Description

Nowadays the agricultural methods used for presowing seed treatment are based on the processing of seed by different chemicals (bromine methyl, chloropicrin, vitavacks etc.). High price of chemicals, harmful impact on environment and human health stimulate the development of alternative methods for presowing seed treatment.

One of promising methods is an ecologically safe ozone technology for presowing seed treatment which was recently developed by scientists from NSC KIPT and Yuriev Plant Production Institute in Kharkov. This method is a result of investigation of influence of ozone (environmentally friendly oxidant) on the process of activation and growing of seed, as well as the development of ozone equipment that is well adapted for operation under agricultural conditions.

As a result of 10 year investigation and testing of method the impact on seed metabolism was determined and shown that ozone presowing seed treatment leads to increase of energy of germination and germination in field conditions in comparison with chemical method of seed treatment. In addition, the crop capacity was on 10-15% above. The ozone presowing seed treatment was met with approval at collective farms and was confirmed high efficiency of method. Improvement in quality of seed material which had been grown out from seed treated by ozone was also observed as a result of investigations.

In the NSC KIPT a new ozone generators with barrierless electrode system and high-voltage pulsed power supply have been developed. The barrierless ozone generators have a high reliability due to elimination of the dielectric barrier from discharge gap. It excludes the damage of electrode system in case of accidental spark breakdowns. The barrierless ozone generator has significantly low gasdynamic resistance because the discharge gap is a wider. Besides, the electronic control system of the ozonizer improves operating characteristics of the ozone generator. The advantage of the barrierless ozone generator is a possibility of stable operation by using the atmospheric air as a feed gas. The barrierless ozone generators in the best way approach for operation under agricultural conditions.

The barrierless ozone generators have a modular construction that is an assurance of serviceability and allows to vary the ozone productivity in wide range 25 – 100 g O₃ per hour. The parameters of the agri-ozone module are the following:

- Ozone production: 25 g/h
- Feed gas: atmospheric air
- Feed gas flow rate: up to 100 mi/h
- Power consumption: 1000 watt
- Supply voltage: 220±20 V
- Cooling: air

Novelty and main advantages

The main innovation of the developed technology is the use of ozone technologies for presowing seed treatment. It allows in the environmentally friendly way to carry out the activation for seed and as consequence the increase in the crop capacity up 10-15%.

Thus the ozone technology has the following advantages in comparison with commonly used methods:

- increase of crop capacity on 10-15%
- improved quality of grain
- 2-4 times reduction of dosage of chemicals
- decrease of expenses on operating supply for presowing treatment
- environmentally friendly technology exclude the harmful impact on environment
- the ozone is produced at the place of operation
- the technology can be used for control of seed quality during its keeping in granaries; for seed freshening improved quality of grain

Application

This technology can be applied in agriculture for crop growing, for keeping, drying and processing of agricultural products.

Working out stage

The method of ozone presowing seed treatment is now at the stage of commercial introduction. Operation instruction for realization of method was approved by the Ministry of Agriculture of Ukraine and the Ukrainian Academy of Agriculture. The Patents of Ukraine for this technology were taken out. Technologies of drying and keeping of seed and other agricultural crop are now at the stage of testing under industrial conditions.

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Fig.1. Ozone technology of presowing seed treatment.