

THE ROLE OF LOW TEMPERATURE TO CONTROL STORED FOOD PESTS¹

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Temperature has been recognized as an important regulator of biological processes for a long time. It is not surprising that temperature regulation has been used as a means of controlling pests in stored food. Both high and low temperatures have been used to control pests but this paper will be confined to a discussion of the use of low temperature.

Certain definitions will be made at the beginning to clarify the discussion that is to follow. Stored food is taken to mean any cereal seed or oilseed, or product made from these seeds, that is held in storage before being consumed. Some examples are wheat, rice, peanuts, flax, coconut, barley, corn (maize), oats. Pests of stored food are the organisms that live in and feed on the stored food and produce losses in the quality or quantity of the product before it is used for human or domestic animal consumption. The examples to be used in this paper are in the classes of fungi, mites, insects. Low temperature is taken to refer to any temperature at which growth and reproduction of the pest organisms is less than optimal, usually sufficiently low to prevent reproduction.

RESPONSES OF STORED FOOD PESTS TO LOW TEMPERATURE: Since the temperatures that generally inhibit growth and reproduction are different for the different classes of pests, the responses of each class will be discussed separately.

Fungi - More than 100 species of fungi have been found in stored cereal grains[1]. These species have been grouped into two (or three) main classes (1) field fungi (and intermediate) and (2) storage fungi[2,3]. Field fungi infect the seeds at the time the crop is ripening in the field and usually disappear during the storage period[2,4]. The important species as far as damage to stored food is concerned are storage fungi.

The most important storage fungi are in the genera *Aspergillus* and *Penicillium*. The optimum temperature range for growth of these fungi is 30 to 45°C for *Aspergillus* spp., and 20 to 25°C for *Penicillium* spp.[5]. The minimum temperatures for growth range from 0 to 25°C for *Aspergillus* spp. and from -5 to 0°C for *Penicillium* spp. (Table 1). To prevent extensive growth of fungi in stored food by using temperature alone, the product would have to be cooled to 0°C or lower, depending on the moisture content of the fungus[6].

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