REPRODUCTION AND DEVELOPMENT OF TWELVE SPECIES OF STORED-PRODUCT INSECTS ON KENAF SEED

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ABSTRACT

Four primary species, Sitotroga cerealella (Olivier), Callosobruchus maculatus (F.), Rhyzopertha dominica (F.), and Sitophilus oryzae (L.), and 8 secondary species, Lasioderma serricorne (F.), Cryptolestes pusillus (Schönherr), Gibbium psylloides (Czernyński), Plodia interpunctella (Hübner), Tribolium castaneum (Herbst.), Oryzaephilus surinamensis (L.), Cathartus quadrircollis (Guérin-Ménéville), and Trogoderma inclusum Le Conte of stored-product insects were placed on samples of dry, intact, and ground kenaf, Hibiscus cannabinus L., seed and held for 4 months. No species developed on the intact seeds, and primary species did not develop on the ground seed. The order of reproductive success in secondary species on 2 Cuban varieties of ground seed was: L. serricorne T. inclusum T. castaneum. Other secondary species did not develop on ground Cuban varieties and no secondary species developed on ground SH/15R seed.

Kenaf, Hibiscus cannabinus L., is used as a commercial fiber crop to replace jute and more recently has been proposed as a source of pulp for paper (White et al. 1970). The likelihood of large fields of kenaf being grown has greatly increased because tests with kenaf by the U. S. Department of Agriculture have shown that it will produce a high quality paper (Anonymous 1970).

In 1970 the squarenecked grain beetle, Cathartus quadrircollis (Guérin-Ménéville), was found infesting kenaf seed pods in a planting of the variety Everglades 71 near Savannah, Georgia. Only 12 seed pods were examined, but of these 3 were infested. No other stored-product insects were observed. However, this infestation raised the possibility that other species of stored-product insects might also develop successfully in kenaf seeds. These insects could destroy potentially valuable seeds, and a reciprocal infestation between kenaf fields and nearby grain fields or storages might occur. Several species of field-crop insects attack kenaf, but I found no reports of insects attacking the mature seed pods or seeds. Therefore, a laboratory evaluation of 12 species of stored-product insects as potential pests of kenaf seeds was made.

MATERIALS AND METHODS

Three varieties of kenaf seed were used: Cuba 2032, an early flowering

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1 Primary insects as used in this paper denotes those that attack sound whole seeds and develop internally within such seeds.

2 Secondary insects as used in this paper denotes those that usually attack broken or damaged seeds and that feed externally as larvae.
photoinsensitive variety, and Cuba 108 and SH/15R, 2 late flowering photoinsensitive varieties. Seeds were weighed into 10-g samples and placed in 8-dram shell vials. Three replications were used for each species in each variety. In addition a single replication containing 5 g of whole seed and 5 g of finely ground kenaf seed was used in each instance.

Ten 1 to 3-day-old unsexed adults of each species were placed in each vial with the exception of the Indian meal moth, Plodia interpunctella (Hübner), where 25 eggs/vial were used. All infesting adults were removed after 2 wk. Test conditions were 27±2°C, 60±5% RH, and alternating 12-hr light: 12-hr-dark cycles. Samples were examined monthly for insect development, and any adults were removed, recorded, and discarded. The test was terminated at 4 months.

The primary insects tested included:

- angoumois grain moth, Sitotroga cerealella (Olivier)
- cowpea weevil, Callosobruchus maculatus (F.)
- lesser grain borer, Rhyzopertha dominica (F.)
- rice weevil, Sitophilus oryzae (L.)

The secondary insects tested included:

- Lasioderma serricorne (F.)
- flat grain beetle, Cryptolestes pusillus (Schonherr)
- Gibbium psylloides (Czenpinski)
- Indian meal moth, Plodia interpunctella (Hübner)
- red flour beetle, Tribolium castaneum (Herbst.)
- sawtoothed grain beetle, Oryzaephilus surinamensis (L.)
- squarenecked grain beetle, Cathartus quadricollis (Guerin-Meneville)
- Tribolium inclusum LeConte

RESULTS AND DISCUSSION

No reproduction by any species occurred in the intact kenaf seeds. Mature kenaf seeds are hard and dry; the average moisture content as determined by the oven-drying method was 10.9% for the Cuba 108, 10.6% for the Cuba 2032, and 11.1% for the SH/15R. Although these are less than optimum moisture contents for stored-product insects, they are sufficient for their development.

Three species of insects reproduced in the vials containing both ground and intact seeds. The cigarette beetle, Lasioderma serricorne (F.), was the most successful species, producing 127 and 191 adults in Cuba 108 and Cuba 2032, respectively. The red flour beetle, Tribolium castaneum (Herbst.), produced small numbers of adults in the same 2 varieties. Trogoderma inclusum LeConte produced healthy larvae in the Cuba 108 and Cuba 2032 samples at the end of 4 months. This species develops slowly, and presumably adults would have developed in time. Development of all 3 species was much slower than on laboratory diets. These 3 species develop successfully on a wide range of food materials. The most polyphagous of these is the cigarette beetle, and this species was the most prolific on kenaf. The fact that no insects developed on the variety SH/15R, although it had the highest moisture content, could be an advantage of this variety over some others. Although found as a field infestation, the squarenecked grain beetle did not develop successfully on the mature, dry seeds in the laboratory test. The higher moisture content of the developing seeds or the varietal difference may have caused this difference.
Apparently kenaf seed cannot serve as a reservoir of infestation for the primary grain insects studied. However, kenaf is a potential host for secondary grain insects, and these insects may interfere with efforts to produce kenaf seed. Mature kenaf seed that is cleaned and dried as recommended (White et al. 1970) can probably be stored indefinitely at low humidity conditions without any possibility of stored-product insect attack.

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LITERATURE CITED


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