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Quality and mycotoxin contamination of maize stored in air-tight containers in rural farm stores: data from two semi-arid zones in Kenya and Tanzania

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Abstract

Hermetic containers have been promoted in recent years for chemical-free grain storage among smallholder farmers. In the context of grain quality, the influence of maize storage and pre-storage practices (harvesting time, dehusking, drying, and shelling method) on performance of air-tight bags was investigated in the semi-arid regions of south eastern Kenya and northern Tanzania. Completely randomised trials were conducted in farmer-own stores; shelled maize was filled in air-tight bags or woven polypropylene (PP) bags and stored for 30-35 weeks. Insect damage, physical grain quality, mould infection were evaluated at 6-7 weeks intervals, and mycotoxin contamination was examined at onset, mid, and end of storage. Maize stored in hermetic bags was generally free from insect infestation, while PP bags permitted profuse build-up of insect populations causing grain damage of up to 82%. Total aflatoxin contamination of maize stored at moisture content below 14% increased significantly in the PP bags (5 - 8 folds) but not in the air-tight ones. Harvesting, drying and shelling practices significantly influenced the quality of maize stored in hermetic bags, resulting in sorting losses of 6-23 kg/100 kg after 6-8 months of storage. Since sorting is an important operation for improvement of food value and market quality, such losses would significantly lower the benefits of air-tight storage. Pre-storage practices of sorting, cleaning and moisture verification by farmers have impact on overall performance of air-tight storage.

On-Farm Maize Insect Pest and Mycotoxin Levels in Ghana

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Abstract

Maize post-harvest losses are perennial in Ghana but reliable comparative information on on-farm losses of maize produced in the Middle and Northern Belts of Ghana is lacking. Two studies were conducted from September 2015 to February 2016 to identify factors contributing to on-farm losses of maize in these two Belts. In the Northern Belt, the study was conducted in six communities including Adubiyili, Diari, Pong-Tamale, Savelugu, Toroyili and Zamnayili; and in the Middle Belt, in Ejura, Sekyedumase and Amantin communities. Moisture content, percent weight loss, percent insect damaged kernels (IDK) on numerical basis (%IDK_{nb}) and percent IDK by weight basis (%IDK_{wb}), insect pest abundance, and mycotoxin levels were estimated. Moisture content values of maize at pre-harvest and heaping stages in all nine communities were below 15%. *Sitophilus zeamais*, *Sitotroga cerealella*, *Cathartus quadricollis*, and *Carpophilus dimidiatus* were found to attack maize on-farm in communities in the Middle Belt, but no adult insect pests were collected on pre-harvested maize in the Northern Belt. The %IDK_{nb} values on-farm in all nine communities were < 2% per 250 g. Mean aflatoxin levels below 15 ppb were obtained from pre-harvested maize in both regions but levels above 15 ppb were obtained from heaped maize on-farm. Fumonisin levels of maize were below 4 ppm on pre-harvested and in heaped maize in both regions. Results show that heaping maize on-farm increases aflatoxin levels beyond the acceptable threshold level and should not be practiced.