USING CHEMISTRY TO ESTIMATE THE AGE OF THE PINKSPOTTED BOLLWORM (*PECTINOPHORA SCUTIGERA*)

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INTRODUCTION

Insects of the order Lepidoptera including *Heliothis* spp. and *Pectinophora scutigera* (pinkspotted bollworm) are major pests of cotton. The bollworm, recorded mainly in central Queensland has recently been found to have a wider distribution on hosts such as *Hibiscus* spp., *Gossypium sturtianum* and *Brachychiton* spp.

Because the bollworm moths are small and nocturnal and sampling for eggs is not practical, early detection can be difficult. Pheromone traps give helpful data but are not useful alone in determining the timing of insecticide application. As well, the continuing need for the pyrethroid strategy can make late season control of the bollworm difficult.

A better understanding of the population dynamics of the Lepidopterous pests is needed to assist with control. The adults of the bollworm can live for more than 50 days in the field so that a rapid means of age determination is important for population studies.

Some recent approaches to the estimation of age in adult Diptera (Mail et al. 1983, Lehane and Mail 1985) have used changes in concentration with age of fluorescent eye pigments (pteridines).

The aim of the present work is to assess the usefulness of pteridines in determining the age of adults of P. scutigera. Major practical results are outlined in the following sections - detailed procedures and data will appear elsewhere.

METHODS

Rearing of P. scutigera

In the primary experiment a laboratory culture of the pinkspotted bollworm was maintained on artificial diet at 25°C. Moths were held for known times at this temperature until frozen for analysis. In further work, adults were kept at either 35°C (10 days) or 18°C (20 days) before analysis. Mated adults (25°C) were also compared with virgin equivalents held at the same temperature. Limited numbers of adults whose larvae hade been reared on flowers of Hibiscus spp. (25°C) were compared with their equivalents from artificial diet. Field specimens of the pinkspotted bollworm moth were collected for analysis from light and pheromone traps in the Biloela area.

Chemical analysis

The published method of Lehane and Mail (1985) for age determination in Diptera using total pteridine accumulation did not work for P. scutigera. Instead, individual pteridines from the heads, thoraces and abdomens were separated by high performance liquid chromatography (HPLC) and quantified on a spectrofluorimeter using their fluorescent properties.

Concentrations of the four pteridines, xanthopterin, biopterin, isoxanthopterin and pterin as well as the unidentified compound "conjugated xanthopterin", were determined in ten replicates of moths for each age and sex.

RESULTS AND DISCUSSION

As a method for age estimation, results for the head capsules of moths seem most useful. Figures 1 and 2 show the changes in concentration of "conjugated xanthopterin" with age for male and female adults (25°C) respectively. The concentration of xanthopterin also follows this pattern while the level of other pteridines and changes with age differ for male and female. This data enables the age of unknown adults of P. scutigera cultured at 25°C to be determined fairly precisely.

From this preliminary work, the effect of mating on the pteridine content of the head capsule appears minimal. The effect of diet may be more pronounced. Pteridine analyses of adults whose larvae had developed on flowers of Hibiscus spp. were close to but mostly outside the range of data for those from artificial diet.

The temperature at which adults were kept caused marked differences in pteridine levels. The analysis is measuring the physiological age of the moth. The "apparent" ages of moths reared at 35°C are higher and those at 18°C lower than those for moths of the same chronological age reared at 25°C.

The precise relationships between pteridine concentrations, chronological age and temperature have not been established so that the absolute values for ages of field collected moths will not be reliable. It is reassuring to find, however, that the pteridine data from the field moths lie mostly within the range of those for moths from artificial diet (25°C) and that the mean estimated ages of males and females from the same sites (light traps) are similar.

Future work will aim at making the method reliable for field collected adults of P. scutigera to assist the study of population dynamics.

ACKNOWLEDGEMENTS

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Figure 1

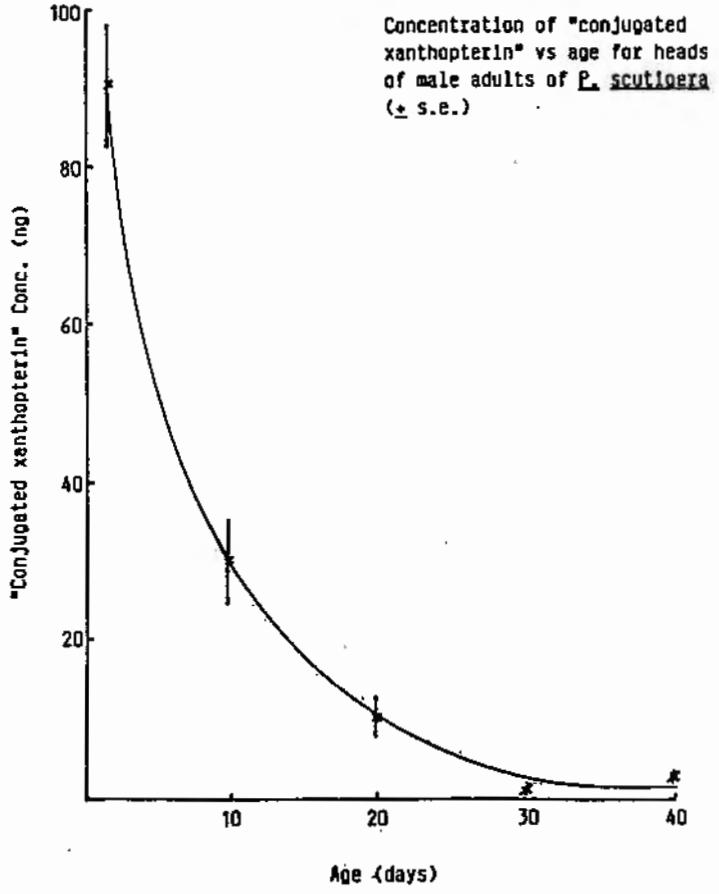

Figure 2