

NATURAL ENEMIES AS CONTROL AGENTS FOR STORED-PRODUCT INSECTS

Richard T. Arbogast
Stored-Product Insects Research and Development Laboratory
Agricultural Research Service
Savannah, Georgia 31403

Introduction

Insect pests of stored products are attacked by a variety of natural enemies, including vertebrates, insects, mites, and pathogenic microorganisms. Some of these are of potential value as control agents for storage pests. The present paper outlines briefly how they might be applied for this purpose, illustrates their efficacy by presenting experimental results for representative examples, and concludes with a few remarks on what needs to be done and on the current direction of research.

Application of biological control involves one or more of the following: (1) introduction and establishment of exotic natural enemies (classical biological control), (2) conservation and augmentation of resident species, and (3) periodic colonization by inundative or inoculative releases. Use of the first approach in storages will probably be limited, because many natural enemies of storage pests have been widely distributed in shipments of insect-infested commodities and are now cosmopolitan. Biological control of storage pests is envisioned as comprising four primary approaches: (1) conservation by altering the environment to minimize adverse effects on natural enemies, such as limiting the use of chemical pesticides, (2) augmentation of natural enemies to make them more effective, as for example, development of insecticide-resistant strains or providing supplemental food to sustain biological agents during periods of low pest density, (3) inoculative releases, that is, serial releases of small numbers of predators or parasites, and (4) application of microbial insecticides.

Use of natural enemies to control insect pests in storage situations is not a new concept, but it has only recently received serious attention. This can be attributed, at least in part, to the often expressed objection that use of predators and parasites in and around stored products would increase contamination of the products with insect remains and to the observation that natural enemies appear in significant numbers only after a product has become heavily infested and serious damage has already occurred. Although the first criticism certainly has some validity, blanket rejection of biological control on the basis of sanitary requirements is unwarranted, because insect remains are of comparatively little concern in some products such as seed grain,