EFFECTIVENESS OF HEAT FOR DISINFESTATION OF NITIDULID BEETLES FROM DATES

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Dates are subject to infestation by nitidulid beetles during and after harvest. Fumigation of dried fruits with methyl bromide (MB) upon arrival at the packing plant effectively controls infestation and also causes a high proportion of larvae and adults to emigrate from the fruit before they succumb. This work was undertaken to investigate the effectiveness of heat treatment as an alternative to MB, which would remove insects from the dates and prevent insect development and preserve fruit quality. Dates grown in Israel served as a model for development of this technology to be integrated as part of the existing dates drying system.

Materials and methods

Carpophilus hemipterus L. were collected from infested dates. The beetles were reared in a rearing room at 26°C and 75% relative humidity on an artificial diet composed of 1 L. water, 125 g corn-flour, 90 g. glucose, 44 g. sugar, 50 g. brewer's yeast, 18 g. agar extract, 3.1 ml propionic acid and 1 g methyl 4-hydroxybenzoate in 10 ml of ethanol. Cultures were set up by placing adults beetles in 200 ml jars containing about 150 g of food medium mixed with sawdust. After 2 days, for oviposition, adults were removed and insects were reared in these jars until required for experiment. Larvae 6-8 days olds and adults 7-10 days old were removed from the cultures for the tests.

The artificial feeding sites destined to simulate the dates consisted of cardboard rectangles placed on food medium contained in Petri dishes. Exposure to different treatments was carried out in 2.54 L desiccators. For each treatment, exposure times of 2 h after the feeding sites reached to their test temperature were employed. Temperatures of 40^{o}, 45^{o}, 50^{o} and 55^{o}C were tested for determining the effect of percent disinfestation and mortality of larvae. Temperatures within the artificial feeding sites were always 1^{o} to 2^{o}C lower than the nominal test temperature in the desiccators and it took approximately 60 min to reach from 26^{o} to the test temperature. The ratio of the number of insects found outside the feeding sites to the total number of insects was used to describe the term "percent disinfestation". After each treatment the number of survivals were examined and percentage of mortality was calculated.

Results and discussion

Average disinfestation value obtained was greatest (92.3%) at exposure to 50^{o}C and it differed highly significantly from 40^{o} and 55^{o}C. Highest mortality values reaching 100% were obtained at 50^{o} and 55^{o}C. Conventional drying temperatures for most date varieties are in the range of 45^{o} to 55^{o}C. Since percent disinfestation and control was most effective at 50^{o}C, application of heat appears an encouraging solution for the treatment of

dates as a replacement to MB. The feasibility of this approach is under investigation in the Jordan Valley grown madjoul variety dates at commercial scale application. This treatment is intended to replace the conventional fumigation with MB. Since dates are first disinfested using MB and then dried when necessary, it is expected that this treatment will be most suitable for dates that are subject to drying before storage. As for dates that are already at their moisture content suitable for storage, exposure to heat will last no more than 2 hours after the dates reach the desired temperature. Preliminary experiments showed that such short exposure of 2 hours causes an insignificant moisture reduction of dates.

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