

Abstract:

Potato (*Solanum tuberosum* L.) is the world's fourth largest food crop, following rice, wheat, and maize. Long-term storage of potatoes requires special care in cold warehouses for the viability of the seed potato to be maintained and quality of the tuber for food. Potato tuber moth *Phthorimaea operculella* (Zeller) (PTM) is a major pest of this potato crop (in the field and store) affecting seed potato and ware potato leading to losses of stored tubers of 23 -47 %. Potato tuber moth is a complex of *P. operculella*, *Tecia solanivora* (Povolny) and *Symmetrischema tangolias* (Geyen) with a worldwide distribution. A survey was undertaken in five potato growing regions of Kenya (Nyandarua, Molo, Limuru, Meru and Bomet) to determine the occurrence of the pest, species and damage on tubers. Five thousand tubers collected from farmer stores from the different potato growing areas were assessed for PTM at the entomology laboratory Kabete Campus University of Nairobi. Tubers were assessed for damage and moths' presence on collection and after three months of storage. Adult moths emerging after three months of storage were trapped and the species occurring in the different regions were identified using entomological identification keys for lepidopterans. Tunnels and larvae in tubers were counted to estimate damage. In a subsequent study, varietal resistance in potatoes was evaluated in an effort to develop an Integrated Pest Management programme to reduce the damage caused on ware potato and the seed potato. Five popularly grown potato varieties (Asante, Tigoni, Desiree, Kenya Karibu and Kihoro) were screened for natural tolerance to PTM in the field over two growing seasons and consequently in storage for a period of 3 months after harvesting. At harvesting, one thousand and two hundred tubers were collected from each variety, sealed in khaki sugar bags and stored at KARI-Tigoni. Destructive sampling was carried out on one hundred tubers of each variety fortnightly to determine the PTM damage per variety. Tunnels were measured, larvae and pupae were counted per tuber to determine PTM damage. Damage on the potatoes tubers collected from the five regions was not significantly different ($p > 0.05$) following the initial assessment of the damage and after three months storage. However, Njambini had the least number of larvae and tunnels at the initial assessment while Bomet and Limuru had the highest number of larvae and tunnels respectively. After three months of storage, Limuru had the highest number of larvae and tunnels in the tubers while Njambini and Meru had the least number of tunnels and larvae. From the results obtained from the study, there was a significant difference ($p < 0.01$) in damage on the five potato varieties in the field during season one but the difference was not significant ($P > 0.05$) in the second season. During storage, there was a significant difference ($p < 0.05$) in the damage on the tubers for the two seasons. Desiree was found to have the least PTM damage both in the field and in the store whereas Kihoro had the highest damage in the field and in store. Yields of the five varieties were also found to be significantly different ($p < 0.05$). Desiree had the lowest yields in the first and in the second season. On the other hand, Tigoni had the highest yields kgs/ha (ware and seed potato) in season one with Kenya Karibu being second. In season two, Kenya Karibu had the highest yields followed by Tigoni. All the five potato varieties were infested with PTM, the damage on foliage and tubers was found to vary with some varieties showing high levels of susceptibility to the PTM damage. This could be an indicator of tolerance level to the potato tuber moth in the different varieties which should be further explored as a management tool for the pest. Only one potato tuber moth species *Phthorimaea operculella* (Zeller) was identified as occurring in all the surveyed areas. These results indicate continued activity of moths in the stores thus necessitating the management of

the pest in the store in order to protect the harvested crop since the pest can cause losses ranging from 23- 47% in store.