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Results Pryvedenы эksperymentalnыh sravnytelnыh polevыh Quality indicators of research work and usovershenstvovannoy seryynoy mashiny MCP-4.

Cleaner, korneplodы, Mass nalypshey soil, ochystytelnыy shaft diameter auger, auger rotation frequency.

The results of the experimental comparative field researches of indexes of quality of work are resulted improved that serial machine of MKP-4.

Pile cleaner, roots, sticker soil mass, cleaning shaft, screw diameter, screw rotation frequency.

UDC 631.3

Of monitoring and quality assurance of technological processes in growing crops

OO Brovarets, Ph.D.

Information technology and hardware can provide the required quality of manufacturing operations by monitoring the status of agricultural land. For proper performance monitoring of the state agricultural land classification developed monitoring systems, which demonstrates the feasibility of using a particular method of monitoring under certain technological operation.

Precision Agriculture, monitoring technology.

Problem. Agricultural production is characterized by uneven resource distribution in space and time [1, 2, 3]. Therefore, one of the key stages of modern technologies in agricultural production (Fig. 1**Oshybka! Source links not found.**) Is monitoring Agrobiological and

phytosanitary state agricultural land [3, 4, 5, 6, 7, 8, 9, 10, 11] before sowing, during the growing season and at harvest.

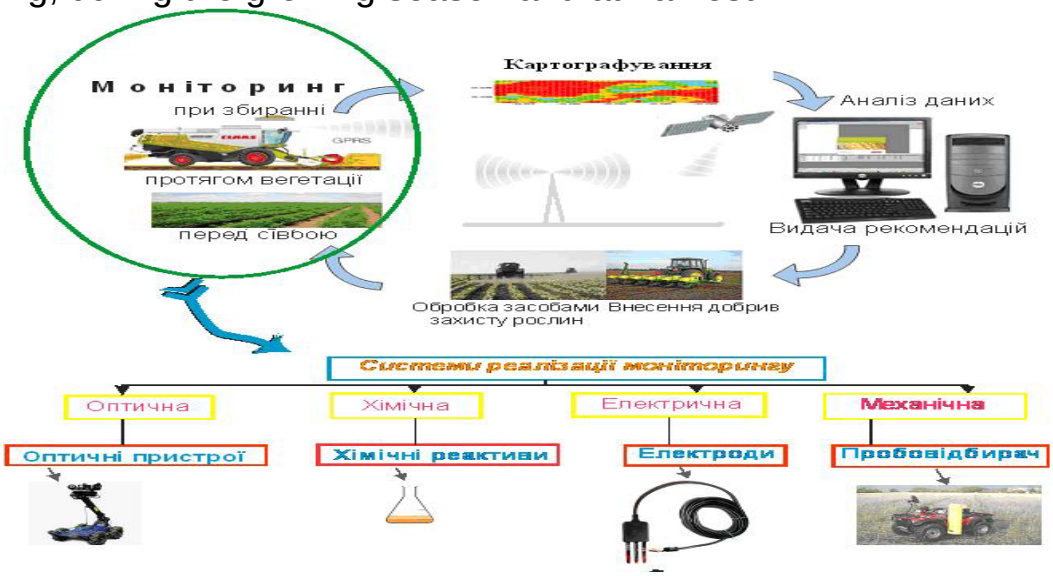
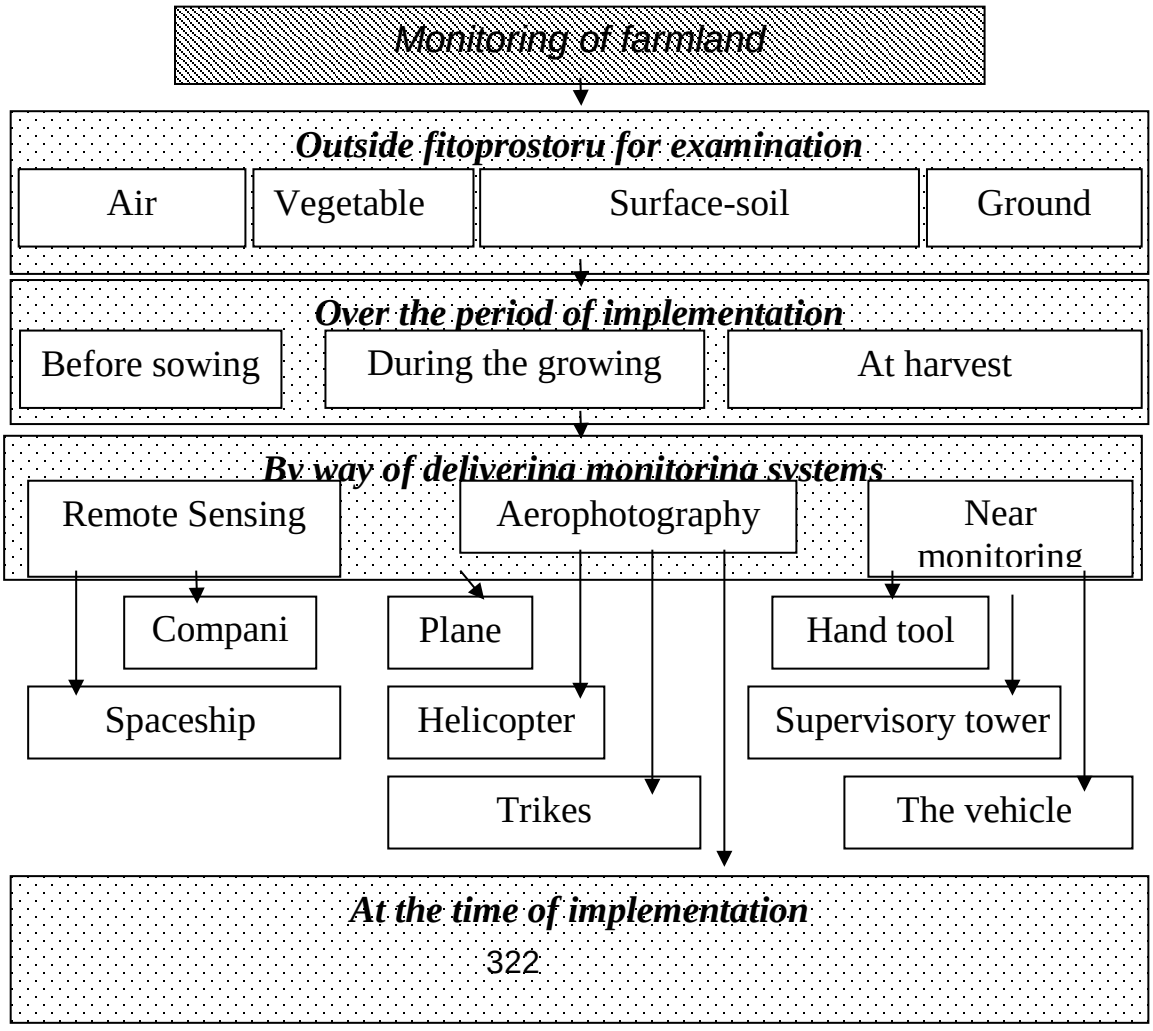


Fig. 1. Scheme implementation of precision agriculture technologies.

Based on the review of the literature [2, 3, 4, 5, 6, 7, 9, 10, 11] prepared classification systems for monitoring the status of agricultural land (Fig. 2).



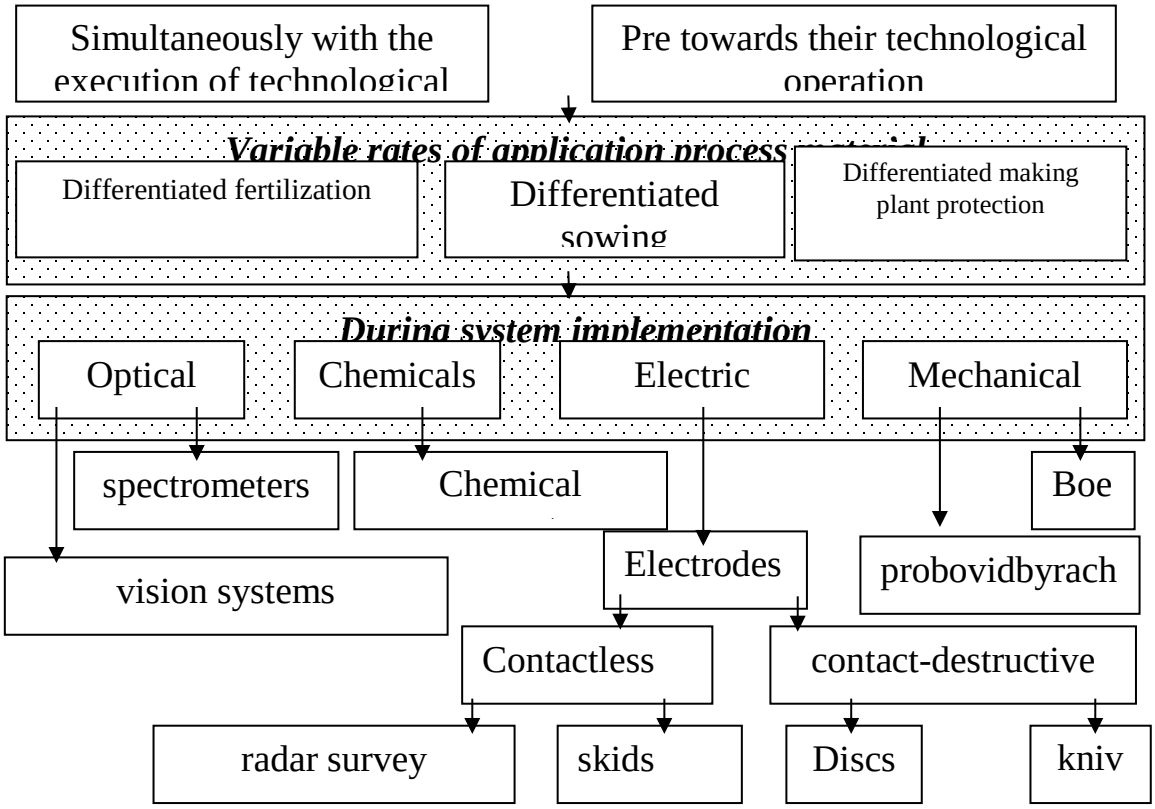


Fig. 2. Classification systems for monitoring the status of agricultural land.

It is the application of knowledge of alternating potential land resources at the local level promotes the strategy of variable standards making process material [1], which aims to improve economic efficiency and reduce the negative impact on crop production through differentiation methods and rules of use of technological materials (seeds, chemicals etc.) according to local needs and recommendations. However, one of the weak links of these technologies is the data field - field maps, whose creation through existing methods at this stage takes a significant investment of time and money. Finding new ways of monitoring - a priority direction of technology development of agricultural production [1, 2, 3].

Traditionally, monitoring land reduced to the analysis of soil samples to determine the chemical composition and properties of soil under laboratory conditions [12, 13]. Chemical measurements behind closed doors lead to a significant delay between sampling and analysis. A limited number of samples that can be analyzed in any particular feature can lead to incompleteness chemical profile and gives only a partial understanding of the controlled process [13, 14]. However, the final crop yields significantly influences their development during the growing season, which does not take into account the traditional monitoring systems which are based on analysis of soil [15, 16].

One of the ways to improve the monitoring of soils by traditional methods are automated mode control sampling and analysis of their chemical composition developed by advanced technologies [16] (Fig. 3).

Fig. 3. Automatic auger sampling of soil samples.

These systems out automatically carry out the analysis of samples taken by a specific pattern and transmit data collected during research on a storage device for further processing. These systems facilitate and accelerate control, feedback and regulation process [17]. However, these systems can not provide a significant increase in performance monitoring.

Therefore, at the present stage of development of agricultural land is necessary to use modern sensor systems for monitoring the status of agricultural land (Fig. 4).

Fig. 4. Modern sensor systems for monitoring of agricultural land.

At this stage, the most prevalent use of touch optical and electrical systems for monitoring of agricultural land. In this respect, an important place using sensor systems for monitoring research conductive properties of the soil (Fig. 5, Fig. 6, Fig. 7) and spectrometric monitoring of agricultural land.

Fig. 5. A device for determining the conductive properties of the soil contact-destructive method.

To investigate the conductive properties of the soil using the following methods:

- contact-destructive method of monitoring conductive properties of agricultural land (Fig. 5);
- non-contact method of monitoring conductive properties of the soil (Fig. 6, Fig. 7).

Fig. 6. A device for determining the conductive properties of the soil by touch.

Spread extensively contactless monitoring methods (touch) state farmland. The use of such systems makes it possible to increase the accuracy of the performance characteristics as a result of the operation (Fig. 7).

At this stage in agricultural production prevalent use of mobile automated sensor systems for monitoring the status of agricultural land. This lets you use a mobile sensor systems for automated measurement of conductive properties of the soil at different ahrofonah (Fig. 7).

Fig. 7. Mobile device to determine the conductive properties of the soil by touch.

Data obtained from the use of such devices (Fig. 8) are represented as cartograms magnitude of induced voltage at measuring sensors in heovyznachenyh coordinates for each of the experimental plots. Cartogram zone can provide uniformity characteristics of the soil, which subsequently will dramatically reduce the cost of manual sampling for soil agrochemical laboratory analysis.

Spread extensively portable monitoring systems that enable operational control state farmland. In particular, the use of penetrometer, which enables to control soil compaction and soil determine the presence of "sole", which was formed as a result of cultivation of agricultural land in the traditional way (plow) (Fig. 8).

Fig. 8. penetrometer to determine the properties of the soil.

When measuring nutrients in the soil using electrodes (Fig. 9) that are able to operate in continuous mode and thus very accurately assess the quantity of a substance per unit volume of soil (to measure the volumetric concentration).

Fig. 9. Ion-selective electrodes for monitoring of agricultural land.

A review of research towards improving the efficiency of monitoring allows to state that at this stage of development of information technology there is a need for innovative ways [18, 19, 20, 21, 22, 23, 24], which improves the efficiency and quality monitoring, reduce costs to perform this operation. Research domestic and foreign researchers [22, 23, 24] indicate the need for widespread methods of analysis Agrobiological and phytosanitary condition of agricultural land non-contact method using optical systems including machine vision systems.

Widespread in agriculture acquire portable optical systems (vision systems) used agronomists as microscopes for monitoring of agricultural land. Images obtained with these devices enable the field or in the laboratory to diagnose the state of agricultural land in the early stages of plant development (Fig. 10).

Fig. 10. Optical systems (vision systems) monitoring the status of agricultural land.

Spectrometric monitoring to determine the nutrient content of the soil, the plant in real time during the growing of plants. With these data we can establish the necessary rule making it for foliar and root feeding, provide local band differentiated fertilization on the basis of the monitoring data variability parameters agricultural field [18]. Thus, the scheme of modern management Agrobiological potential agricultural farmers (Fig. 15) provides for common elements: composition process materials, manufacture, composition of oil farms and new elements for the effective functioning of agricultural production by increasing the quality of technological operations. In particular, an important element of these technologies is the continuous monitoring of agricultural land in three areas: satellite monitoring (implementation by satellite) aeoromonitorynh (using aircraft) and close monitoring (using moving vehicles). This arrangement makes it possible to form a model state Agrobiological potential field and take the head (engineer, agronomist, head of department, head of sector, head of department at the Ministry) to take effective management solution Agrobiological potential field. Moreover, the manager can remotely analyze decisions regardless of their own locations using mobile computing devices (Fig. 11). Obtaining reliable data is only possible with advanced systems and scientifically based management approaches Agrobiological potential field.

Fig. 11. Scheme of modern management Agrobiological potential field.

Conclusions

Based on the above facts, we can conclude that at this stage of development of agriculture and information technology is a natural formation of the new direction of improving the efficiency of agricultural production - monitoring of agricultural land, which is based on creating a database - Agrobiological status fields, it is important to develop appropriate method of calibration, processing, coordination with other data and presentation in an appropriate manner to effectively further use.

Today continues the development of modern methods of control and automation technology operations monitoring. There is a need for a means of automation based on promising scientific and technological base, ahead of the development of fundamental knowledge. This is achieved by solving the problem of continuous expansion and deepening the knowledge base of experimental studies.

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Information Technology and tehnycheskye sredstva pozvoljajut obespechyt neobhodymoe Quality Execution of technological operations putem MONITORING STATUS selskohozyaystvennыh Agreement. For nadlezhascheho Perform STATUS MONITORING selskohozyaystvennыh agreement razrabotannaya classification systems of monitoring, kotoraja clearly demonstryruet tselesoobraznost Using Or that the second method of monitoring at opredelennoj perform technological operations.

Tochnoe zemledelye, MONITORING, tehnycheskye funds.

Information technologies and hard wares allow to provide necessary quality of implementation of technological operations by monitoring of the state of agricultural lands. For the proper implementation of monitoring of the state of agricultural lands the developed classification of the systems of monitoring, which evidently demonstrates expedience of the use of that or other method of monitoring at implementation of definite technological operation.

Exact agriculture, monitoring, hardwares.