

THE DESIGN OF A TEST MODEL COMBINE HARVESTERS SHOWING THE LOCATION ELECTROMAGNETIC RADIATOR

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Abstract: *The program and methods of field research combine harvester equipped with a system of low-frequency electromagnetic radiation grain material; specification for the design of combine radiators with the system in different locations in the course of promoting the grain of the material from the hopper to the ISU.*

KEYWORDS: COMBINE HARVESTER, EXPOSURE GRAIN MATERIAL, PROGRAMME AND METHODS OF RESEARCH

1. Introduction

The monitoring of the application of various types effects on cereal grain showed that most a positive effect on grain low-frequency electromagnetic radiation: increased germination, increased vigor, increases the ability of seeds to the long-term storage by almost 40%. However, this result was achieved under stationary conditions on small batches of seeds. There is a need to check the effect of exposure to the effects of mobile applications, directly in the processor, working on the moving bed of grain material in different working bodies combine [1-4]. The development relates to methods for threshing crops by magnetic treatment of freshly threshed seed to change its biophysical, biochemical, physical and chemical properties and can be used in agriculture for seed magnetization during the threshing of different types of crops at harvest.

The research on the effects of magnetic field to the seed in the field. To this end, it developed a technological design for processing seeds Combine harvesters "Yenisei-1200 HM". The design of transporting the working bodies of the threshing mechanism to the grain tank were mounted 3 modules source of low-frequency electromagnetic oscillations to influence them in the moving portion of the freshly threshed grain. Electromagnetic radiation in the range of 10-20 minutes has the greatest impact on the quality of seed grain, which suggests that the irradiated grain enough going into the combine hopper and, accordingly, it is necessary to irradiate the other stages of the process of work the combine. Influence of electromagnetic radiation on the geometric parameters of the grain, its shape and weight of 1000 grains is not much. This is accompanied by the growth of the mass of plants grown from seeds magnetized. The irradiation of the grain using a device "Almag - 02" optimal mode corresponds to the program number 23 with the following parameters: the magnetic induction $B=6$ mTs, frequency - 16 Hz. It is advisable to proceed with field studies on the effect of irradiation on grain using other models of combine harvesters to harvest the different varieties and types of crops.

The program and methods of field research combine harvester equipped with a system of low-frequency electromagnetic radiation grain material; specification for the design of combine radiators with the system in different locations in the course of promoting the grain of the material from the hopper to the ISU.

2.1. Preconditions and means for resolving the problem

Increased agricultural production and the volume of production can be achieved through the use of proven practices and the development of scientific advice that is specifically designed for intensive plant cultivation technology. The use of such techniques would lead to increase yield and improve the quality of crops and, as a result, a significant increase in economic efficiency of agricultural enterprises. This cannot be achieved without the introduction of technology in the agricultural achievements of modern physics, chemistry, electronics and biology. Bringing innovative agricultural technologies will lead not only to a

significant reduction in energy costs and, accordingly, reduce the cost of production, but also to achieve the highest plant yield by increasing the potential productivity of varieties, seed quality and farming techniques of cultivation of plants [4].

For effective use of environmentally friendly sources of physical stimulation of plant growth, you need to install the particular impact of the types of natural stimulants, including natural and artificial sources of energy, magnetic field, electromagnetic radiation, on the condition of the plants; identify the relationship between the parameters of these sources of plant stimulating effect depending on their type and section type; dependence need to organize the plant response to the impact of a source to determine the mechanism of the effect of physical stimulation on the biochemical and biophysical processes in plants; identify factors that determine the completeness of the implementation of the genetic potential of seeds, increase the yield and resistance to environmental stress.

Many of [4], devoted to research of complex preplan effects on plant seeds in the laboratory. It uses laser light with a wavelength of 632.8 nm, a corona discharge electric field with strength of 1-5 kV/cm, gradient magnetic field with magnetic induction 2-20 mTs/cm. Also described exposure carried out in the field: magnetic field, electric corona field polarized red laser radiation and separately each individual factor, or in combination with each other. Some general regularities of the influence of physical factors on the rate of growth and development of higher plants have been established. So regardless of the current average value of a physical factor stimulation of plant growth reached +10 - + 40% relative to the control samples, not treated with a stimulant. There is a "non-specific biological response" to stimulate the action of weak physical factors of growth and development. Processing crops by natural stimulants may increase their productivity by increasing germination energy of seed germination and seedling [5-11 et al.]; by improving disease resistance, resistance (resistance) to the fungal, bacterial, etc., by disease seed disinfection [12-17 и др.]; variation of mineral composition [18,19], as well as the change in morphological and physiological characteristics that influence the transport properties, water absorption of seeds [20-23 et al.]. The effects are dependent on the processing method, the type and source of stimulation parameters.

2.2. Solution of the given problem

Positive results of electromagnetic processing grain materials achieved under stationary conditions on small batches of seeds. There is a need to check the effect of exposure to the effects of mobile applications, directly in the processor, working on the moving bed of grain material in different working bodies combine. Proposed by the authors method of threshing crops by magnetic treatment of freshly threshed seed to change its biophysical, biochemical, physical and chemical properties can be used in agriculture for seed magnetization during the threshing of different types of crops at harvest.

In the process of threshing crops include grain threshing division of straw mass on the productive and non-cereal part of the

crop during threshing, threshing drum beater type of classical performance, carried out at the same time magnetic treatment of freshly threshed productive part of the harvest in the pass-through mode.

Also, in the method of threshing crops productive magnetic treatment of the crop threshing process is carried out: fruitful initial velocity increases mass of 1.8 to 8.0 m / s in the threshing apparatus; increasing distance between pests ranging from 180 to 280 mm, respectively, and the number of pests from 6 to 12; increasing the length of the concave sweep; increasing drum diameter from 380 to 800 mm in length at a constant sweep concave.

And the threshing process is carried out: threshing drum of smaller diameter (380-500 mm) with the same length of concave and supply fruitful mass; with different profiles drum pests; open drum (free space between the whips and whips with under the whip) having an active angle of attack of 30-60 °; closed drum (solid cylinder) with attached to it the women without an active attack angle (less than 30 °); with increasing "live section" concave (ratio of the area under the holes to the total area of concave) 0 to 40%; when the distance between the concave strips from its beginning to the end of the variable, and, with a large distance in the first and last zones and smaller in the middle of the concave; so that a productive part of the harvest of different cultural influences various magnetic fields with the optimal settings for each of them [1-5].

Combine harvester and seed crops containing installed in series on the downstream side header, feeder, and a number of local self-government bodies of transporting workers (grain, augers, elevators, etc.) from the grind up the grain tank is modular transporting workers authorities, where each housing unit is equipped with a device of a magnetic field to influence them in the moving portion of the freshly threshed seed from ISU to combine grain tank in the pass-through mode. Wherein at least one module the device is provided with a magnetic field.

Purpose - to identify the effect of the effects of low-frequency electromagnetic radiation moving in the combine grain material layer. Aftereffect evaluated on physical and mechanical properties of the grain, seed quality and capacity for long-term storage.

The objectives and the research program:

1. Fixate characteristics agro background.

2. Взять пробы зерна из бункера на четырех режимах работы комбайна - 30,50,75 и 100% от номинальной нагрузки на комбайн.

Take a sample of the grain silo in the four modes combine - 30,50,75 and 100% of rated load on the processor.

Three 100 gram sample in 3 replicates.

3. Each feed grain weight per harvester combine to determine the speed of movement during the experiment, the loss of grains, cereals, grains and cleanliness bunker data recorded in Table 2.

4. Each feed grain mass to take a grain sample from the bunker on the three modes of electromagnetic irradiator system.

1st mode - emitters included only over shakes board, all the rest are off.

2nd mode - emitters included only a grain auger, all the rest are off.

3rd mode - enabled emitters are combine in the hopper; all others are turned off. At the same time samples are taken after the complete filling of the hopper.

4th enabled transmitter shakes on board and a grain auger.

5th mode - full emitters.

This mode combines work to the full capacity grain silo and samples are taken from three different places of the hopper. The experience is repeated three times. Since the research program provided for the gradual incorporation of radiators in all three base points, then we can determine the effectiveness of each place. The third place is characterized in that the grain long time exposure

occurs, and a thick fixed bed. Table 1 provides a summary quantitative assessment of three basic locations of electromagnetic emitters.

Figure 1 is a flow diagram indicating the combine basic locations of electromagnetic emitters.

Table 1 - Characteristics of the basic installation locations emitters

Basic installation location	Irradiates. material	The average density of the material, kg / m ³	The thickness of the irradiated material, mm	Movement speed layer, m / s	Approximate time finding material in the irradiated area.
№1 shake over board cleaning	grain with chaff	200-250	40-60	to 1,0	0,5-3 sec.
№2 a grain auger	refined grains	750-800	60-80	3-5	2-8,0 sec.
№3 combine in a bunker	refined grains	750-800	800-1000	0	10-40 min.

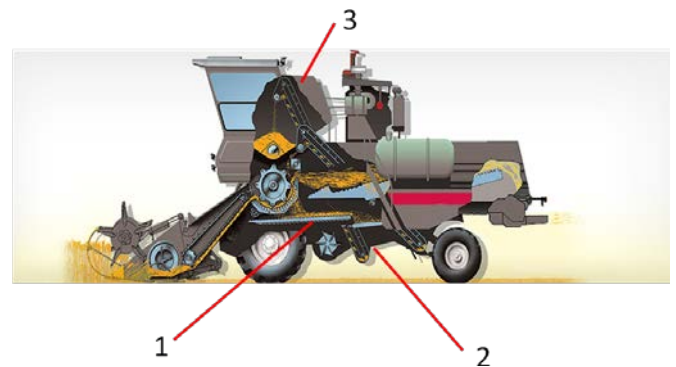


Figure 1 - РСМ " Нива-Эффект " (1, 2, 3- base emitter location)

The methodology of field trials

1. Sampling of irradiated grains under different schemes enable emitters to base their locations should be carried out by fixing the supply of grain mass in the harvester during the experiment, as well as grain loss and fragmentation. This requirement is for two reasons. First - it is necessary to respect the reality of the process under study combine work and to ensure the accuracy of the results. The second - the change in the supply of grain mass in the processor means changing the number of irradiated material, and hence the degree of his exposure to electromagnetic radiation. Maybe for sample analysis results obtained so that effectively irradiate only at low feed rates, or vice versa - no feeding.

2. The process of sampling and processing should be carried out in accordance with current standards in the Republic of Kazakhstan on the test methods of harvesting. In this document, it marked only the specific features of tests in connection with a new focus of research

3. Evaluation combine functional parameters are performed in the optimal timing for agronomic harvesting zones. In the absence of the required area of soil fertility tests are carried out in real conditions prevailing in agreement with the developer of the manufacturer. These indicators with the quality of the test machine are compared only with indicators of the quality of analog.

4. To determine the functional parameters selected portion sizes which may allow for testing of all scheduled modes. For each mode field harvester portion should have a length, on which a

machine manages to dial a predetermined speed and the process enters a steady mode.

5. Tests carried out on the harvester thresher one main culture in the area, the culture, for which they are designed according to TK, TU.

6. Prior to the testing machine shall be run, and adjusted according to the operating instructions and work at least 10 hours. Adjust the speed of the machine and the working bodies in the tests performed in the intervals between accounts plots. Accounting logging site experienced by the machine should be held at a constant speed.

7. The same combine, but with disabled irradiators used as an analogue.

2.3. Results and discussion

All grain samples on all radiators operating modes are stored in separate samplers (sacks, bags, etc.) and used in the future for the laboratory analysis of the quality of grain and subsequent seeding into the soil for the assessment of crop quality.

Careful selection and individual samples of grain (seed) and their subsequent analysis should allow answering four questions:

- whether the electromagnetic radiation affects the quality of the grain?
- if there is enough time for irradiating the grain in the successive three places or enough of any one or two?
- where effectively install electromagnetic emitters?
- on a feed grain mass efficiently produce electromagnetic radiation of grain (whether, in general, the value of feed grain weight per combine).

Requirements to test modes

1. Quality indicators implementation process of work the combine should be determined in the four working speeds at which performance is achieved within 30, 50, 75, 100% of the nominal.

2. Rated W_H combine performance is determined by the formula:

$$W_H = 1,44 q_k \cdot t / h$$

where q_k - a potential capacity of the combine at a ratio of weight to the weight of the grain straw 1.5.

Depending on the used combine takes the following bandwidth: for « Niva-Effect » - 5,6 kg/s; « Yenisei-1200NM » - 5,8 kg/s; « Vector-420 » - 8.8 kg/s; « Don-1500B » - 9.5 kg/s; « Akros - 540 » - 10.5 kg/s; « Torum-740 » - 12.6 kg/s.

3. In the course of the experiments are not allowed to change the settings of the working bodies grind at all speeds combine movement.

4. When sampling to assess the grain loss is recommended to use special wooden frame size 4400x1500 mm covered with rubberized canvas. Frames are thrown to the ground under the harvester in the region of space between the rear wheels combine and bottom stacker. Frames are emitted every 5 meters at an equal distance.

5. Each experiment included a system of electromagnetic emitters combine to work to complete filling of the grain silo.

6. Each sampling of spent grain is placed in a separate package (sampler), together with a label indicating the experience of the hotel.

2.4. Conclusion

To date, to increase the yield of crops most widely used stimulant physical energy, which laid the basis for the action of magnetic and electromagnetic fields. At the same time a lot of attention is paid to a high-frequency, low-frequency radiation sources taxi. The problems of achieving optimum results stimulate seed germination, plant growth and development requires deliberate action on the productivity of plants. To do this, you need to install

all the conditions of action of stimulating factor on the planting material, including its morphological and biophysical parameters, the choice of the emission source, its operating parameters, and stimulation modes. It is important that all these factors are interrelated. Knowledge about these factors and the relationships between them allow you to control the processes of growth and development of crops, thus yielding crops.

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2.5. Literature

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