ABSTRACT

The present investigation was undertaken to develop an artificial diet to rear the Tea Tortrix, Homona coffearia Nietner in vitro, and to: (a) study the biology of this insect in detail under defined conditions, (b) determine the critical dietary ingredients that are essential for normal development and growth, and (c) screen various compounds that are likely to act as metabolic disruptors, interfering with the uptake of such critical dietary ingredients.

Initial attempts were made to develop an oligidic diet to mass-rear the Tea Tortrix and a simplified diet consisting of only minced tea leaves and brewer's yeast was found adequate for successful growth and development. Detailed observations on the biology of this insect were made at 24° and 75% R.H. under a 14 h light - 10 h dark photoperiod. A definite rhythm for pupation and adult emergence was observed; pupation was observed in the mornings between 6.00 - 9.00 h and adult emergence between 16.00 - 18.00 h. The average fecundity of females under these conditions was estimated to be 4.15 ± 3.2 egg masses per female. Fecundity was also found to be influenced by the composition of the adult diet and maximum egg lay was observed when fed with a mixture of 5% sucrose and 2% bee's honey.

A meridic diet without any leaf components was also perfected to rear this insect *in vitro*. This study revealed that this insect was unable to utilize cholesterol and that it needed a dietary source of a Δ^7 sterol. The fatty acids linoleic and linolenic acids have also been found to be essential dietary supplements for successful adult development and emergence. These two fatty acids seem to be the main critical dietary supplements offered by tea leaf in oligidic diets.

The very simplified diet consisting of brewer's yeast and the fatty acids linoleic and linolenic acids, was found to be the most suitable meridic diet to grow this insect *in vitro*. Further enrichment of this diet with additional ingredients seemed to bring about an imbalance in the uptake of essential dietary ingredients.

It was not possible to perfect a completely defined (holidic) diet to successfully grow this insect to the adult stage. Some of the tested holidic diets appeared to be very promising since the larvae developed up to the final instar and showed pre-pupating behavioral signs, but failed to pupate.

Of the various tested metabolic disruptors, the saponins from tea seeds and the seeds of *Cyclamen europaeum* were found to suppress development in oligidic diets, only in the absence of brewer's yeast in the diet.

Metabolic inhibitors like the azasterol, 25-azacoprastane and the nonsteroidal amine, N,N dimethyltetradecanamine, in minute amounts very significantly suppressed development. This suppression appeared to be due to the possible blockage of the availability of an adequate amount of dietary sterol and consequently, interfereing in the formation of ecdysteroids. Since a Δ^7 sterol is a critical dietary requirement for this insect, it now seems possible to disrupt the normal development of this insect by using the above compounds in trace amounts.

Copper in the form of cuprous oxide was also found to very significantly suppressed development, even at low concentrations of 100 ppm of cuprous oxide. Copper suppressed pupation and adult emergence very strongly and the few adults that emerged were deformed with naked wings, showing characteristic fatty acid deficiency symptoms. Since the fatty acids linoleic and linolenic acids have been found to be very critical dietary ingredients for this insect, copper ions hold very good promise as suppressing agents.

These findings have thus opened up an entirely new approach of managing this insect pest, by resorting to control at the physiological level and consequently avoiding the use of lethal insecticides which are, in general, ecological disruptors.