USING STRONG ELECTRIC FIELDS IN THE GRAIN INDUSTRY

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Nowadays grain processing in order to stimulate growth processes, decontamination and disposal of harmful microorganisms insect pests is carried out mainly by chemical means. But at the achievement of positive results, the use of drugs has several negative consequences, including the pollution and pesticides as their accumulation in the soil and in the plant production, the complexity of the performance of work.

In Ukraine and abroad actively conducting research on the use of ozone. Ozonation as the disinfection method is well studied with sanitary - hygienic hand. It was approved sanitary - medical facilities all the advanced countries (USA, Germany, Japan, France and so on. D.). Importantly, after the disinfecting ozone decomposes leaving treatment facilities for hazardous decomposition products, and smell. Research using ozone demonstrate the high efficiency of its action, but existing facilities and processing methods do not provide the desired effect of the treatment.

At this stage of development of these technologies for processing grain material used ozonizers. Modern ozonizers in which ozone is produced by electrical discharge in the air include myself, except ozone generators, auxiliary equipment, system cleaning and drying the air cooling system, compressor, duct system, measuring device. When applying ozone from the generator to the processing chamber it is partially decomposed, resulting in significant losses. Besides these treatment methods do not ensure uniformity contact with ozone production. As a result of such plants have low efficiency, which prevents their wide implementation.

The purpose of research - to establish the efficacy of strong electric fields in the grain industry.

Materials and methods of research. Exploring the grain mass under an electric field of high tension was found occurrence of partial discharges,

accompanied by ionization processes in the air gap grain mass. The result of ionization processes is the formation of ozone, which is known for its antibacterial properties.

Installation of the formation of ozone in the whole volume of grain mass under an electric field of high tension opens up new technological possibilities for environmentally friendly processing of various grain crops.

Results. At the Institute of Energy, automation and energy saving developed ways of handling grain mass in the electric field of high tension.

To study the mechanism of stimulation of biological processes in the grain was considered a separate seed under an electric field of high tension DC. It was put forward and theoretically substantiated the hypothesis of change in ion concentration in interstitial fluid and therefore transmembrane potential of the cells as a result of current conduction under an electric field of high tension. The result is an output of seed dormancy, which will provide it with a much more active process of seeding germination and subsequent growth. In addition to the volume of seed mass produced ozone, which neutralizes the harmful microflora on the surface of seeds and seedlings would reduce the incidence. Thus developed a method Seedbed grain groups based on two factors: first - the impact on physical processes directly in the seed that leads to biological stimulation; second - the impact on microorganisms that are found on the surface of the grain, with the aim of neutralizing their harmful activities.

As a result of studies found that seed treatment in an electric field of high tension current conditions preclude the permanent increase soybean yields by 27 ... 34%, barley by 18 ... 40%, wheat by 17 ... 35%.

When the task disinfection of grain that can be used during its storage and food processing industries and stimulating action unnecessary grain that occurs at constant current. The effectiveness of decontamination in this case depends primarily on the concentration of ozone. Established intensity discharge processes, and therefore the concentration of ozone is higher when using AC voltage electric

field. Thus our theoretical and experimental studies have been associated with the use of the electric field of high tension AC. As a result of experimental research on the influence of processing method on the microflora of winter wheat was established: reducing caryopsides populated pathogens Alternaria alternata Keis 43% relative to the control; Alternaria tenuissima (Kunze ex Nees et T.Nees: Fries) Wiltshire - 59%; Bipolaris sorokiniana shoemaker - 70%. Among the pathogens of the genus Fusarium: the number of grains contaminated with Fusarium sporotrichiella Bilai decreased by 80%; Fusarium graminearum Schw - 80%, Fusarium culmorum (WC Sm.) Sacc - 64%; Fusarium oxysporum Shlech - 80% and Fusarium moniliforme Sheld 85%. In control variant was also marked by the presence of the genus Penicillium and Mucor mucedo Fres. None of the treated variants was not observed manifestations of this pathogen.

The proposed method of treatment for the removal of insects in a strong electric field of grain and placed between plane-parallel plate electrodes to which high voltage is supplied. The feature of this type of treatment is that the pests are factors such exposure: a strong electric field, surface and volume current ozone. In order to expand technological capabilities, namely increasing the productivity of ozone synthesis in the processing for the purpose of disposal insects used source of high voltage pulsed current. Using this source provides a substantial increase in partial discharge of air inclusions in the grain mass compared with DC or AC, and accordingly the concentration of ozone.

As a result of studies found that the proposed method can effectively neutralize insect pests.

Conclusions

Presented developed ways of handling grain mass in a strong electric field in order to stimulate growth processes, decontamination and disposal of harmful microorganisms pests. It was established that the processing of grain mass in a strong electric field can increase yields of different crops to 40%, 85% to neutralize harmful microorganisms on the surface of grains and 100% destroy insect pests that are found in the grain mass.