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# **MASS MULTIPLICATION TECHNIQUES OF IMPORTANT PREDATORS - *Cheilomenes, Cryptolaemus and Chrysoperla***



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Mass multiplication techniques of  
predators viz.,

1. Green lace wing : *Chrysoperla carnea*
2. *Cryptolaemus montrouzieri*
3. *Cheilomenes sexmaculata*



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*Rodolia cardinalis*, *Cryptolaemus montrouzieri* Mulsant and *Curinus coeruleus* (Coccinellidae: Coleoptera) have been successfully used in classical biological control.

Indigenous coccinellids like *Chilocorus nigrita* (Fabricius), *Cheilomenes sexmaculata* (Fabricius), *Coccinella septempunctata* Linnaeus, *Scymnus coccivora* Ayyar and *Pharoscymnus horni* (Weise) have potential for exploitation in augmentative biological control.



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EGG



LARVA



PUPA

# Production procedure for Green lace wing : *Chrysoperla carnea* (Neuroptera, Chrysopidae)



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Larvae are important predators of insect pests viz., aphids, mealy bugs, eggs and smaller larvae of various insects of agricultural importance and mites. Each larva has potential to feed on average 12 aphids/day or about 120 aphids during the entire developmental period.

### **Equipment and facilities required :**

Black muslin cloth,

Cotton rolls,

plastic jars (20x15 cm),

Chrysopa cage,

Glass tubes (10x2.5 cm),

Camel hair brush,

Honey, pollen,

Laboratory host, Corcyra, refrigerator etc.

### **Biology (When reared on Corcyra) :**

Larval period : 6.50 days

Pupal period : 7.50 days

Adult longevity (male): 27.50 days

Adult longevity (female) : 27.50 days

Fecundity : 34.28

Incubation period : 3.00 days



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# *Corcyra cephalonica* (Lepidoptera, Pyralidae)



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## Rearing :

Newly hatched larvae are reared in individual vials or plastic cages containing hexagonal cells.

On an average 1 cc eggs of the laboratory host *C. cephalonica* are required for rearing 5-6 larvae of the predator.

In each hexagonal cell a larva along with sufficient prey is placed and covered with a layer of white paper sheet. Finally the cage is covered with lid and shifted to the room at  $27 \pm 2^{\circ}\text{C}$  and  $60 \pm 5\%$  RH for further development.

If needed, food may be added after 3 to 4 days in each cell by sprinkling from the top and left undisturbed till the cocoon formation.

After one week the cocoons may be collected and kept in separate jars for emergence.

Newly emerged 10 pairs of *C. carnea* caged in a jar are provided with a swab of honey (20%) and pollen grains of castor.

Jars are covered with wet black cloth. It prefers to lay eggs on black cloth used for securing the adults, hence these eggs are removed daily from the cloth by cutting their base by a sharp blade or scissors.



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# Production procedure for *Cryptolaemus montouzieri* (Coccinellidae: Coleoptera)



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After 15 days of infestation of pumpkins with *Planococcus citri*.

Release a set of 100 beetles for 24 hr and kept in cage. The beetles during the period of exposure feed on mealy bugs and deposit their eggs singly or in groups of 4-12.

The grubs are visible in such cages within a week of exposure. The young grubs feed on eggs and small mealy bugs but as they grow they become voracious and feed on all stages of mealy bugs.

For facilitating the pupation of grubs, dried guava leaves or pieces of paper are kept at the base of the cage. The first beetle from the cage starts emerging **on 30th day** of exposure to *C. montrouzieri* adults.

The beetles are collected daily and kept in separate cages for about **10-15** days to facilitate completion of mating and pre oviposition. The beetles are fed on honey agar medium.

From each cage about **175** beetles are obtained.



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**EGG**



**LARVA**

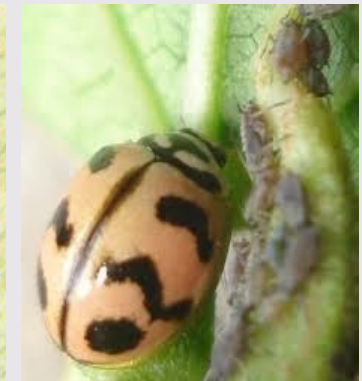
# Production procedure for *Cheilomenes sexmaculata* (Coccinellidae: Coleoptera)



**PUPA**



**ADULT**





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*Cheilomenes sexmaculata* is a very important, polyphagous predator of aphids and other soft bodied insects. It has been recorded in most crop ecosystems, particularly where aphids are serious pests.

It has been produced in the laboratory and used for the suppression of *A. craccivora* on groundnut.

*C. sexmaculata* is also used in cotton, citrus and sunflower crop-ecosystems.



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## Production procedure :

The initial culture is started by collecting unparasitised pupae of *C. sexmaculata* from the field.

The **parasitized pupae** look dark black to brown and are brittle to touch, whereas, **healthy pupae** are bright yellow coloured with black markings and are soft to touch.

The freshly emerged adults are fed with *A. craccivora* for 10 days in which period mating may occur.



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The days old, pre-fed beetles are released on pumpkins bearing colonies of 25 days old *Ferrisia virgata*.

Honey (50%) soaked in absorbent cotton swab is provided as an additional carbohydrate source.

The beetles are allowed to feed on *F. virgata* in the same cage for 25 days.

Dry leaves of *Bauhinia purpurea* walls are arranged on the periphery of the pumpkins in a slanting position.

Any other plant's leaves can also be used as an oviposition substrate. The leaves should be broad and should remain stiff after drying. These leaves act as oviposition substrate and also help the beetles to climb over the pumpkin.



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The pumpkin is replaced with another infested pumpkin if necessary. Dead adults are removed regularly and replaced with fresh ones to ensure regular supply of eggs. The honey swabs are changed on alternate days.

The eggs deposited on the leaves are collected and used for further multiplication. Eggs thus collected are kept separately in glass vials, as the grubs are highly cannibalistic.

The grubs are released on cowpea seedlings infested with *A. craccivora*, grown either in plastic cups or glass jars.

Twenty five grubs can be reared for 8-9 days in one jar containing more than 6500 aphids. Four jars are required for rearing 100 grubs up to the pupal stage. The adults emerging in 5-6 days from pupae are used either for further multiplication or for field release. The adult beetles survive for 50-70 days on mealy bugs.

A regular decline in fecundity is observed 3-4 weeks after emergence and the beetles stop laying eggs during the last week of their life. Hence, the beetles should be discarded after the fourth week as they become less productive and rearing becomes uneconomical.