20-016

LYOPHILIZED ARTIFICIAL MEDIA FOR IN VITRO REARING OF TRICHOCRAMMA SPP. (HYMENOPTERA: TRICHOGRAMMATIDAE)

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To make easier the rearing in artificial media for the oophagous parasites of the genus Trichogramma, it is possible to use lyophilized media. These media can be prepared when biological material such as insect hemolymph is available, and stored for one year before use.

The performance of rehydrated lyophilized media (containing pupal hemolymph of Philosamia cynthia or Mamestra brassicae) were tested with the artificial egg card systems for rearing 2 strains of Trichogramma dendrolimi from China (TdC) or Italy (TdI) and Trichogramma brassicae (Tb). All experiments had concerned 5560 artificial eggs.

Percentages of parasitization, pupation and emergence were similar or higher with rehydrated lyophilized media kept for one year, than with fresh media. Lyophilized media, centrifuged after rehydration could induce a higher egg laying rate than non centrifuged ones: little modifications of the balance between free and total amino acids could be involved. As far as centrifugation effects were concerned, performances varied according to the result parameters considered, the medium used and the strain of Trichogramma tested. With TdC, non centrifuged media were a little better than centrifuged ones; with TdI no significant differences were observed and with Tb centrifuged media were better than non centrifuged ones.

Lyophilization, which does not alter the performances of the media, is a good process to keep artificial media for a long time.

20-017

IN VITRO REARING OF TRICHOCRAMMA MINUTUM RILEY (HYMENOPTERA: TRICHOGRAMMATIDAE) FOR MULTIPLE GENERATIONS AND OTHER ADVANCES IN THE DEVELOPMENT OF AN IN VITRO REARING SYSTEM

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Trichogramma minutum Riley were reared on an artificial diet for 10 generations. Several quality control criteria; including adult emergence rate, development time, adult size and sex ratio; were monitored. In comparisons with T. minutum reared on Helicoverpa zea (Boddie) eggs, the values for the quality control criteria of in vitro reared insects was generally quite good, often better than those for in vivo reared insects.

Though the diet used for these studies may not be suitable for use in commercial mass rearing (development of a more chemically defined diet is in progress) of these parasitoids, it does facilitate the development of an automated mass rearing system that could be used in a commercial setting. Progress in the development of such a system, including techniques for collecting Trichogramma eggs, rearing to the adult stage, field release and necessary equipment will be discussed.

20-018

DEVELOPMENT OF AN EFFECTIVE PROGRAM FOR AUGMENTATION OF TRICHOGRAMMA AGAINST CODLING MOTH IN CALIFORNIA

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Trichogramma platneri is an indigenous egg parasitoid of the codling moth, Cydia pomonella, in California and can achieve up to 60% parasitism of codling moth eggs in unsprayed orchards later in the growing season. As part of a research program to reduce reliance on insecticide treatment of codling moth, we are developing an inundative release program for T. platneri in combination with mating disruption in pear orchards.

The two main questions that we have investigated are (1) how does release rate affect the level of suppression of codling moth damage, and (2) how is the impact of a constant release rate affected by the number of release points in an orchard? Release rate was investigated using treatments of 0 (control), 123,500, 247,000, 494,000 and 988,000 T. platneri ha⁻¹ wk⁻¹ in a replicated block design of 0.2ha plots. The number of release points in an orchard was similarly investigated using a constant release rate of 494,000 parasitoids ha⁻¹ wk⁻¹, with releases in every tree, every second or every fourth tree and a non-release control. Parasitism was monitored using sentinel eggs and damage was estimated by visual inspection of fruit in the center of each plot. The results confirm the absence of parasitism from wild Trichogramma populations in control plots and significant reductions of fruit damage in Trichogramma release plots. The optimal release rate was determined to be about 400,000 parasitoids ha⁻¹ wk⁻¹ and the extent of reduction in fruit damage was directly related to the number of release points in a plot.

20-019

MATHEMATICAL MODELLING ON THE BIOLOGICAL ESTIMATES OF TRICHOGRAMMA SPP. AGAINST HELICOVERPA ARMIGERA (HEL) IN COTTON ECOSYSTEM (HYMENOPTERA: TRICHOGRAMMATIDAE - LEPIOPTERA: NOCTUIDAE)

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Simple correlation and regression techniques relating rates of parasitism to host densities do not contribute much to the understanding of host-parasitoid interaction in the field. A more feasible approach is the development of simulation model based on behavioural parameters. Data were generated in cotton field on the per cent parasitisation of Helicoverpa armigera eggs (artificially seeded) by Trichogramma spp. (T. brassiliensis, T. chilonis, T. japonicum and T. pretiosum) in three doses (1.0, 1.5 and 2.0 lakh/ha), at different distances (20 to 50cm) from the point of release and in eight directions during summer and winter of 1993 to 1994 seasons. The data were processed suitably by non-linear bounded exponential model in order to predict radius of influence, per cent parasitisation, optimum spacing between release points and benefit cost ratio for the released and unexploited doses. The non-linear maximization algorithm by Marquardt-Lavenberg was used on a PC AT 286 computer to determine the parameters of the model. Totally eight models were worked out, a model for each Trichogramma spp. and season. All the eight models gave highly significant coefficient of determination (R²). Model predicted parasitisation by Trichogramma spp. (up to 10%) within the radius of 44.5 to 60.5m from the point of release in winter and 13.5 to 34.9 m in summer season. Parasitoid species and release densities did not influence the dispersal. Predicted order of superiority with reference to per cent parasitisation was T. chilonis > T. brassiliensis > T. pretiosum > T. japonicum. Optimum spacing between release points and benefit cost ratio estimated were 30.0 to 62.0m and 35.0 to 54.1 for winter season. This was 12.0 to 38.0m and 32 to 34.0 in summer. Increase in optimum spacing and decrease in benefit cost ratio were noted due to increase in release densities.