

Injury capability of pests to stored legumes in Namibia

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Abstract: It is recognized that in developing countries the stored product pests endanger both food safety and food security. However, there is a controversy over the extent of weight losses caused by pests to various stored food products. In this work we report unusually high pest related losses (i.e. losses >95%) to stored legumes (*Vigna unguicula*, *Arachis hypogea* - Leguminosae) in Namibia. In the inspected samples and stores we found: (i) 100% infestation of legume kernels; (ii) 100% injury of legume germs; (iii) the weight loss of internal content of kernels of *Vigna unguicula* was >95%. Symptoms of combined injury caused by pyralid moth (*Corcyra cephalonica*) and bruchid beetles (*Callosobruchus subinnotatus*) are described and photo-documented.

Key words: legumes, Namibia, weight loss, damage, *Vigna unguicula*, *Arachis hypogea*, *Corcyra cephalonica*

Introduction

Stored-food pests endanger food security and food safety world wide (Haines., 1991, Hill, 2002). In the developed countries, the activity of stored-product pests is mostly associated with presence of allergens (Arlian, 2002) or toxigenic fungi in the infested stored-food commodities (Hubert et. al., 2003, 2004, Stejskal, et al. 2004). In the developing countries, currently the main concern is not the food safety but the food security. In these regions, pests have the potential to cause weight losses that negatively influence the seed availability and food security of the affected human populations. It is widely recognized that in tropical and subtropical countries the high circum-annual temperatures aggravate the problems with stored food pests enabling a long-term exponential increase of pest populations resulting in measurable weight losses. However, there is a controversy over the extent of losses that may cause pest organisms in various stored food products. Some authors (CIAT, 1986, Hill, 2002) claim that pest-related losses of stored food show figures reaching 5-50 %. On the contrary, Golob et. al. (2002) argues that losses usually do not exceed 5% over the storage season. The aforesaid mentioned controversial information generates conclusion that the data enabling the estimation of the capacity of storage pests for injury/loss in various geographical and storage areas is far to be complete.

The objective of the present paper was to: (i) report weight losses exceeding 95% and (ii) describe the symptoms resulting from infestation of stored legumes (*Vigna unguicula*, *Arachis hypogea* - Leguminosae) by arthropod food-pests in the northern Namibia.

Materials and methods

The inspection was conducted in two stores in (Ogongo, Omahenene) in northern Namibia in April and May 2004. We inspected highly infested textile bags (designed for 500 kg of agro-food commodities) containing two legumes, cowpea (*Vigna unguicula*) and groundnuts (*Arachis hypogea*). It was not possible to determine the length of storage since both sample were not labelled properly. However, the estimate of storekeepers was 14 months storage period for *Arachis hypogea*, and 22 months for *Vigna unguicula*. We inspected the content of the bags and collected individual insects for their identification. We sampled 100 seeds in each bag (N= 20 bags per each food commodity) and estimated percent on injured (infested) seed/100 g. Injury symptoms of single and multiple species infestation were described and photo-documented by a digital camera (Fig.1).

Results and discussion

In each examined sample of 100 seeds per each of the total of 20 textile bags: (i) 100% of seeds was infested in both *Arachis hypogea* and *Vigna unguicula*; (ii) 100% injury of germs (100 % loss of germination); and (iii) loss of more than 95% of the internal content of all inspected seed of *Vigna unguicula* (Fig.1 A, B). Fig. 1 B, C show extent and symptoms injury caused solely by *Callosobruchus subinnotatus* on *Vigna unguicula* (Fig. 1B) and *Arachis hypogea* (Fig. 1C). The injury marks caused by bruchid beetles represent oval exit holes and white eggs adhered to the surface of the beans by the female beetle. Fig 1A, D show the extent and the symptoms of combined injury caused by the pyralid moth (*Corcyra cephalonica*) and the bruchid beetles (*Callosobruchus subinnotatus*) on *Vigna unguicula* (Fig. 1A), and *Arachis hypogea* (Fig. 1D). Beside oval exit holes caused by the bruchid beetles, the marks include irregular injuries to the surface layer of the legume kernels and contamination by faeces and webbings that are produced by larvae of the pyralid moth *Corcyra cephalonica*.

Such extensive loss (Fig. 1A, B, C, and D) and contamination of legumes by allergenic faeces (Fig. 1 A, D) of pests exactly documents the large pest potential of storage arthropods to stored food and seeds in developing countries. Oerke & Dehne (2004), in their comprehensive work, reviewed estimates of overall losses for various groups of pest organisms and crops: 31, 8 % weeds, 17,6% animal pests, 14,9 % bacteria and fungi, and 3,1% viruses. In stored products, the reported pest-related losses show figures usually ranging from 5-50%. However, Golob et. al. (2002) consider these figures largely overestimated, asserting that the results for the farm level showed losses to be fairly well contained about or bellow 5% over a storage season. They admitted the only exception: were the high losses caused by *Prostephanus truncatus* (Hodges et. al.1983), to which farmers were unaccustomed, and for which locally traditional storage provided ideal conditions. On the contrary, Schamle et al. (2002) gathered documentation that bruchid beetles (*Acanthoscelides obtectus* and *Zabrotes subfacsiatus*) may cause losses reaching 7.4 % in Colombia, 35% losses in Mexico and Central America, and 13% in Brazil at different storage times (CIAT, 1986). It was found that after 3 months of pests infestation weight losses were 9.7% caused by psocids (*Liposcelis bostrychophila*) (Kučerová, 2002) and 3,2-9,3 % by *Sitophilus granarius* (Kučerová & Stejskal 1994). Our case showed that long-term storage (>1 year) of unprotected legumes may result in weight losses exceeding 95%.

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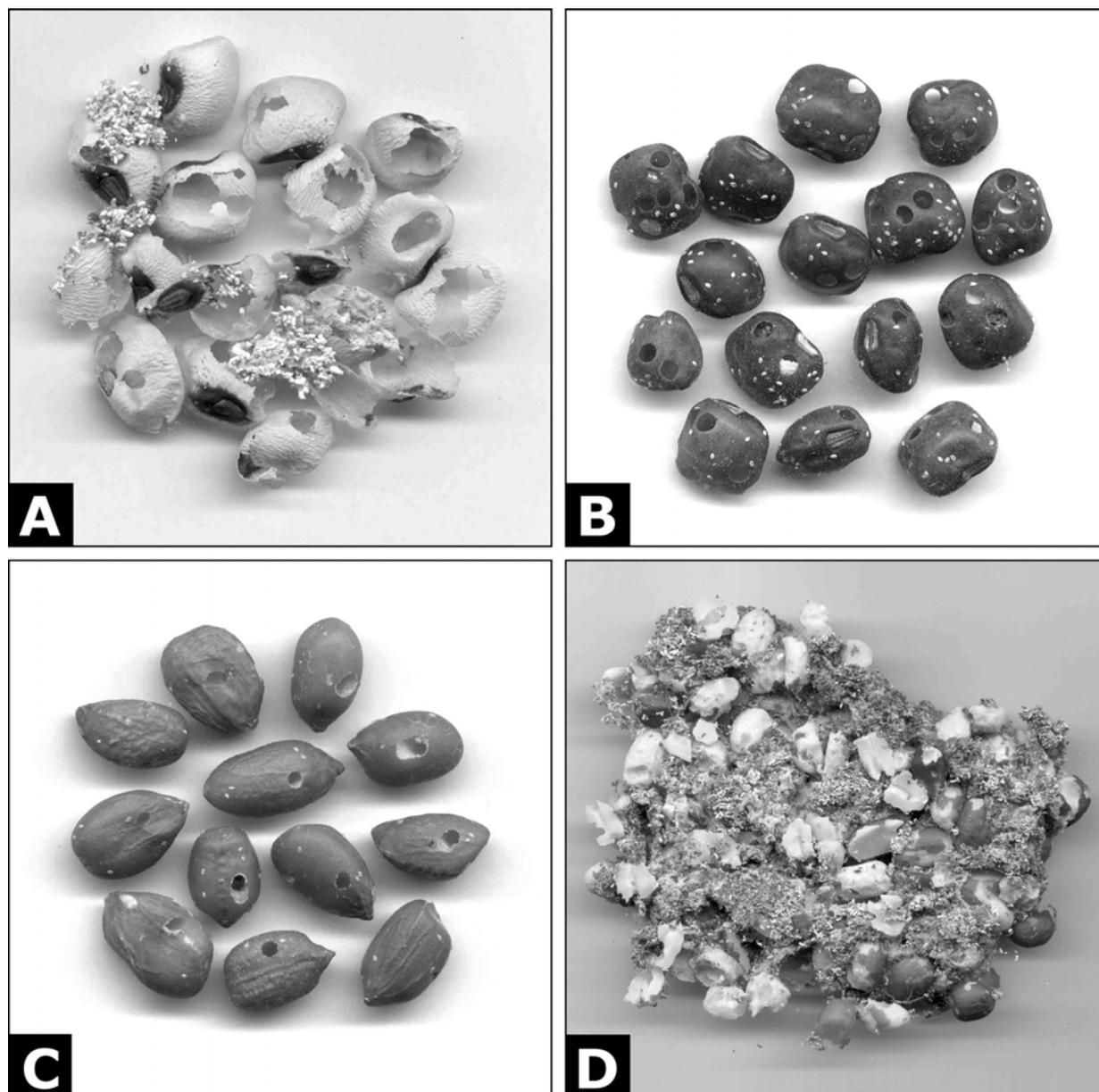


Fig. 1. Symptoms and extent of infestation of stored legumes (A, B – *Vigna unguicula*; C, D – *Arachis hypogea*) by stored food pests (A, B, C, D – *Callosobruchus subinnotatus*; A, D – *Corycra cephalonica*). For description, see text.

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