechnical requirements and minimizing soil pollution with fuels, lubricants and plant protection chemicals;
- Sustainable impact of work organs on the soil, ensuring the preservation of the fertility of the soil and significant reduction of the energy consumption;
- Minimal soil dusting of the working organs on the soil, reducing the influence of the machines on the water, wind and mechanical erosion, as well as the maximum preservation of the moisture in the periods of drought;
- Optimal combination of working organs, adapted to the different soil conditions, providing high efficiency soil treatment and intensive weed control with minimal use of herbicides;
- Creation of promising combined machines, aggregates and working bodies, minimizing the cultivation of the soil in the cultivation of different crops.

World experience shows that the problem of intensification of agricultural production through universal increase of labor productivity is a task both for science and for practice, and the main

factors for realization are: knowledge, new technologies, new machines, qualification and information.

Consequently, the engineering sphere under the new conditions is a basic engine for productivity growth, and in the field of agriculture, the realization of this goal in the agrarian policy is possible through the optimization of:

- Machine system;
- The system of machine technology for production of products;
- The system of using the technique.

The development of agricultural production should be based on high-energy aggregates and strict compliance with the requirements of technologies for production of quality production, ecologically clean.

Trends in the development of agricultural machinery are:

- Multilateral expansion of the nomenclature of machines and assembly units and assemblies;
- increased productivity and reduced labor, maintenance, repair and regulation costs;
- automation of control and management of MTA;
- environmental protection;
- technical aesthetics and creation of comfort and safety conditions of mechanists;
- widespread use and further upgrading of electric and hydro-drives in tractors, combines and other complex machines.

It is proven that the most powerful and economical factor of productivity is the system of efficient use of the machinery.

The system for using the machinery must solve the following economic, technological, technical and organizational problems:

- economic problems:
 - cost optimization related to the operation of machines;
 - establishment of a system for renovation of the park of machines;
 - an individual approach to pay for work;
 - motivation of the mechanics for high quality of the technological operations.
- technical issues:
 - selection and utilization of resources - economical technologies of the production processes;
 - preparation of the aggregates for the implementation of the technical processes, quality control system;
 - use of aggregates over the season to achieve optimal annual load and transitions.
- technical issues:
 - Choice of optimal periodicity for maintenance and repair of machines;
 - developing a system for supplying spare parts to maintain the machine's working ability;
 - creating an optimal logistics system for distribution and management of spare parts and resources stocks;
- **organizational problems:**
 - formation of efficient enterprises for agricultural production;
 - Creating an efficient service system of agricultural technology and technology.

Development of resource-saving ecological machine technologies for agriculture.

The basis of the developed resource - saving ecological machinery technologies for agriculture. Specific crop varieties, soil and climatic conditions intended for the final production should be laid down.

In the source data and varieties of agricultural crops should be included:

- the potential of the variety of productivity;
- susceptibility to disease and pest damage;
- mechanical characteristics;
- variety of use of the given variety;
- a place in the crop rotation;

- Continuous storage mode.
- Characteristics of soil conditions include:
- Mechanical composition;
 - humus content;
 - tendency to thicken.
- Characteristics of the natural conditions are:

- Sum of annual rainfall by periods;
- Number of solar by period of basic field work;
- Number of days without precipitation;
- Temperatures for the growing season of an agricultural crop (from sowing to harvesting).

In the machine technology, the destination of the final agricultural product (grain, root crops, etc.) must be clear. For what purposes the crop is grown: seed, industrial needs, animal feed, etc.

The process of creating new technologies must be accompanied by a developed technical specification for the technology that will implement the technology.

The technology can be recognized as new if it allows to increase yields above 10% compared to the achieved level, provided that the environmental performance, shelf-life and environmental impact indicators are not lower than the achieved analog technology , Which has been used so far.

The test is conducted with a comprehensive assessment of technology and machines in interaction with humans, nature and end product.

Agrarian science should be seen as a subsystem of the national economy and as a continuously evolving system, characterizing the objectives of its functioning, composition and structure, as well as the way of interaction and the interrelation between its elements.

From a system point of view, industrial technologies in agricultural production, based on agricultural machinery, are inseparable from the processes of their organization and management. And the more complex the technology, the greater the efficiency gains of using these two elements (organization and management) of production systems. In fact, agricultural mechanics are an integral part of industrial technology, and the latter are part of the technological process of the modern production system.

The technological processes in agriculture (the production system) are realized in a complex organizational system (fig. 3), which has input and output connections with external systems.

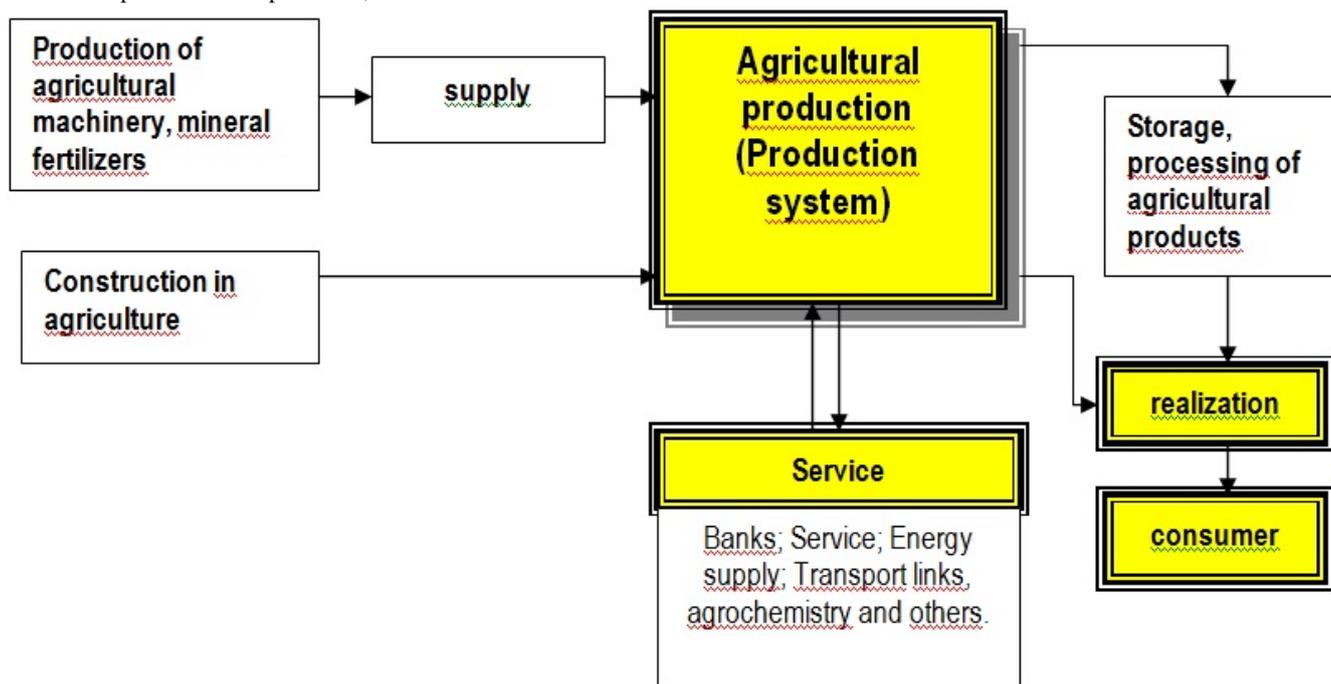


Fig.3. Organization structure of agricultural production

Systems in agriculture in aggregate have two main elements: organic (land - plants - animals) and service (human - technics).

Therefore, agricultural production is:

- a complex system that is dependent on the government system;
- an open and highly dependent system of industry, investment, population;
- a manageable system, the main element of which is the person to be motivated.

To develop a strategy for the development of agrarian science, it is necessary to use a general scheme (fig. 4), considering agricultural production as an "open system", which has three states:

- future state (where do we want to be?);
- current state (diagnosis and identification of where we are currently?);
- transition (where and how do we manage?).

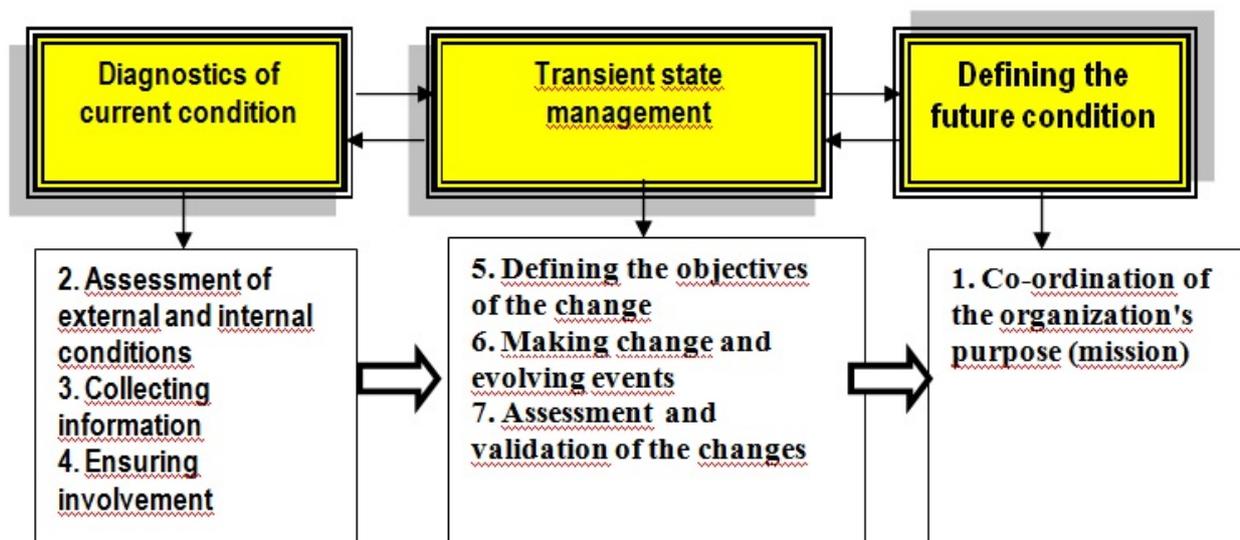


Fig.4. Organizational development process

In conclusion, agricultural production is a complex system, a system where many interests and factors are encountered, an open system that is exposed to risks - natural and environmental, but agrarian science, if interwoven in any element of this system, will improve its functioning efficiency.

Resources :

1.Тасев Г. Механизация на земеделското производство.-С.,2014.

2.Георгиева К. Съвременни механизирани технологии в земеделието.-Ямбол,2015.

3. Михов М., И.Гайдаров. Влияние на техническото състояние на тракторите и самоходните земеделски машини върху околната среда, сп.Механизация на земеделието, 2001, N4, с.12-14.

4.М.Михов, Г.Тасев - Техническо обслужване и ремонт на машините, С., 2012 г., стр.149.