

Title The survival of developmental *Sitophilus granarius* (L.) subjected to constant and fluctuating temperatures between 0 and 10 deg C.

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Abstract

Surface infestations of grain weevils, *S. granarius*, have occurred during mid-winter in commercial aerated stores and in 20-tonne cooled bins when the grain was stored over 2 seasons and temperatures were rarely above 5 deg C. It was hypothesised that they were the result of eggs laid in the summer, which had continued to develop through the autumn and early winter and emerged in mid-winter when fluctuating temperatures at the surface permitted this. Therefore, this study was set up to discover what proportion of developing stages of different ages could survive exposure to steady temperatures between 0 and 10 deg C which coincide with the temperatures attained within the bulk of most stored grain in the UK. The effects of a temperature fluctuating between 0 and 10 deg C were also studied as this approximates the extreme fluctuations that might be expected at the surface of a cooled bulk in winter. Steady temperatures below 5 deg C were successful in killing all developmental stages within 7 weeks and are achievable in most years in the UK. However, when the temperatures were allowed to cycle between 0 and 10 deg C, it extended the time needed to eliminate all developing stages to more than 16 weeks. It is unlikely that this temperature-time combination could be achieved in the UK. It is therefore quite likely that a mixed-age infestation of developing grain weevils inside the grain could survive the fluctuating temperatures that occur at the grain surface.