IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 16, Issue 1 Ser. I (January. 2023), PP 16-19
www.iosrjournals.org

Natural enemies of *Aphis nerii* and its feeding potential from Kolhapur District, Maharashtra.

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Abstract :
Aphids are an economically important pest of numerous crops. India faces a huge agricultural loss of about 8,63,884 million owing of soft-bodied insect pest. In India, mainly in Maharashtra various aphid species infect number of crops i.e. Aphis craccivora, Aphis gossypii , Myzus persicae,Aphis fabae, Toxoptera aurantii, and Aphis nerii etc. Aphis nerii mainly feed on ornamental plants from the family Asclepiadaceae, Apocynaceae, and Verbenaceae. Aphis nerii mainly feed on ornamental plants from parts of India infested to Calatropis sp, Nerium, Asclepias currasavia, Phyllanthus niruri. Aphis nerii causes discoloured spots on foliage and stem. Sooty mold was developed on honeydew secreted by the colony members.A.nerii infected mostly to ornamental plants. In nurseries, most of Aphis nerii infestation were observed due to this infestation economy of nursery growers affect significantly.In the present study, the population of Aphis nerii controlled by various predators such as Coccinellid beetle, Syrphid flies, Spiders are observed. In the present study, feeding potential of Cheilomenes sexmaculata (Fabricius), Coccinella transversalis Fabricius, Scymnus latemaculatus Motsch, Pseudaspidimerus trinotatus (Thunberg), Pseudaspidimerus flaviceps (Walker) were recorded and it ranged between minimum (230,180,60,55the most potential predator among all predators, but Scymnus latematchulus found abundantly in aphid colony and responsible for reducing aphid populationabundantly in aphid colony and responsible for reducing population of aphid.The above study will help to understand predatory potential of natural enemies of A.nerii.

Key words: *Aphis nerii, Predator, Lady bird beetle, Scymnus beetle, Feeding potential*

Date of Submission: 27-12-2022 Date of Acceptance: 07-01-2023

I. Introduction :

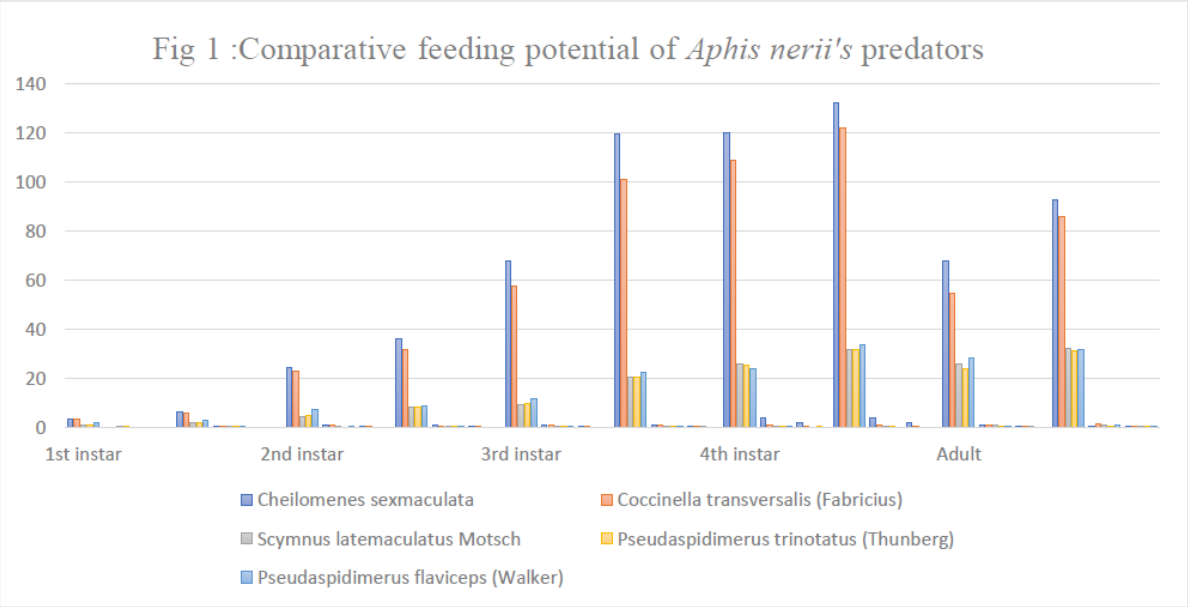
Aphis nerii Boyer de Fonscolombe (Hemiptera: Aphididae) commonly called as Oleander aphid and milkweed aphid usually found on ornamental plants such as Nerium oleander, milkweed, and blood flower.(20,24, 10,14) *A.nerii* is cosmopolitan and hosts plants from families such as Apocynaceae, Verbenaceae, and Asclepiadaceae. This aphid is capable to attack plant part in different families such as Apocynaceae (Nerium and Vinca), Asclepiadaceae (Asclepias, Calotropi, and Gomphocarpus), Asteraceae, Convolvulaceae, Euphorbiaceae and Rutaceae (4,11) The parthenogenetic mode of reproduction, high fecundity and short generation time allows large colonies of oleander aphid to build quickly on infested plants. This aphid is able to transmit several viruses including sugarcacanpotyviruse and papaya ringspot potyvirus. (8,26,7) The oleander aphid ingeststs sap from the phloem of its host plant. The nymph and adult insect feeds on the plant host by sucking the sap from plant tissues. (21)They prefer fresh parts, which leads to the weakening of the host and leaf curling.The damage caused by aphid colonies is mainly aesthetic due to large amounts of sticky honeydew. In addition, the growing terminals can be deformed. Stunted growth of plants due to repeated heavy infestation throughout the year. The insect secretes the honeydew that covers the vegetative branches when sucking the sap from plant tissues, the dust particles were collected, and black sooty molds grow, which inhibits the photosynthetic activity, respiration, and transpiration process. (13,23, 3,9)Generally, the insect can transmit several plant virus weakening the plant and reducing its production (23, 25). Natural biological control can be quite effective in controlling populations of the oleander aphid (26). Generalist insect predators such as syrphid larvae in the families Chamaemyiidae, Chrysopidae, and Hemerobiidae and coccinellid larvae have been observed feeding on aphid colonies from Kolhapur district.

II. Material & Methods :

Surveys on predators of *A.nerii* have been carried out from five talukas of Kolhapur district i.e.Karveer, Gadhinglaj, Shahuwadi,and Shirol from December 2019 – December 2021. Survey studies were carried out on various infested ornamental plants and weeds by weekly collection method. Infested twigs, flowers, leaves are collected in polythene bags. Stages of predators such eggs , grubs, adults were collected in plastic bottles and brought into lathe boratorthe y at Department of Zoology, Shivaji University, Kolhapur.

Stages like grubs and eggs incubated till the emergence of adult. Specimens were preserved in 70 % alcohol for preservation and further identification process. Predators were collected using an insect collection net, and the stages like eggs, grubs, and larvae were collected and brought into the laboratory to observe feeding potential studies. Feeding potential was observed by daily consumption of predators. Collected stages were placed in separate plastic bottles to observe the feeding efficacy of every stage. Aphids were collected from nearby infested plants. Aphids were provided daily in 10,20,30,40 developing stages to calculate-per day consumption.

Larval stage	Consumption rate	*Cheilomenes sexmaculata*	*Coccinella transversalis* Fabricius	*Scymnus latemaculatus* Motsch	*Pseudaspidimerus trinotatus* (Thunberg)	Pseudaspidimerus flaviceps (Walker)
1st instar	Minimum	3.34	3.61	1.23	1.1	2.1
	S.D.	0.207	0.235	0.284	0.312	0.296
	S.E.M.	0.063	0.105	0.127	0.139	0.132
	Maximum	6.30	5.8	2.1	2.1	3.0
	S.D.	0.717	0.370	0.33	0.299	0.258
	S.E.M.	0.226	0.165	0.149	0.134	0.115
2nd instar	Minimum	24.30	22.9	4.23	4.67	7.2
	S.D.	1.080	0.896	0.387	0.234	0.365
	S.E.M.	0.487	0.400	0.173	0.105	0.159
	Maximum	35.9	31.5	8.3	8.5	8.7
	S.D.	0.809	0.677	0.396	0.273	0.389
	S.E.M.	0.361	0.302	0.177	0.122	0.174
3rd instar	Minimum	67.9	57.8	9.3	9.9	11.7
	S.D.	0.864	0.823	0.410	0.458	0.370
	S.E.M.	0.384	0.368	0.183	0.205	0.165
	Maximum	119.8	100.9	20.3	20.6	22.6
	S.D.	1.07	0.945	0.667	0.473	0.39
	S.E.M.	0.481	0.422	0.294	0.211	0.177
4th instar	Minimum	120.16	108.9	25.9	25.5	23.9
	S.D.	3.93	0.861	0.460	0.625	0.49
	S.E.M.	1.75	0.385	0.206	0.279	0.22
	Maximum	132.4	121.9	31.8	31.9	33.69
	S.D.	4.08	0.836	0.479	0.465	0.214
	S.E.M.	1.82	0.376	0.214	0.208	0.035
Adult	Minimum	67.9	54.9	25.9	23.9	28.5
	S.D.	0.799	1.169	1.134	0.454	0.394
	S.E.M.	0.357	0.518	0.504	0.203	0.176
	Maximum	92.6	86	32	31.4	31.9
	S.D.	0.648	1.34	1.187	0.607	0.779
	S.E.M.	0.290	0.60	0.531	0.271	0.348



III. Result And Discussion :

In this present study 5 species of predators observed and they are, 1.*Cheilomenes sexmaculata* (Fabricius), 2. *Coccinella transversalis* Fabricius 3. *Scymnus latemaculatus* Motsch
4. *Pseudaspidimerus trinotatus* (Thunberg) 5. *Pseudaspidimerus flaviceps* (Walker) in study area Kolhapur district, Maharashtra. The feeding potential of predators were decided by consumption rate of aphid per day by developing instar. In present investigation, it shows that consumption of 4th instar in all predators as compared to 1st,2nd,3rd instars. In table no.1 it shows maximum feeding efficacy of *C.transversalis* and *P.trinotatus* shows minimum feeding potential. 1st instar shows relatively low feeding potential due to small size and low preying ability, they usually feed on young nymph (6) Khalid Abbas et.al (2020) shows that *C.sexmaculata* feeds effectively feeds on *Myzus persicae* and preferred 2nd to *Aphis nerii* and consumed 8.50,11.83,17.50,27.33,65.51 aphids per day in 1st,2nd ,3rd.4th instars respectively. (27)*C.sexmaculata* consume more aphids with developing instars and shows maximum consumption at 4th instar.Consumption of aphid at 3rd day of 3rd instar and 2nd day of 4th instar were high. Consumption of aphid per day of adult and larva were 26.82 & 47.13 per day.(22).Omkar (2004) shows host preference of *C.sexmaculata* that *A. craccivora>A. gossypii>R. maidis > M. persicae > U. compositae > L. erysimi > A. nerii C.transversalis* shows low consumption during 1st instar and it become high with developing instar.4th instar proved to be more effective stage and consume minimum 108.9 aphid/day and around 250-400 aphids in their total lifecycle.(16) Wagle BKS et al observed that *C.transversalis* consume average 38.8 *B.brassicae* aphids/day in 25-50 range.*C.transversalis* male & female shows more consumption on *A.gossypi* (145.08 & 121.04) nymphs/day and *A.nerii* (62.93 & 58.27) nymphs/day.(25)*Scymnus latemaculatus* consume (1.23 -2.1) aphids / day in 1st instar stage & (4.23-8.3) aphids per day in 2nd instar stage.*S.latemaculatus* were more abundantly found in aphid colony as compare to other four beetles. Ali (2015), recorded that *S.latemaculatus* feed on *A.craccivora*,*A.gossypii*,*L.erysmi*,*M.persicae*.(1,2) It shows maximum consumption during 4th instar (25.9 -31.8) per day.Consumption rate decreases in adult stage. *Pseudaspidimerus trinotus* feeds on number of host plants such as *Aphis gossypii*,*Aphis fabae* Scopoli,*A. nerii* on brinjal (18,19) Larval forms of *P.trinotus* were different from another Scymnus beetles,they resembles like bug.Consumption varies with developmental stages.Table no.1 shows feeding rate per day.They were consume more aphids at 2nd day of 3rd instar and 1st day of 4th instar and maximum consumption during 4th instar. This adult beetle show low feeding potential than another studied beetle.*Pseudaspidimerus flaviceps* population is very less as compare to S.latemaculatus & *P.trinotus*.They usually feed *A.gossypi*,*A spiraecola*,*A.dispersus* & *San josecule* (17) Table no.1 shows that it has high feeding efficiency than *S.latemaculatus* & *P.trinotus*.In 1st,2nd,3rd instar they show effective feeding efficiency.4th instar and adult also shows maximum consumption than *S.latemaculatus* & *P.trinotus.*

IV. Conclusion:

Aphis nerii are economically important insect pest.the were observed in ornamental plant such as scarlet milkweed,oleander plants,Nerium,vinca etc.It include host from Apocynaceae, Verbanaceae, Asclepidaceae, Asteraceae, Convolvulaceae, Euphorbiaceae and Rutaceae.This all plants are cultivated in garden,parks,nurseries etc. Nursery growers faces trouble due to infestation of *A.nerii* in their nursery.

infestation of Aphids causes stunted growth of plant,development of sooty mould and virus infection to plant. Rate of transfer plant to plant infection is faster and affect nearby plants. Once infestation takes place in sapling it can not be sold out and infestation transfer to another ornamental plants and affect economy of nursery growers. For the management of *A.nerii* biological insect pest control is best option to reduce population. During this study, few things were observed in which once natural enemies such as *C.sexmaculata* introduced in aphid population it reduces number of aphid significantly in very short duration. There is no need of use of insecticide & pesticide.Culturing, rearing, releasing of natural enemies in infested plant will be effective in reducing population of aphids without using any chemical control.In present investigation *C,sexmaculata* proved to be potential predator and *S.latemaculatus* were most abundantly found in aphid population.They are best option in biological insect pest control in upcoming future.

References :

[1]. Ali M, Ahmed K, Ali S, Raza G, Hussain I, Nafees MA, Anjum SI (2018) An annotated checklist of Coccinellidae with four new records from Pakistan (Coleoptera, Coccinellidae). ZooKeys 803: 93-120. https://doi.org/10.3897/zookeys.803.22543

[2]. Ali M, Perveen R, Naqvi AN, Ahmed K, Raza G, Hussain I (2015) The Tribe Scymnini (Coccinellidae: Coleoptera) From Sindh Province, Pakistan. Journal of Insect Science 15: 146.

[3]. Bachmann, A. C., Naultba, S. J. and Fleischer. (2014). Alate aphid (Hemiptera:Aphididae) species composition and richness in northeaster USA snap beans and an update to historical lists. Florida Entomologist, 97:979-994.

[4]. Blackman RL, Eastop VF. Aphids on the world's crops. 2nd edi. Johnwiley, Chichester UK, 2000, 466p.

[5]. Bukero A, Anwar M, Rustamani, Hussain G, Abrol, Lodhi AM. Feeding Potential of Menochilus sexmaculatus (Fabricius) Against Sucking Insect Pests. Journal of Basic and Applied Sciences. 2014; 10:554558

[6]. Dixon A F G, Russel R J 1972. The effectiveness of Anthocoris nemorum and A. confusus (Hemiptera: Anthocoridae) as predators of the sycamore aphid, Drepanosiphum plantanoides. II. Searching beahviour and the incidence of predation in the field. Entomologia Experimentalis Applicata, 15: 35-50.

[7]. Groeters, F. R. (1993). Tests for host-associated fitness tradeoffs in the milkweed oleander aphid. Oecologia, 93:406 -411.

[8]. Jo Rothschild, M. E., Von, J. and Reichstein, T. (1970). Cardiac glycosides in the oleander aphid, Aphis nerii. Journal of Insect Physiology, 16:1141-1145. urnal of Plant Pest Science, 1:29-34.

[9]. Kadam, D. B., Kadam, D. R. and Lekurwale, R. S. (2014). Seasonal incidence of sucking pests of Bt cotton in different intercropping systems and their natural enemies.

[10]. Kataria R, Kumar D. Studies on the chemical analysis of aphid Semiochemicals from Aphis gossypii (Glover) and Aphis nerii (Boyer De Fonscolombe). International Journal of Pharma and Bio Sciences. 2015; 6(4):553-574.

[11]. Martel JW, Malcolm SB. Density-dependent reduction and induction of milkweed cardenolides by a sucking insect herbivore. Journal of Chemical Ecology. 2004; 30:545-561.

[12]. Maryam ALEOSFOOR & Mohammad Saeed MOSSADEGH (2015) Natural enemies of oleander aphid, Aphis nerii B. de F. (Hom., Aphididae), effective factors in attraction of coccinellids and population fluctuation of oleander aphid in Shiraz and Ahvaz (Iran)

[13]. Minks AK, Harrewijn P. In: Aphids, their control: biology, natural enemies and control. Elsevier, Amsterdam, Oxford, New York, Tokyo. 1987; B:171-

[14]. Mitra S, Ghosh LK. New host record of Aphis nerii B. D. Fonsc. (Homoptera: Aphididae) from West Bengal, India. Journal of Aphidology. 1996; 10:77-79.

[15]. Obrycki J J, Kring T J. 1998. Predaceous Coccinellidae in biological control. Annual Review of Entomology 43(1): 295-321.

[16]. Omkar, R. B.; Bind, 2004. Prey Quality Dependent Growth, Development and Reproduction of a Biocontrol Agent, Cheilomenes sexmaculata (Fabricius) (Coleoptera: Coccinellidae). Bio. Scie. & Tech., 14(7):665-673.

[17]. Poorani, J. 2002. An annolated checklist of the Cocinellidae (Coleoptera) (excluding Epilachninae) of the India sub-region. Oriental Insect, 36: 307383

[18]. Puttarudriah, M. and Channabasavanna, G. P. 1955. Beneficial coccinellids of Mysore Ii. Indian Journal of Entomology, 17: 1–5. [Google Scholar]

[19]. Puttarudriah, M. and Channabasavanna, G. P. 1956. Beneficial coccinellids of Mysore Iii. Journal of the Bombay Natural History Society, 54: 156–159. [Google ScholarR.

[20]. Rani BJ, Sridhar V. Records of aphids [Homoptera: Aphididae] and their natural enemies on some medicinal and aromatic plants. Pest Management in Horticultural Ecosystems. 2005; 11(1):71-77

[21]. Saikia HC, Das BK, Kalita J. Studies on the Insects associated with Calotropis gigantean in Guwahati city of Assam, India. The Journal of Zoology Studies. 2015; 2(3):6-13.

[22]. Singh, Y.P., H.P. Meghwal and S.P. Singh 2008. Biology and Feeding Potential of Cheilomenes sexmaculata Fabricius (Coleoptera: CoccineIlidae) on Mustard Aphid. Annals of Arid Zone, 47(2): 185190.

[23]. Raccah, B. and Fereres, A. (2009). In Plant Virus Transmission by Insects. Encyclopedia of Life Sciences (Wiley, Chichester). http//www.elsnet

[24]. Talhog, A. S. (1984). Agriculture pest the most distribution in Saudi Arabia and the reduction their damage. Ministry of agriculture and water. Al. Riyadh Saudi Arabia 121

[25]. Usmani MK, Rafi U. Aphids (Insecta: Hemiptera: Aphididae) of Aligarh region of Uttar Pradesh, India. Journal of Threatened Taxa. 2009; 1(11):573-577.

[26]. Uzest, M., Brault, V., Monsion, B., Jacquot, E. and Blanc, S.(2010) Aphids as transport devices for plant viruses. ComptesRendus Biologies, 333, 524–538. (6) (PDF) Insect transmission of plant viruses: Multilayered interactions optimize viral propagation.].

[27]. Wagle BKS, Saravanan L, Jacob PS, Anand P. Biology and predation potential of aphidophagous predators, Coccinella septempunctata and Coccinella transversalis on cabbage aphid Brevicoryne brassicae Linnaeus. The Allahabad Farmers. 2006; 9:70-74.

[28]. W. Hall and Ehler, L. E. (1980). Population ecology of Aphis nerii on oleander. Environmental Entomology, 9:338-344.

[29]. Khalid Abbas et al.2020 Cheilomenes sexmaculata (Coccinellidae:Coleoptera) as a potential biocontrol agent for aphids based on age-stage, two-sex life table PLOS ONE | https://doi.org/10.1371/journal.pone.0228367