

The ever increasing world population requires high increase in food production and great assurance of food security. The food insecurity is a global crisis and FAO has warned of increase in food prices. In Eastern and Southern Africa alone, food losses are valued at \$1.6 billion per year, or about 13.5 percent of the total value of grain production. About 35% of crops all over the world are destroyed by insect pests. Losses occur when grain decays or is infested by pests, fungi or microbes, and physical losses are only part of the equation. Losses can also be economic, resulting from low prices and lack of access to markets for poor quality grain, or nutritional, arising from poor quality or contaminated food. Maize is the main staple food in Kenya, averaging 80 % of the total cereal. Postharvest losses in maize due to storage insect pests are generally estimated to range between 20 to 30% of which 10 to 20% of the weight losses have been by the maize weevil *Sitophilus zeamais* after 3 months storage on the farm. Attempts to control the insect using conventional insecticides has caused problems. They are known to leave toxic residues, pollute the environment and wild life coupled with high cost of production. In this study, diatomaceous earth (DE) and five plants were investigated for their bioactivity against *S. zeamais*. The plants investigated include; *Tagetes minuta*, *Chenopodium album*, *Artemisia absinthium*, *Tarhomonanthus comphoratus*, *Sorghum bicolor* husk and *Sorghum bicolor* leaves. Experiments were conducted both in the laboratory and designed on-farm trials in order to assess the insecticidal potency of botanical products. Insecticidal toxicity against *S. zeamais* by powdered plant materials, solvent extracts (hexane, dichloromethane (DCM), and methanol), essential oil of the plants and DE was evaluated. Repellence of the essential oils of *T. minuta*, *C. album*, *A. absinthium* and *T. comphoratus* was also investigated. Further experiments were conducted on the efficacy of mixture of DE and essential oil of *A. absinthium* (DE/AB) against *S. zeamais*. The effect of the diatomaceous earth, solvent extract and essential oil on the viability of maize grains was determined. The weight loss of the treatment was assessed in the laboratory after 62 days and in the field in 12 months period. This study has revealed that most powdered plant materials caused mortalities against *S. zeamais* less than 50% after 8 days of treatment at both 5% and 10% dose level and were significantly different from the positive control, actelic super". The hexane extracts of most plants displayed mortalities above 50% against *S. zeamais* after 120 hours at a dose of 1.0%. DCM and methanol extracts of the plants caused mortalities less than 20% after 120 hours at both 0.5% and 1.0% dose level. The DE caused mortality above 90% against *S. zeamais* at both 5% and 10% dose level both in the laboratory and in the field trials. The weight loss of the grains treated with the actelic super" was not significantly different ($\alpha = 0.05$) with those of the DE, DEO/ITM and DEO/A. abut significantly different from the untreated control. The germination of the maize seeds was

not affected by the treatment of the grains with DE, hexane extract and essential oils. All the germinations were significantly different ($\alpha = 0.05$) from the untreated control. The essential oil of; *T. minuta*, *A. absinthium*, *C. album* and *T. comphoratus* showed significant repellent activity against *S. zeamais* at dose level of 0.5%. The major constituents of the essential oils *T. minuta*, *A. absinthium*, *C. album* and *T. comphoratus* was determined by GC-MS. Thujone present in essential oil of *A. absinthium* and borneol in essential oil of *T. comphoratus* have been reported to have bioactivity against *S. zeamais*. The plants are therefore promising alternatives to the conventional insecticide for the control of stored product pest, *S. zeamais*.