

**VIGOUR OF FUNGICIDE-TREATED AND UNTREATED MAIZE SEED  
FOLLOWING STORAGE**

**BY**

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I, the undersigned, declare that these studies, except where acknowledged in the text, is my own work and has not been previously submitted in any other form to this or any other tertiary institution.

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## **Vigour of fungicide- treated and untreated maize seed following storage**

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### **ABSTRACT**

An assessment of the effect that conventional storage structures, used by small-scale farmers in northern Kwa-Zulu Natal and southern Mozambique, had on germination and vigour of maize seeds was conducted. The survey confirmed that the methods of storing the seed decreased the quality of the maize seeds. Storing maize in the field was good as a short-term solution as initial germination was 100%. Following storage at sub-optimum conditions, germination dropped to 25.3%. Commercially treated maize seeds were compared to the test samples collected. After storage, the commercially treated seeds maintained a germination percentage above 75.

Untreated maize seeds were treated with fungicides at the recommended dosages. Thereafter the seeds were subjected to germination and vigour tests according to methods outlined by the International Seed Testing Association. All treatments maintained percentage germination above 75. Apron<sup>®</sup> XL had the highest percentage germination of 83. This trend was also found following the cold test and greenhouse emergence. None of the treatments differed significantly from the control. In this study none of the treatments caused major imbibition damage as indicated by the percentage weight increase and the low leachate conductivity (1012-1271  $\mu\text{Scm}^{-1}\text{g}^{-1}$ ).

The effect of accelerated ageing (AA, 2 and 4 days) and long-term storage (3 and 6 months) on germination and vigour of treated maize seeds was investigated. In the untreated control and treatments there was a gradual decrease in germination following ageing and storage of the seeds. Apron<sup>®</sup> XL failed to germinate after 3 months. The

decrease in germination was mirrored by the leachate conductivity readings. Thiram was the only treatment to maintain germination after 6 months storage. The seeds were planted in two greenhouse trials to assess the performance of the treatments *in vivo*. The first trial evaluated the emergence and second the emergence and control of *Fusarium graminearum*. Results from the first trial showed that following 2 d AA, seeds treated with Thiram had the highest percentage emergence (70.7) followed by Celest<sup>®</sup> XL (68) and the untreated control (62.7). Following inoculation, a similar trend was seen for the treatments and the untreated control. In relation to the percentage seedlings emerged, the control had the highest percentage diseased seedlings. Celest<sup>®</sup> XL had the lowest percentage diseased seedlings (10, 2 and 1) but failed to germinate after 6 months storage. Thiram was the only treatment to emerge after 6 months storage.

The ultrastructural changes in embryonic roots of the untreated control, Celest<sup>®</sup> XL and Apron<sup>®</sup> XL were investigated using transmission electron microscopy. These seeds were subjected to 48 hr rapid imbibition and 2 d AA. The most obvious difference between the untreated control, Apron<sup>®</sup> XL and Celest<sup>®</sup> XL was the number and position of the vacuoles. In contrast the lipid layer was still attached to the cell wall in the Apron<sup>®</sup> XL and Celest<sup>®</sup> XL treatments but in the untreated control they appeared more concentrated in the cytoplasm.

This study proved that Thiram was the best treatment among the fungicides tested. However, these results need to be confirmed using a larger range of maize seed lots.

**Keywords:** germination, emergence, fungicides, *Fusarium graminearum*, maize, storage, ultrastructure, vigour, *Zea mays*

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