Evaluation of the effect of Gastoxin® B57 on maize seed quality by germination and cold test

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ABSTRACT

Gastoxin® B57 is used to control stored grain pests. The objective of this study was to evaluate the effect of different doses of Gastoxin® B57 on seed quality of 18 maize lines through germination and cold testing. The seeds were treated with Gastoxin® B57 for 72 hours in a 1m3 environment. The dosages used were: dosage recommended by the manufacturer; twice the recommended dosage and control. After treatment with the insecticide, germination and cold tests were performed. The experimental design was randomized blocks in a 3x18 factorial scheme (3 doses and 18 strains), followed by Tukey's test of comparison of means. Analysis of variance showed that there was a difference in treatments as a function of the doses. Lines 2, 3, 4, 14 and 16 showed higher germination and vigor potentials. The dose recommended by the manufacturer and the control did not affect the seed quality of the corn lines in the cold test and in the germination test.

Keywords: *Zea mays*, Insecticide, Germination, Vigor.

1 INTRODUCTION

In the process of seed production and commercialization, one of the main factors is the preservation of seed quality throughout the storage period, and seed quality must be maintained at least until the sowing time Carvalho (1992).

Physiological quality, in particular, can be affected by the action of different agents. Among them, the storage pests *Sitophilus zeamais, S. oryzae, Rhyzopertha dominica* and *Sitotroga cerealella*, which may be largely responsible for the deterioration of the stored seed lot (LORINI et al.2003). The control of these pests depends practically on liquid chemical insecticides (preventive treatment) and fumigants (purge).

Gastoxin® B57, the main product used on the market today, is effective at all stages of insect development.

In addition to quantitative losses, pest attacks on seeds can cause losses in germination power and vigor (BARNEY et al. 1991).

As corn seed purging is routinely performed, and due to the few studies reported in the literature on its effect on seeds, it is of great importance to evaluate the effects of commercially available insecticides on seed quality.

Based on the few studies found in the literature, Andrade & Nascimento (1987) on the effect of purging on the physiological quality of maize seeds, this study was developed. The objective of this study was to evaluate the effect of Gastoxin® B57 on maize seed quality by germination and cold tests.

2 MATERIAL AND METHODS

Seed samples from 18 lines from the breeding program were used. The seeds were treated with phosphine gas using Gastoxin® B57 for 72 hours in a 1m3 environment.

The dosages used were: a) Manufacturer's recommended dosage – 1g of Gastoxin® B57 per m^3 (1 Gastoxin tablet per m3), b) Double the recommended dosage – 2 g of Gastoxin® B57 per m^3 (2 Gastoxin tablets per m^3) c) No dosage (control).

After insecticide treatment, germination tests were performed according to Brazil (2009) and cold test, according to Barros et al. (1999) and Vieira & Krzyzanowski (1999).

The experimental design was randomized blocks, in a 3x18 factorial scheme. To meet the assumptions of the analysis of variance, the transformation of the germination and cold test data was performed using a logarithmic scale (log).

The mean clustering test proposed by Scott-Knott (1974) was used. Statistical analyses were performed using the R program (R Development Team, 2006)

3 RESULTS AND DISCUSSION

It was verified by the analysis of variance that there was a difference in treatments as a function of the doses of Gastoxin® B57, considering the germination and cold tests, i.e., at least one treatment differs from another as a function of dosage.

By grouping the means by the Scott-Knott test at 5% probability, of the 18 corn lines

considering each dose of the product, it is observed that the dosages of 0 and 1 gram of Gastoxin® B57 were combined in the same group, i.e., they did not affect the germination of the seeds of the strains (Table 1)

Table 1. Averages of the 18 maize lines in the germination test at each dose of the product Gastoxin® B57

Dose	Average1
0	3.04 to
1	3.04 to
2	2.90 B

[1]Averages followed by the same letter do not differ from each other by the Scott-Knott test at 5% probability.

Their vigor was also not affected (Table 2)

Table 2. Averages of the 18 corn strains in the cold test at each dose of Gastoxin® B57 product

Dose	Average1
0	3,08 a
1	3,05 a
2	2,69 b

[1]Averages followed by the same letter do not differ from each other by the Scott-Knott test at 5% probability.

The lines differed into two and three groups in the cold and germination tests, respectively, and lines 2, 3, 4, 14 and 16 showed higher germination and vigor potentials (Table 3)

Table 3. Average, in the three doses of phosphine, of the transformed data of the 18 treatments in the germination and cold tests

Lineage	Germination Test1	Cold Test1
1	2.78 c	3.07 a
2	3.16 a	3.13 a
3	3.20 a	3.05 a
4	3.13 a	3.04 a
5	3.03 b	3.06 a
6	2.89 c	2.94 a
7	2.85 c	3.10 a
8	2.98 b	2.88 b
9	2.76 c	2.96 a
10	3.17 a	2,87 b
11	2.84 c	2.84 b
12	3.04 b	2.84 b
13	2.89 c	2.71 b
14	3.18 a	2.95 a
15	3.01 b	2.81 b
16	3.18 a	3.07 a
17	2.86 c	2.92 a
18	2.82 c	2.67 b

[1]Averages followed by the same letter do not differ from each other by the Scott-Knott test at 5% probability.

4 CONCLUSION

The doses of 0 and 1 gram of Gastoxin® B57 did not affect the seed quality of the corn lines in the cold test and in the germination test.

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