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Mycobiota Grains Of Winter Wheat, Depending On The Fungicidal Treatment.

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ABSTRACT

Studies have shown that the highest biological efficacy against fusariosis of the ear is observed when using a fungicide based on propiconazole and tebuconazole with an active substance content of 300 and 200 g / l, respectively, at a rate of 1.0 l / ha. The decrease in the content of tebuconazole in the composition of fungicides to 125 mg / l adversely affects its biological effectiveness, as evidenced by the indicators of infection of winter wheat grains with fungi of the genus *Fusarium* and the content of deoxynivalenol fusariotoxin produced by them.

Keywords: winter wheat, grain, *Fusarium*, *Alternaria*, fungicides, biological efficiency, 4-deoxynivalenol (DON).

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INTRODUCTION

Microorganisms that inhabit the grain, significantly affect its seed, technological and sanitary properties. The most common components of the microbiome of winter wheat grain are the fungi of the genera *Alternaria* and *Fusarium*. Among the causative agents of wheat diseases, the fungi of the genus *Fusarium* are among the most harmful. Infection of ears during the flowering period not only leads to loss of the harvest, but also to contamination of grain with fusaryotoxins dangerous for human and animal health.

Due to agro-ecological conditions, the western part of the territory of the Stavropol Territory belongs to the zone of the harmfulness of the ear fusarium. Beginning in 2010, outbreaks of spike fusarium in the territory of the region were observed in 2014, 2016 and 2017. [12]. In the adjacent Krasnodar Territory in 2017, out of 150 lots surveyed, 80% of the grain was infected with *Fusarium* in the range of 2-5%, and in some cases up to 18% [3].

According to the requirements of GOST R 5254-2006 "Wheat. Technical conditions ", GOST R 53900 - 2010" Feed barley. Technical conditions ", GOST 28672 -1990" Barley. Requirements for procurement and supply ", GOST R 54078-2010" Feed wheat. Technical conditions ", the content of *Fusarium* grains should not exceed 1.0%. However, in a number of countries that traditionally import Russian grain, there are restrictions on contamination with *Fusarium* (for example, Jordan reduces the permissible figure to 0.03%) [4].

According to FB Hannibal [5], the infection of seeds of cereal crops by species of the genus *Alternaria* also leads to the accumulation of mycotoxins harmful to humans and animals. For example, alternarniol, alternarnol monomethyl ether, tenuaic acid, and other toxins were found in wheat grains. The lethal dose (LD₅₀) of tenuazonic acid for chicken embryos is 548 µg per egg, that is, the amount that can be contained in 85 g of wheat grain.

According to GD Sokolova and A.P. Glinushkina [6], Volters I.A. at al. [7], the aggravation of the infectious background occurs due to the widespread of resource-saving surface tillage technology, which contributes to the preservation of the infectious principle on non-embedded plant residues. Thus, the urgency of minimizing the risks of infection of winter wheat with toxoid fungi is beyond doubt.

The aim of the work was a comparative assessment of the biological efficacy of fungicides against *Fusarium* spike.

MATERIALS AND METHODS

Production experience was laid in 2015 in the conditions of the unstable moisture zone of the Stavropol Territory on a natural infectious background (the predecessor is corn for grain). It should be noted that in the previous year in 2014 in the Stavropol Territory, damage to winter wheat crops was detected on an area of 281.9 thousand hectares (31% of the surveyed area) with a weighted average distribution rate of 13 [1].

Plot size - 25 hectares, placement - single-tier, systematic. The processing of winter wheat varieties Yuka (medium resistant to fusarium of the ear) with fungicides was carried out according to the experimental design in the flowering phase.

To assess the occurrence of fungi on the surface (spontaneity) and inside (infestation) of winter wheat seeds, two weights of grain were taken from an average sample of the sample of grain. One was washed with sterile water and laid out on a nutrient medium (sterility detection) without sterilization. The second sample of grain was additionally sterilized with 70% ethanol solution for 3 minutes, after which the grain was again washed with sterile water (infection detection). The grains from each sample (100 pieces) were laid out on the surface of the nutrient medium poured into Petri dishes (10 pieces per cup). Before spilling the nutrient agarized potato-sucrose medium (CSA), streptomycin sulfate was added to it at a concentration of 100 mg / l to suppress the growth of bacteria and Triton X-100 solution (2 × 10⁻⁴ ml / l) to reduce the linear growth of fungi. After 7 days of incubation at 24 ° C, the number of grains on the surface of which colonies of fungi were formed was taken into account. The taxonomic affiliation of fungi was determined by reference to Ainsworth J., Bisby H. [8]. Mycotoxins were detected by enzyme immunoassay [9].

RESULTS AND DISCUSSION

The research results showed that under conditions of unstable moisture in the Stavropol Territory, the highest biological efficacy against fungi of the genus *Fusarium* is observed when using a fungicide based on propiconazole and tebuconazole with an active substance content of 300 and 200 g / l, respectively, at a rate of 1.0 l / ha. The level of internal infection did not exceed 24%, which is 1.9 times less than when using the reference drug and 2.25 times less than when using the fungicide based on the active ingredients prothioconazole and tebuconazole. Thus, a decrease in the content of the active substance tebuconazole (as the most effective against *Fusarium* infection) in the composition of the fungicide from 200-250 mg / l to 125 mg / l negatively affects its biological effectiveness against toxinogenic fungi of the genus *Fusarium*. This is also evidenced by the indicators of the content of 4-deoxynivalenol (DON) fusariotoxin produced by them in the grain of winter wheat (Table 1).

Table 1: Mycobiota and the content of 4-deoxynivalenol (DON) in the grain of winter wheat and depending on the fungicidal treatment

Option	Mushrooms of the genus <i>Fusarium</i>		Mushrooms of the genus <i>Alternaria</i>		DON content in grains, mcg / kg *
	Over crowding %	Contamination %	Over crowding %	Contamination %	
Tebuconazole (250 g / l) 0.4 l / ha (reference)	57	46	36	16	520
Prothioconazole (125 g / l) + tebuconazole (125 g / l) 0.8 l / ha	94	54	21	14	1403
Propiconazole (300 g / l) + tebuconazole (200 g / l) 1.0 l / ha	46	24	37	12	557

*The maximum permissible concentration in food grain is 700-1000 µg / kg

On the other hand, prothioconazole, as an active substance, is rather effective against alternaria infection, reducing the level of external infection by 1.7 times.

CONCLUSION

Thus, the highest biological efficacy against fungi of the genus *Fusarium* is observed when using a fungicide based on propiconazole and tebuconazole with an active substance content of 300 and 200 g / l, respectively. The decrease in the content of the active substance tebuconazole in the composition of the fungicide to 125 mg / l adversely affects its biological efficacy against fusarium fungi. This is evidenced by indicators of external and internal infection, as well as the content of 4-deoxynivalenol (DON) produced by them in the winter wheat grain.

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