RESEARCH ARTICLE

Methodology for rearing leaf webworm, *Acria meyricki* Shashank and Ramamurthy (Lepidoptera: Depressariidae): A serious defoliator of oil palm

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ABSTRACT

A simple methodology is described for rearing the successive generations of *Acria meyricki* Shashank and Ramamurthy (Lepidoptera: Depressariidae) in the laboratory. All the components are commercially available and the diet is principally of plant origin. Use of blotting paper smeared with non-absorbent cotton encouraged ovi-position by the adults and allowed easy egg collection. Adults laid eggs with 80.0-95.0 % viability. The ideal conditions for egg laying were 26±0.5°C constant temperature and 55.0-60.0 per cent relative humidity. The survival rate of larvae was ranging from 75.0 to 90.0 per cent and pupa to adult emergence was 100.0 per cent, which resulted in feasible mass rearing process. This is the first report of insect rearing technique for this pest. Suggestions and future applications are indicated.

Key words: Leaf webworm, *Acria meyricki*, Insect rearing technique, Oil palm

Oil palm (*Elaeis guineensis* Jacquin: Arecaceae) is an important vegetable oil crop with a capacity of 4-6 tonnes of oil per hectare per year. The introduction of oil palm in different states of India was followed by the attack of native insect species, which became pests on oil palm. Many pests found on oil palms are specific pests of several species of wild palms. Oil palm shared some pests with already established crops like coconut (*Cocos nusifera* L.), areca nut (*Areca catechu*) and palmyrah, *Borassus flabellifer* L. (Kalidas 2004; Kalidas et al. 2006). However, level of damage is varied among them. There are at least 80 species of arthropods are associated with oil palm and many are potential pests and some are serious and inflicting heavy damage on oil palms in India (Dhileepan 1991, 1992; Ponnamma, Biju 1997; Kalidas et al. 2006, 2011; Shashank et al. 2015).

Among the insect pests, defoliators are important pests of oil palm throughout the world causing heavy yield losses (Norman, Basri 2007; Cheong et al. 2010; Martinez et al. 2013). In addition to the known lepidopteran defoliators of oil palm in the World, a new species, *Acria meyricki* Shashank and Ramamurthy (Lepidoptera: Depressariidae) is described from Andhra Pradesh, India on oil palm for the first time (Shashank et al. 2015). The pest is commonly called as oil palm leaf webworm, as the larvae is characterized by constructing white silken web on the leaf and remain inside the web defoliating the leaves.

The pest has become endemic in some of the areas. The infestation is in the range of 80.0-100.0 % in some plantations. In coastal Andhra Pradesh, India, defoliation caused by *Acria meyricki* resulted to the yield losses of 29.0% in the first year, 31.0% in the second year and 21.0% in the consequent year (Kalidas 2004). The occurrence is normally restricted to cooler months of the year (October to March). This pest is occurring regularly, seasonally in the recent years and causing severe damage. Therefore, various research strategies have to be developed in order to develop pest management programme in the field. Hence, it is desirable or necessary to facilitate both basic and applied research. In order to achieve this, practical mass rearing technique is necessary.

A.meyricki culture was established in the laboratory, from the larvae and pupae collected in oil palm plantations located in West Godavari District, Andhra Pradesh, India. The larvae were maintained on oil palm leaves. Newly emerged adults were sexed

following the guidelines given by Shashank et al. (2015) and were paired. Around 5-10 pairs were confined to transparent plastic jars of 20 x 10 cm (Fig. 1A). A piece of blotting paper was smeared with thin layer of non-absorbent cotton on both sides (Fig. 1B) and was placed in slanting position without a bent in the plastic mating jar having perforations. Blotting paper with non-absorbent cotton served as substrate for egg laying. The adults were provided with 50 per cent honey fortified with few drops of multivitamin syrup.

The set up were maintained at 26±0.5°C constant temperature and 55.0-60.0 per cent relative humidity in Biological Oxygen Demand incubator. The adults laid eggs after one or two days on and in between cotton fibres. Blotting strips having loaded with eggs were cut into smaller strips (6 x 2 cm). And they were loosely sand witched between fresh nursery oil palm leaf bits in smaller specimen tubes (Fig. 1C and D). Eggs hatched in about six to seven days with 80.0-95.0 % viability. The newly hatched larvae would move from the cotton fibre strips and start feeding on oil palm leaf bits. Fresh leaf bits were provided as and when required for about a week. While providing fresh leaf bits, care was taken, not to disturb the larvae feeding inside the silken web. It is natural for the larvae to leave the leaf bits which lost turgidity and feed on the fresh ones kept along side of the old ones.

Fig. 1. Rearing technique of *A.meyricki* (A) Mating Jar with egg laying substrate; (B) Blotting paper smeared with non-absorbent cotton; (C) Blotting paper strips loaded with eggs along with oil palm leaf bits; (D) Rearing set up for early instar larvae.

When the larvae reach second or third instar stage, they were shifted to transparent perforated plastic jars (15 x 10 cm) having oil palm leaf bits. The bottom and side of the jars were lined with blotting paper, moistened regularly to maintain the turgidity of the leaves. Fresh leaf bits were provided to the larvae regularly until pupation. The caterpillars developed in 20-25 days with 75.0 to 90.0 per cent survival and pupated within the larval webs.

The pupae were collected along with larval webs and maintained, in a small container. This stage lasted for 4-6 days. The survival from pupa to adult was 100.0 per cent. After emergence, the adults were introduced in mating jars to begin a new cycle. This technique was standardized after conducting a series of experiments to know the substrate for egg laying by adults using different substrates.

It was found that the adults preferred to lay eggs on the old larval webs. Hence, this pest is a seasonal pest, and thereby, availability of larval webs is constraint during off season, non-absorbent cotton was smeared on blotting paper to simulate for egg laying. It was found that adults successfully laid eggs on this substrate. This made the rearing process simple and continuous. Still there is scope to rear this insect on artificial diet with some modifications.

This rearing methodology can be used to mass rear *A. meyricki* larvae in the laboratory successfully. Such reared insect colonies can be used for testing efficacy of chemical and botanical pesticides in the laboratory, mass rearing of biological control agents on this host, developing and testing pheromone technology, carrying out plant resistance studies etc.

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