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Life cycle and feeding efficacy of *Micromus igortus* (Bank) brown lacewing against *Myzus persicae* (Sulzer)

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Abstract

Myzus persicae(Sulzer) (Hemiptera : aphididae) is most polyphagous and economically important pest.Managment of *M.persicae* by using insecticide and pesticide is difficult as they resides under leaves and curls. Natural enemies play important role in controlling pest population. *M.persicae* have wide range of predators such as coccinellid beetle, lacewings, syrphid flies, spiders and aphid midges. Some hymenopteran parasitoids significantly lower population such aof *Aphidius matricariae* (Haliday Braconidae) and *Aphelinus asychis* Walker (Aphelinidae) and *Diatellaria rapae*. *Micromus igortus* Bank (Brown lacewing) has average predator potential against *M. persicae* than other aphid species. *Micromus igortus* mostly feed on *Aphis craccivora* and followed by *Aphis gossypi*. Biology and feeding efficacy of brown lacewing were studied in the fields from Kolhapur district, Maharashtra under laboratory condition in Shivaji University, Kolhapur. All stages of Brown lacewing and adults also have significant predatory potential against *M.persicae*. Feeding potential increases as the instars progressed their development. Rate of consumption on stage of 1^{st} ,$2^{nd,}$ and 3^{rd} instar of lacewing were average 11.15 days (Range Minimum 6.8 – Range maximum 15.5 days), 39.135 days (Range min. 23.5 – max. 31.27 days), 52.48 days (Range min. 46.91- max. 58.04 days) respectively per day. Third instar is proved to be most prodigious feeder as they feed on large number of aphids. Lifecycle period for egg incubation, larval development, prepupal, pupal and adult period,total lifespan were 4.36 days(Range min. 4- max.5 days), 6.2 days (5-7 days), 1.3 days (1-2 days), 6.1 days (5-7days),9.6 days(8-12 days),29.32 days (28-32 days) respectively. The above studies will help to know the lifecycle of Lacewing in field conditions and proves the predatory potential of brown lacewing.

Keywords: *Myzus persicae*, natural enemy, biological control, brown lacewing, lifecycle, feeding efficacy.

Introduction:

M. persicae is most infectious aphid among the aphid species. (van Emden HF and Harrington R. (2007), Tamaki G, Halfhill JE. 1968)It has wide range of host in agroecosystems i.e. trees, shrubs, vegetable crops. The food plants of aphids belong to different families like Solanaceae, Asteraceae, Fabaceae, Moraceae, Rutaceae, etc. (Blackman&Eastop 1984), Blackman & Eastop (2000), Castle&Berger (1993), Kennedy et al. (1962). To suppress infestation of *M.persicae*, biological control, is a good option in IPM.(Chaudhary & Singh,2012) There are number of predators observed in fields during study period. The predators of *M.*

persicae belongs to various orders such as Coleoptera, Neuroptera, Diptera, Hemiptera and Hymenoptera (van Emden, Eastop, Hughes, Way 1969). Neuroptera proves significant group of predators as far as *M. persicae* infestation is concerned. It has large number of predator species having potential to control large number of insect pest species and they are found all over the world. Neuroptera have families Chrysopidae and Hemerobiidae are compulsive affluent of many soft bodied insect such as aphids, mealybugs, whiteflies.(Balduf,1939;New 2001;Grimaldi & engel,2005) In classical biological control, brown lacewings is a well known natural enemy of larval and adult stages of some economically important aphid species.(Sato & Takda,2004) Some adult species are habitat specific and few are generalist predators.(Kilington,1937;Monserrat & Marin,1996) The brown lacewing exhibit high reproductive rate and long life span due to availability of ample food in the form of both larval and adult stages of *M.persicae*. Brown lacewing proved and accepted to be an effective biocontrol agent of aphids. (Macleod & Stange,2005, Cutright 1923; Yayla &Sator 2012). Feeding efficacy and lifecycle studies were carried out in various regions against different pests by Cutright (1923), Radhakrishnan & Muraleedharan (1989) Potemkina & Kovalenko (1990) Shantibala & et.al. (1994), Patil NG (2003), Lingappa S. & et. al. (2004), Sato & Takada (2004), Miller & et.al. (2004) Mulimani & et.al. (2007), Srikanth J (2007), Patil AS & et.al. (2007), Gillani & et.al. (2009) Vidya M & et.al. (2010) Joshi (2011), Vidya M & et.al. (2011), MacLeod, E. G. & L. A. Stange. (2017).

Materials and Method:

Stages of Brown lacewing i. e. Egg, larva, pupa were collected from different tehsils from Kolhapur district during July 2018 – December 2021.Collected and hand picked stages were brought into laboratory and incubate, observed and time stretch were recorded till emergence. Larval stages feed daily with *M. persicae* aphid. Infested leaves were collected from nearby tobacco field for feeding. All emerged larvae kept separately in plastic vials covered with muslin cloth at one end with supply of 20,30,50,100 aphid in increasing manner per day. Observation were made on number of prey consumed/day and total number of prey consumed/instar and throughout the life period were calculated. Hatched adult kept for observation for longevity.

Result:

Brown lacewing as major predator of aphids (Lingappa et al.2004) with greater activity during June to December. (Deshmukh et al.2007; Sharanbasappa et.al 2009). Peak population of *M. persicae* in Kolhapur district are late December and in early January. Brown lacewing feed on all aphid species but not other soft bodied insect like mealy bug, whitefly, jassid, psyllids. Brown lacewing commonly feed on respected families i.e.Aphidinae, Macrosiphini, Hormophidinae, subfamily : Ceratophidinae. *M.persicae* belongs to Aphidinae,

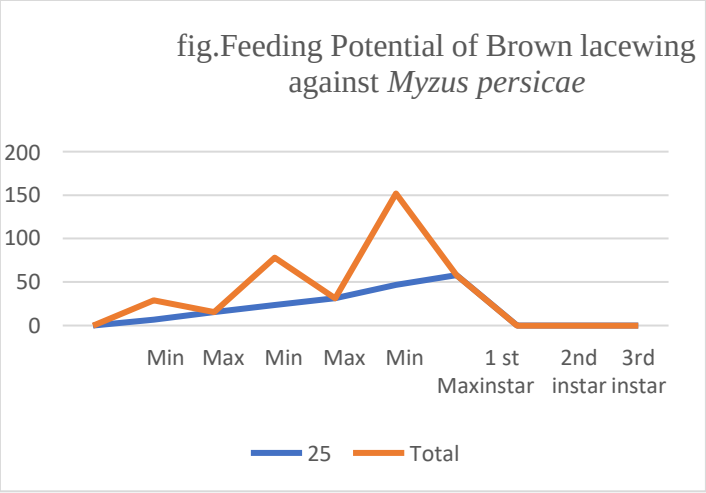
Table 2: Developmental Period of Brown lacewing

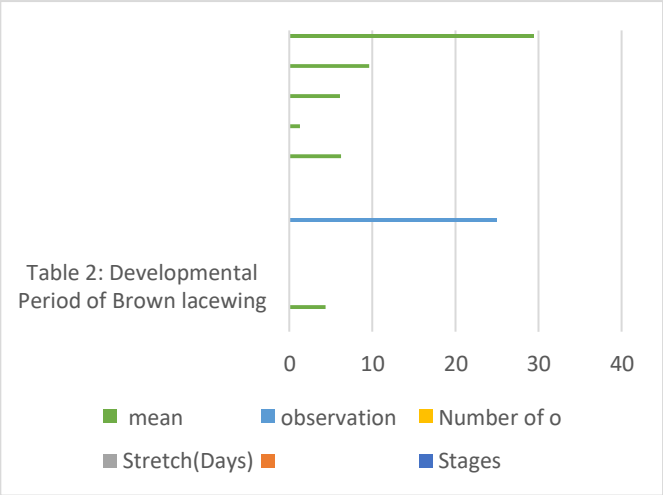
Stages	Incubation period	Larval developmental period			Total	Pre pupal	Pupa	Adult	Longevity
		I	II	III					
Stretch(Days)	4 to 5	2 to 3	1 to 2	2 to 3	5 to 7	1 to 2	5 to 7	8 to 12	28 to 32
Number of o									
observation			25						
mean	4.36				6.2	1.3	6.1	9.6	29.42

subfamily: Macrosiphini, it has average 78.98% pupation rate of Brown lacewing (Sunil Joshi). Consumption rate of aphid increases with development of instar. Rate of consumption on stage of 1st ,2nd, and 3rd instar were approximately 11.15(Range Minimum 6.8 – Range maximum 15.5, 39.135(Range min. 23.5 – max. 31.27), 52.48(Range min. 46.91- max. 58.04)
respectively per day. Total aphid consumption in developmental period of 1st,2nd and 3rd instars were average 28.50 days (Range 12 – 45),54(Range 40 -68), and 112(Range 141 -183) respectively. Egg incubation period of brown lacewing was average 4.36 days (Range min.4-5 max days).Pre pupation takes 1.3 days (Range 1- 2 days). Pupal period varies,it takes 6.1 days (Range5- 7 days). Adult live average 9.6 days (Range 8-12 days). Average time for incubation, larval development, prepupal, pupal, adult period were 4.36, 6.2, 1.3, 6.1, 9.6 29.42 days. Total lifespan of brown lacewing was 28 days observed. Brown lacewings are nocturnal insect, they find rarely at day time. This study shows that feeding, development and reproduction make an positive impact on reducing aphid population. They reduce significantly reduces aphid and other soft bodied insect pest as well, hence Brown lacewings were proved to be potential predator of *Myzus persicae.*

Table No .1 Feeding potential of Brown lacewing against *Myzus persicae*

	Avarage Number of Aphids conumed per day						Number of Aphids consumed		
Number of	1st Instar		2nd Instar		3rd Instar		in specific larval period		
Individual	Min	Max	Min	Max	Min	Max	1 st instar	2nd instar	3rd instar
25	6.8	15.5	23.5	31.27	46.91	58.04	Minimum to Maximum		
Total	22.3		54.77		104.95		12 -45	40 -68	141-183





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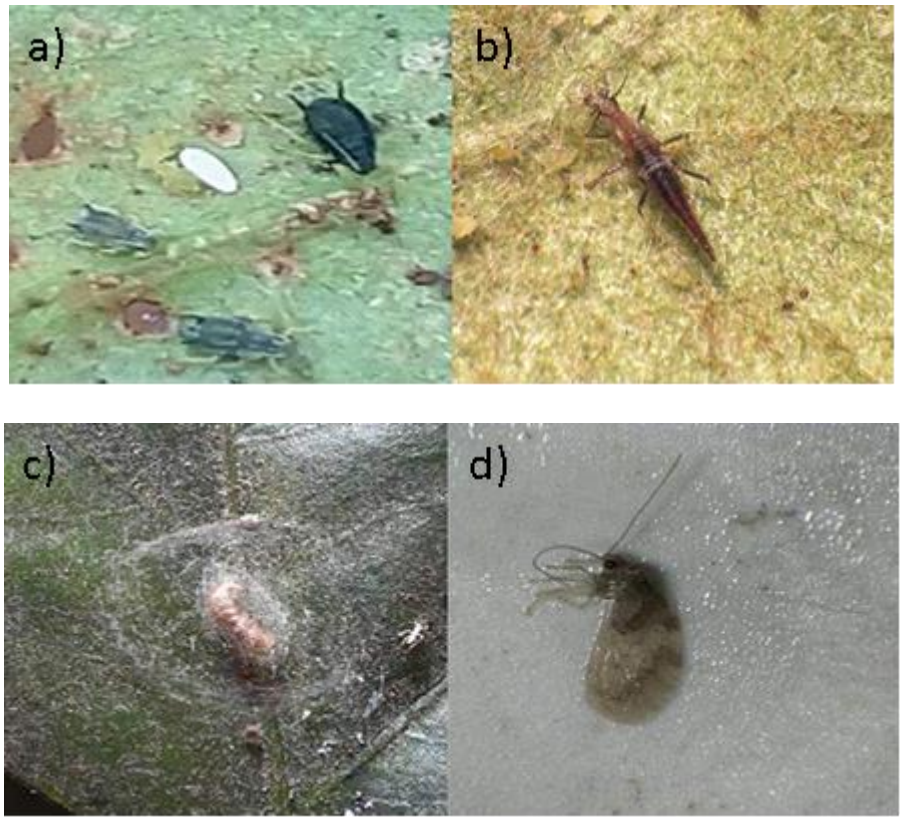

Lifecycle of Brown lacwing
a)Egg b) Larva c) Pupa d) Adult

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