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Parasitism of *Bradybaeneus similaris* Ferussas (Gastropoda: Bradybaenidae) by *Megaselia Scalaris Loew* (Diptera: Phoridae): A New Record

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The *Bradybaena similaris* Ferussas, commonly called round snail, is a terresterial species, considered as an oppurtinist pest in the trophics especially at altitude of over 1,000 meters above sea level (Nor' Aini *et al.* 1995). The snails has a potential to become an important agricultural pest especially on *Brassica* crops such as *B. chinensis* L. and *B. juncea* Cosson (Murali 1991; Ahmad and Ho 1980). Our field observations showed that damaged on growing cabbage by *B. similaris* was comparable to damage by larvae of the diamonback moth, *Plutella xylostella* L., the major insect pest of cabbage.

B. similaris are currently controlled by baited metaldehyde (Siputox) at 3% and 5%. However, evidence of increasing resistence of the snails to this mulloscicide (Salmijah *et al.* 1996) is supported by decreasing field efficacy of the baited Siputox at 3% and increasing usage at 5% by the farmers of Cameron Highlands. Laboratory studies by Noran *et al.* (1992) showed that only 1.5% of *B. similaris* was killed by metaldehyde and that they were unaffected by bioinsecticide treatment, extract of *Azadirachta indica* leaves, which was toxic to the aquatic snails *Indoplanorbis exustus.* Currently, there is no report of any effective biocontrol methods against it, but screening of our laboratory cultured population revealed that the snails were parasitized by a dipteran fly, *Megalasia scalaris* Loew (Phoridae). In West Malaysia, Ahmad and Ho (1980) reported that the giant African snail, *Achatina fulica* Ferussas (Achatinidae) were parasitized by the Phorids (*Aphiochaeta scallaris* loew and *Spiniphora genetalis* Schmitt), Ephydrid (*Discomyza maculipennis* wied) and Calliphorid (*Sacrophaga* dux Thoms). However, there was no report on parasitism of *B. similaris* by any Dipteran parastoids. Therefore, this is a new record of dipteran parasitising *B. similaris* . The objective of this study was to determine the percent parasitism of *B. similaris* by the phorid fly, *M. scalaris,* and the life cycle of the parasitoid.

To measure parasitism rate of the snails by *M. scalaris* in the field, we collected 430 snails from our randomly selected cabbage field in the Cameron Highlands, Pahang, Malaysia. The snails were then reared in four empty fish aquariums (20 cm x 15 cm x 30 cm), fed fresh cabbage leaf raised in the glass house and kept at laboratory condition for at least 10 days. Number of dead snails having the *M. scalaris* were recorded. To make sure those fly larvae were *M. scalaris* and for easier identification we continued rearing them on snails until hatched and emerged as adult flies. Mean percent parasitism was calculated as the number of dead snails with fly larvae, divided by the total number of snails collected x 100.

To study the *M. scalaris* life cycle and parasitism rate we used in the laboratory a total of 50 snails and 10 female flies (collected from the same field as above). Five snails and one female fly (per replicate) were put in each plastic container (500 ml) for 2 days, after which the fly was taken out. Adult flies were fed with 20% sucrose solution wetted on the cotton wool and put in 5 cm diameter petri dish placed in the same plastic container. Number of snails with fly eggs were recorded and used in calculating the percent parasitism. They were then kept in the same container until the eggs hatched. Number of larvae produced per snail was recorded. Larvae were transferred to petri dish (10 cm diameter) half-filled with nutrient agar (3% Gelose nutritive + distilled water, w/v) as food and kept

until pupation. The pupae were placed in plastic container similar to the above until adult emergence. A high humidity environment was maintained by placing wetted cotton wool inside the container and covering its top with aluminium foil. The emerged adults were also placed in a similar type of container and fed as above until they died. The time taken for larvae to reach pupa stage, and number of pupae formed, adult emerged and adult longevity (days from the date of emergence until they died) were recorded. The experiment was arranged following a Complete Randomize Design with 10 replicates.

The rate of parasitism in field population and laboratory reared *B. similaris* parasitized by the phorid fly were 35.0 ± 4.3 and 55.0 ± 6.8 respectively. On average, 28.8 larvae were produced per parasitized snail. Some 85.9% (±9.5) larvae survived successfully to form pupae, and of this, 76.7% (± 8.6) managed to produce healthy adults. The time taken for eggs to hatch, larval development time (to form pupae), adult emergence and longevity were 2.2, 5.5, 11.2 and 24.3 days respectively.

Our results indicate that the fly has a potential to be used in controlling the snail pest especially in combination with other controlling methods such as chemicals (molluscicides) and cultural methods as the field parasitism rate is relatively low. An augmention of field population of *M. scalaris* is possible because it is relatively easy to culture them in the laboratory. In addition, its host, *B. similaris,* for the mass rearing of the fly, the snails can be easily maintained under prolonged captivity compared with other snails.

The use of pesticides for controlling other pests in the field may affect the role of *M. scalaris* as a biocontrol agent of *B. similaris.* As such, the cabbage growers should adopt judicious use of chemical pesticides. Study on the host-parasite relationship between the snails and fly in the field should be conducted as the result could be used as an indicator as to the fly population that is affected by the heavy use of pesticides. Study should also be initiated to determine the main hosts of *M. scalaris* and its biological aspects such as longevity and fecundity. Information on *M. scalaris* ecology and biology is important because it could help us in augmenting and conserving its natural population that indirectly reduces pesticide dependence in controlling *B. similaris.*

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