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Effect of host plants on the feeding potential of *Episyrphus balteatus* (De Geer) preying on two different aphid species

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ABSTRACT: In the study, effect of three host plants (*Cajanus cajan* (L.), *Lablab purpureus (L.)* and *Vicia faba L.*) on the feeding potential of syrphid fly *Episyrphus balteatus* (De Geer) on *Aphis craccivora* Koch. were studied under laboratory condition. It was observed that feeding potential was highly influenced by host plants. Maximum consumption of aphid by a single larva of *E. balteatus* was observed on *V. faba* (261±6.58 aphids) followed by *C. cajan* (244.2±8.38 aphids). Minimum consumption (222.2±5.97 aphids) was recorded on *L. purpureus.* The feeding potential of *E. balteatus* was also observed on different aphid on *C. cajan.* The maximum larval consumption (558.8±11.95 aphids) was recorded on *A. gossypii as compared to A. craccivora* on *C. cajan.* © 2025 Association for Advancement of Entomology

KEY WORDS: *Aphis craccivora*, syrphid, *Cajanus cajan*, *A. gossypii*

Aphids are small sap sucking plant bugs. They are serious pests of agricultural and horticulture crops. They reproduce parthenogenetically and increase their number rapidly above economically threshold level (Ahmad and Parween, 2009; Ahmad *et al*., 2024). Their sap sucking behaviour causes retardation in growth and development of the plant. They also secrete honey dew which develops black sooty mould and retard the process of photosynthesis. They are also responsible for transmission of several plant viruses (Singh and Singh, 2016). Syrphids are important predators of several aphid species (Chambers *et al*., 1983; Radhakrishnan and Muraleedharan, 1993; Tenhumberg, 1995). In India, 48 species of syrphids were reported on 72 species of aphids infesting more than 141 food plants (Ahmad and Kumari, 2024). *Episyrphus balteatus* (Diptera, Syrphidae) is a predominant species worldwide (Sadeghi, 2008) and it was reported preying on 57 species of aphids, infesting 107 species of plants from 20 states of union territories in India (Singh and Ahmad, 2025). Adults are good pollinating agent and larvae of are very important syrphid predator of aphids and other homopteran insects (Sadeghi and Gilbert, 2000; Routray and Dey, 2016). Sadeghi *et al*. (2014) reported that *E. balteatus* is a generalists species in their preference for prey. Bombosch (1963) was the first to propose model of predator feeding potential as a means of assessing the impact of syrphids. Tamaki *et al*. (1974) and Chambers and Adams (1986) have expanded this strategy, although these models continue to rely on the relationship between predatory potential in the field

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and laboratory. Samuel *et al*. (2005) studied the feeding potential of *E. balteatus* (De Geer) on *Lipaphis erysimi* (Kaltenbach) at variable host density. Varshney and Bisht (2016) also used *L. erysimi* for the feeding experiment of *E. balteatus*. Similarly, Muralibaskaran *et al*. (2009) observed feeding efficiency of *E. balteatus* and other syrphid species on *A. gossypii*. In Bihar, *E. balteatus* was recorded on several species of aphids on different host plants with moderate to high intensity of predation (Kumar *et al*., 2015; Kumar and Ahmad, 2017; Ahmad *et al*., 2020; Parween *et al*., 2023). Hence, due to the wide host range, the feeding potential of *E. balteatus*on *A. craccivora and A. gossypii* on different host plants was investigated to examine their efficacy for possible use in biological control programme.

Adults were collected from the field and brought to the laboratory where they were maintained in rearing cages (25cm x 25cm x 25cm) for mating and egg-laying. The collected eggs were kept into glass jars. After hatching, freshly emerged larvae were again kept into separate glass jars. For this experiment, mass culture of *A. gossypii* on *C. cajan* and *A. craccivora* on *C. cajan*, *Lablab purpureus* and *Vicia faba* were done. Each newly emerged larva was provided with a host plant twig infested with 150 aphids on daily basis until the complete larval developmental period. The unconsumed and dead aphids were also counted every day before providing fresh aphids for evaluating predatory potential.

The feeding potential of larval stages of *E. balteatus* was studied on *A. craccivora* on different host plants. Maximum aphid consumption by 1st instar (48.2±3.39 aphids), 2nd instar (85.2±2.40 aphids) and 3rd instar (127.6±5.05 aphids) larvae was observed when reared on *V. fabaas compared to C. cajan* (1st instar 36.6±1.13 aphids, 2nd instar 82.4±6.49 aphids and 3rd instar 125.2±1.2 aphids). However, the lowest consumption was recorded (1st instar 26.0±3.0 aphids, 2nd instar 74.8±4.88 aphids and 3rdinstar 121.4±3.62 aphids) *on L. purpureus* (Table 1). The difference in the consumption by 1st instar larvae between three host plants was observed significant by ANOVA (F = 17, PÂ*0.05*). However, there was no significant difference between 2nd instar (F= 1.2, PÂ0.05) and the 3rd instar (F = 0.7, PÂ0.05).Total consumption of aphids during larval period was observed maximum (261±6.58 aphids) on *V. faba* and minimum on *L. purpureus* (222.2±5.97 aphids) (Table 1). The difference in larval consumption for three host plants is found significant by ANOVA (F= 7.6, PÂ0.05). Thus, on the basis of above investigation, it can be concluded that *V. faba* is more suitable host plant as compared to other host plant.

The feeding potential of *E. balteatus* was also observed on different aphids (*A. craccivora* and *A. gossypii)* on *C. cajan plant*. M*aximum* consumption of aphids by 1st instar (51.6±5.49 aphids), 2nd instar (229.6±9.25 aphids) and 3rd instar (277.6±7.19 *aphids*) larvae of *E. balteatus* and total consumption (558.8±11.95 aphids) was observed on *A. gossypii* as compared to *A. craccivora* when reared on *C. cajan* (Table 1). This difference in feeding potential was found highly significant between *A. craccivora* and *A. gossypii* consumption by each larval instars (1st instar, t = 2.68; 2nd instar, t = 13.04; 3rd instar, t = 20.92) and total consumption (t = 20.61 at 5%).

It is concluded that *E. balteatus* larvae preferred *A. gossypii* than *A. craccivora.* The consumption efficiency *of E. balteatus* varied according to different aphid species. Muralibaskaran *et al.* (2009) reported less larval consumption of *E. balteatus* on *A. gossypii* (1st instar 52.8±10.45, 2nd instar 112.4±25.01 and 3rd instar 245.6±52.14 aphids and total consumption was 410.0±87.60 aphids. Hindayna *et al*. (2001) demonstrated that *E. balteatus* larvae had the greatest predatory capacity on *A. gossypii*. Hong and Hung (2010) also reported more feeding capability of *E. balteatus* on *A. gossypii.* Many workers observed that the consumption efficiency of *E. balteatus* varied according to different aphid species. Total consumption of aphids by *E. balteatus larvae* was 411.8±57.88 on *Lipaphis erysimi* (Varshney and Bisht, 2016). Faheem *et al*. (2019) reported the total consumption as 398.37±9.45 by *E. balteatus* larvae on *Schizaphis graminum.* Similarly, Singh

Table 1. Predatory efficiency of larvae of *E. balteatus* on *A. craccivora*on different hosts and *A. gossypii* on *C. cajan* (mean ± S.E)

Larval instars	*Aphis craccivora*		*A. gossypii*	
Host plants	*C. cajan*	*L. purpureus*	*V. faba*	*C. cajan*
1st instar	36.6±1.13	26.0±3.0	48.2±3.39	51.6±5.49
2nd instar	82.4±6.49	74.8±4.88	85.2±2.40	229.6±9.25
3rd instar	125.2±1.2	121.4±3.62	127.6±5.05	277.6±7.19
Total	244.2±8.38	222.2±5.97	261±6.58	558.8±11.95

et al. (2020) reported total consumption as 393.6±3.44 by the larvae on *Brevicoryne brassicae*. Routray and Dey (2016) recorded gross consumption of 523.33±25.374 on *A. craccivora.* In the present investigation, the total consumption by larval stages of *E. balteatus* was 244.2±8.38 on *A. craccivora* and 558.8±11.95 on *A. gossypii reared on C. cajan* which is highest as compare to other aphid species.

It was also observed that feeding potential was greatly influenced by host plants. The maximum consumption of aphid by *E. balteatus* larvae observed on *V. faba.* Thus, on the basis of above information, *A. gossypii* and *V. faba a*re more suitable aphid and host plants respectively for this syrphid predator.

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REFERENCES

Ahmad M.E., Nawal D. Kumari M., Kumari K. (2024) Prey and host records of *Coccinella* spp. (Coleoptera: Coccinellidae) in India (A review). Journal of Advanced Zoology 45(5): 170–187.

Ahmad M.E. and Kumari K. (2024) Record of aphidophagous syrphids with their prey and host plants in India: A review. Journal of Biological Control 38(2): 117–137.

Ahmad M.E., Kumar S., Parween N. and Rakshan (2020) Bio-ecological study of few species of *Aphis* Linn. in northeast Bihar and their association with food plants and natural enemies for possible use in the biological control. Journal of Advanced Zoology 41(1&2): 103–116.

Ahmad M.E. and Parween N. (2009) New records of aphids and their parasitoids and hyperparasitoids from north east Bihar. Journal of Advanced Zoology 30(1): 7–9.

Bombosch S. (1963) Studies on the propagation of *Aphis fabae* Scop, in seed beet stands with special consideration of the Hoverflies (Diptera: Syrphidae). Journal for Applied Entomology 52: 105–141.

Chambers R.J. and Adams T.H.L. (1986) Quantification of the impact of hoverflies (Diptera: Syrphidae) on cereal aphids in winter wheat:An analysis of field populations. Journal of Applied Ecology 23: 895–904.

Chambers R.J., Sunderland K.D., Wynt I.J. and Vickerman C.P. (1983) The effect of predator exclusion and caging of cereal aphids in the winter wheat. Journal of Applied Ecology 20: 209–224.

Faheem M., Saeed S., Sajjad A., Razaq M. and Ahmad F. (2019) Biological parameters of two syrphid fly species *Ischiodon scutellaris* (Fabricius) and *Episyrphus balteatus* (De Geer) and their predatory potential on wheat aphid *Schizaphis graminum* (Rondani) at different temperatures. Egyptian Journal of Biological Pest Control 29: 2.

Hindayana D., Meyhofer R., Scholz D. and Poehling H.M. (2001) Intraguild predation among the hoverfly *Episyrphus balteatus* (De Geer) (Diptera: Syrphidae) and other aphidophagous predators. Biological Control 20: 236–246.

Hong B.M. and Hung H.Q. (2010) Effect of temperature and diet on the life cycle and predatory capacity of *Episyrphus balteatus* (De Geer) (Syrphidae: Diptera) cultured on *Aphis gossypii* (Glover).

Journal of the International Society for Southeast Asian Agricultural Sciences16(2): 98–103.

Kumar S. and Ahmad M.E. (2017) Coccinellid and syrphid predators of *Rhopalosiphum* spp. (Hemiptera: Aphididae) recorded on different food plants from northeast Bihar. Journal of Advanced Zoology38(1): 1–6.

Kumar S., Ahmad M.E. and Rakshan (2015) First record of aphidophagous syrphids (Diptera: Syrphidae) from northeast Bihar. Journal of Advanced Zoology 36(1): 35–41.

Muralibaskaran R.K., Sasikumar S., Rajavel D.S. and Suresh K. (2009) Biology and predatory potential of aphidophagous syrphids onguava aphid, *Aphis gossypii* Glover (Hemiptera: Aphididae). Journal of Biological Control 23(1): 53–56.

Parween N., Kumar S., Kumari K. and Ahmad M.E. (2023) Interaction of *Myzus* spp. (Hemiptera: Aphididae) with their Food Plants, Parasitoids and Predators in Northeast Bihar. Journal of Advanced Zoology 44: 95–100.

Routray S. and Dey D. (2016) Performance of Syrphid Fly, *Episyrphus balteatus* (De Geer) Feeding on Cowpea Aphid *Aphis craccivora* Koch. Advances in Life sciences 5(5): 1961–1964.

Radhakrishnan B. and Muraleedharan N. (1993) Bio-ecology of six species of syrphid predators of tea aphid, *Toxoptera aurantii* (Boyor de Fonscolombe) in Southern India. ENTOMON 18: 175–180.

Sadeghi H. (2008) Abundance of adult hoverflies (Diptera: Syrphidae) on different flowering plants. Caspian Journal of Environmental Science 6: 47–51.

Sadeghi H. and Gilbert F. (2000) Aphid suitability and its relationship to oviposition preference in predatory hoverflies. Journal of Animal Ecology 69: 771–784.

Sadeghi H., Rotheray G., Laska P. and Gilbert F. (2014) Host preferences of aphidophagous hoverflies from field distribution of their larvae. Egyptian Journal of Biology 16: 1–16.

Samuel R.N., Dass I.J. and Singh R. (2005) Feeding potential and its effect on development of an aphid predator, *Episyrphus balteatus* (De Geer) (Diptera: Syrphidae) vis-a-vis variable prey density. Journal of Aphidology 19: 93–100.

Singh R. and Ahmad M.E. (2025) Tritrophic association of aphidophagous *Betasyrphus* and *Episyrphus* species (Syrphinae: Syrphidae: Diptera) in different states and territories of India. Munis Entomology & Zoology 20 (supplement): 3451–3474.

Singh R. and Singh G. (2016) Aphids and their biocontrol. In: Omkar (Ed.), Ecofriendly Pest Management for Food security, Academic Press, USA. pp63–108.

Singh P., Thakur M., Sharma K.C., Sharma H. K. and Nayak R.K. (2020) Larval feeding capacity and pollination efficiency of the aphidophagous syrphids, *Eupeodes frequens* (Matsmura) and *Episyrphus balteatus* (De Geer) (Diptera: Syrphidae) on the cabbage aphid (*Brevicoryne brassicae* L.) (Homoptera: Aphididae) on mustard crop. Egyptian Journal of Biological Pest Control 30: 105.

Tamaki G., McGuire J.U. and Turner J.E. (1974) Predator power and efficacy: A model to evaluate their impact. Environmental Entomology 3: 625–630.

Tenhumberg B. (1995) Estimating predatory efficiency of *Episyrphus balteatus* (Diptera: Syrphidae) in cereal fields. Environmental Entomology 24: 677–691.

Varshney R. and Bisht R.S. (2016) Feeding propensity of the larvae, *Episyrphus balteatus*(De Geer) and *Ischiodon scutellaris* (Fabricius) on the mustard aphid *Lipaphis erysimi* (Kalt.). Current Biotica 9 (4): 374–387.

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