INCREASE OF THE PROTECTION OF GRAIN STOCKS FROM GRANARY PESTS WITH THE USE OF COOLING IN THE LONG-TERM STORAGE

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In the conditions of application of innovative energy saving technologies and intensification and specialization of agrarian production among the measures guaranteeing the increase of production of agricultural products, the protection of plants from harmful objects, the loss of grain products as a result of improper organization, which reaches according to FAO 10-15 %, although for the correct organization of the loss of losses only 0,03-0,7% of the mass of grain. Global losses of grain stocks are estimated at 5 million tons, they would be enough to live 150-200 million people.

For wreckers, stocks of grain mass stored in enclosed spaces, where there is no sharp fluctuations in temperature and humidity, are the main habitat environment. Under such optimum conditions, high fertility and survival of populations are ensured. A short period of ontogenetic development, the absence of most types of diapause contributes to their extremely rapid reproduction.

Of the peculiarities of pest biology biology, the significance of reproduction intensity is the temperature regime and the moisture content of the grains laid down

for storage; therefore, these indicators should be taken into account and used as elements of control of their numbers [1]. Prolonged minus temperatures delay development and reproduction, causing the death of ticks and insects. It has been established that optimum temperatures for the development of granary wreckers are in the range of 18-32° C, and in some species it reaches 35° C. At temperatures above 12-13° C, insects are capable of multiplying, evolving from eggs to the imago, increasing their numbers and actively feeding. At low temperatures, they are able to survive, but no tangible damage to reserves. Temperature below 5° C can stop the harmful effects of mites, and purification of grain from garbage impurities and drying, in which the humidity below 12-13% leads to their death.

Pests often can not withstand the heat treatment of the grain (freezing to -10° C or warming up to +50° C and above). It should be timely to reduce the temperature of the grain mass by phased aeration. You can use night air with a temperature of 10-15° C, which is cooler than the temperature of the grain. The best trick is rice weevil, southern firefly, corn moss, surinam flour.

Reliable protection of grain and products of its processing from wreckers is possible only with respect to a whole set of receptions. Among them, preventive measures, adherence to the established regime of storage.

In basis of the biologically oriented protective measures about collar wreckers firmness of grain feels strongly to them, that is provided glassiness, hard grain and presence of integumentary tapes.

The vital activity of collateral pests is significantly influenced by the temperature regime. Each type of insects and mites is active only within certain limits of temperatures. It is established that the optimum temperature range for the development of most wreckers of cereal stocks is in the range of 18 ... 32° C. Prolonged minus and minimal positive temperatures hinder their development and reproduction. In the grain, which is cooled to the lower temperature thresholds, insects and mites gradually die. Under such conditions it is possible to store grain without disinsection. The lower temperature threshold of the development of the main wreckers of grain stocks is (°C): 6 - ticks; 10 - stocking weevil, grain

cornflower; 11 - mill fire; 13- rice weevil, cereal moth; 14 - south collar firefighter; 15 - potatoes and small flour cherries; 16 - surinam flour, cereal shishles. Therefore, for the smallest cooling-off, the grain storage facility needs to be ventilated, opening windows and doors, or resorting to active ventilation with stationary and mobile units, or moving the grain by conveyors, passing through grain-cleaning and other units with cold air blowing. A reliable way to limit the amount of wreckers - freeze the grain. In this case, their resistance to low temperatures must be taken into account.

According to our research [2], the best way to store grain in a refrigerated state. This mode is based on the fact that the temperature of breathing of the grain mass is significantly reduced at a temperature of 10º C, and most of the insect wreckers become sedentary and stop multiplying. Further lowering the temperature creates increasingly unfavorable conditions for the reproduction of insects, due to which they eventually disappear. Low temperatures also reduce the activity and development of microorganisms, but they do not die from low temperatures. This grain preservation regime is well manifested in case of application for a short period. For a successful storage of a batch of grain by this method for a longer time should be pre-dried [3]. When using natural sources of cold, canning of cereals by cooling is affordable and economically most profitable. Application of I degree of cooling of the grain by reducing its temperature to 10 - 0º C is possible as a preventive purpose, and for suppressing the life of most wreckers. It can be used both prophylactically and in order to suppress the livelihoods of most pests. To do this, it is enough to bring the temperature of the grain mass to 8 - 10° C.

For ventilation of grain in silos of elevators, various installations with longitudinal or transverse blown grain embossing are used. The heating of the air promotes more intensive drying of grain in silos, but reduces the efficiency of cooling. Cooling and lowering the moisture content of grain in silos when blown up from the bottom upwards correspond to the direction of air movement. First and foremost, the grain is intensively cooled and dried intensively at the entrance of the air into the grain embankment and at the latest and less intensively - at the exit from

it. Installations with vertical blasting in silos of elevators can be effectively used to cool dry grain during the winter season, during periods of significant cooling. Plants with horizontal blasting in the silos of the elevators provide cooling of the grain in a shorter time (approximately 3-5 times) than the units with vertical blowing. In the case of transverse flooding, the specific air supply per 1 ton of grain in 3,0-3,5 times more, the heating of air is about 2° C, the specific consumption of electricity is 8-10 times less compared with vertical blowing. In the process of transverse blowing it is achieved more even cooling of the grain both in height, and at the intersections of the embankment. Preliminary possibility of ventilation is established in the presence of exceeding the temperature of the grain above the temperature of air in dry weather more than +4° C, and in rain more than +8° C, and also if the moisture content of the grain is higher than 24% in dry weather at any temperature air. In the cooling process, it is mandatory to control the equilibrium moisture content of the grain: if it is lower than its actual moisture, cooling can be performed, otherwise the grain will be wetted due to sorption. Cooling with refrigerating machines is more efficient and reliable, but it requires additional funds and special devices. Therefore, this measure, first of all, is recommended for crops that are especially unstable during storage, are rapidly damaged by pests, are affected by diseases: corn, cereals and oilseeds. To cool the grain, air is used from the environment (by ventilating the grain) and (or) artificial cooling (using refrigeration, stationary or mobile) [4]. It is clear that in the first case the precondition is the corresponding climatic conditions - immediately after harvesting the temperature of the air should allow cooling the grain to the recommended + 15° C for the first 2 weeks.

Referens

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