



UNIVERSITI PUTRA MALAYSIA

**BIOLOGY OF SELECTED OPIINE PARASITIDS (BRACONIDAE)
AND THEIR ABUNDANCE RELATIVE TO THE HOST
BACTROCERA DORSALIS (HENDEL).
ON CARAMBOLA**

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BACTROCERA DORSALIS (HENDEL),
ON CARAMBOLA**

By

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**BIOLOGY OF SELECTED OPIINE PARASITOIDS (BRACONIDAE)
AND THEIR ABUNDANCE RELATIVE TO THE HOST,
BACTROCERA DORSALIS (HENDEL),
ON CARAMBOLA**

By

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The opiines (Hymenoptera: Braconidae) are important parasitoids of the oriental fruit fly, Bactrocera dorsalis (Hendel) (Diptera: Tephritidae). In an attempt to exploit their potential in the integrated control of this pest, field and laboratory studies were conducted to generate information about the biology and abundance of the major species.

Based on contribution to overall parasitisation, the opiine parasitoids associated with B. dorsalis in star fruit can be arranged in the following order of importance: Biosteres persulcatus Silvestri, 46.53% > B. arisanus (Sonan), 32.82% >



B. longicaudatus Ashmead, 15.69% > Opius fletcheri Silvestri, 4.95%. Field populations of fruit fly and parasitoids had two peak periods yearly, and both were significantly correlated with abundance of their respective host, except B. longicaudatus. However, their activities were significantly unaffected by size and height of host fruit in the tree.

Biological studies on three parasitoids, B. persulcatus, B. arisanus and B. longicaudatus, showed that mating and oviposition commenced on the first day of adult emergence. Highest daily mean fecundity and number of adults produced per female occurred on the fourth day of adult life, and coincided with the peak of egg maturation. Biosteres arisanus preferred newly laid host eggs (1-12 hr), B. persulcatus incubated eggs (24 hr), and B. longicaudatus older larvae (96-120 hr) for oviposition. The egg stages of B. arisanus, B. persulcatus and B. longicaudatus averaged 27.9, 27.0 and 53.5 hr, respectively, and the entire developmental period of each species was one day longer for females than males (in parentheses): 17.3 (16.3), 17.6 (16.4), and 17.1 (16.3), respectively. Illustrations and detailed morphological descriptions were made for the different developmental stages of these three species, including their external male genitalia.

The three parasitoids were similar in terms of life-time fecundity (gross and net): B. arisanus, 63.19 and 36.65 eggs



per female; B. longicaudatus, 60.16 and 35.48; and B. persulcatus, 56.96 and 35.38; and intrinsic rates of increase (0.30, 0.31, and 0.31, respectively).

Since egg hatchability was unaffected by the presence of other species in multiple parasitised hosts, survival of species was determined by physical combat among the first-instars in the same host. Biosteres longicaudatus prevailed over the two other species, and B. persulcatus over B. arisanus. All the three parasitoids were observed to superparasitise their host. Poor effective parasitisation in B. longicaudatus can be attributed to the high incidence of superparasitisation and encapsulation of its eggs by the host larvae. Encapsulation was not observed on eggs of B. arisanus and B. persulcatus and superparasitisation of host by these species was not as prevalent as in B. longicaudatus.

Six-day-old puparia containing any of the three parasitoids could be stored at 12^oC for two weeks and still have about 50% adult emergence.



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BIOLOGI BEBERAPA PARASITOID OPIINE TERPILIH (BRACONIDAE)
DAN KAITAN BILANGANNYA DENGAN PERUMAH,
BACTROCERA DORSALIS (HENDEL),
PADA BELIMBING

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Parasitoid Opiinae adalah serangga parasit terpenting lalat buah orient, Bactrocera dorsalis (Hendel) (Diptera: Tephritidae). Dalam usaha untuk mempergunakan potensi parasitoid ini dalam pengawalan bersepadu ke atas perosak ini, kajian di makmal dan di ladang telah dijalankan untuk mengumpul maklumat biologi spesies utama parasitoid ini.

Berdasarkan kepada keseluruhan sumbangan pamparasitannya, parasitoid opiine yang ada kaitan dengan B. dorsalis pada belimbing besi boleh disusun mengikut kepentingannya seperti berikut: Biosteres persulcatus Silvestri, 46.53% > B. arisanus



(Sonan), 32.82% > B. longicaudatus Ashmead, 15.69% > Opius fletcheri Silvestri, 4.95%. Populasi lalat buah dan parasitoid di lapangan mempunyai dua puncak dalam masa setahun, dan kedua-duanya berkait rapat secara bererti dengan banyaknya bilangan perumah berkenaan kecuali B. longicaudatus. Bagaimanapun, aktiviti mereka tidak dipengaruhi secara bererti oleh saiz dan kedudukan ketinggian buah pada pokok.

Kajian biologi ke atas tiga parasitoid iaitu, B. persulcatus, B. arisanus dan B. longicaudatus, mendapati kesemua parasitoid ini mengawan dan beroviposit pada hari yang sama dengan kemunculan dewasa. Purata fekunditi harian tertinggi dan progeneri dewasa per betina terjadi pada hari yang keempat di dalam hayat hidup dewasa, dan secara kebetulan bersamaan dengan kemuncak kematangan telur di dalam ovari. Untuk oviposisi Biosteres arisanus lebih menyukai telur yang baru dihasilkan (1-12 jam), B. persulcatus pada telur yang telah dieramkan (24 jam), dan B. longicaudatus pada larva yang matang (96-120 jam). Purata eraman telur adalah 27.9, 27.0, dan 53.5 jam, dan jangka masa perkembangan keseluruhannya, didapati betina adalah satu hari lebih lama daripada jantan (dalam kurungan): 17.27 (16.31), 17.58 (16.36), dan 17.14 (16.26) hari. Ilustrasi dan huraian morfologi terperinci telah dibuat bagi setiap peringkat perkembangan ketiga-tiga spesies parasitoid yang dikaji, termasuk morfologi luar genitalia jantan.

