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Research Note

Predatory coccinellids of insect pests of Assam lemon (*Citrus limon* L. Burmf) in Jorhat district of Assam

H. R. RAMYA* and ROJEET THANGJAM
Department of Entomology, Assam Agricultural University, Jorhat-785013, Assam, India.
**Corresponding author E-mail:* ramyahr1991@gmail.com

ABSTRACT: The diversity of predatory coccinellids of insect pest of Assam Lemon (*Citrus limon* L. Burmf) was studied in the citrus orchard of Assam Agricultural University, Jorhat during 2015-2016. Twelve species of coccinellid beetles *viz., Coccinella transversalis* (Fabricius), *Coelophora bowringii* (Crotch), *Coelophora saucia* (Mulsant), *Cryptogonus bimaculatus* (Kapur), *Cryptogonus* spp., *Cryptolaemus montrouzieri* (Mulsant), *Harmonia conglobata* (Linnaeus), *Harmonia dimidiata* (Fabricius), *Illeis confusa* (Timberlake), *Propylea* spp., *Platynaspis kapuri* (Chakraborty and Biswas) and *Scymnus* spp. were recorded feeding on various sucking pests. Among the coccinellids, *Coccinella transversalis* and *Harmonia dimidiata* were recorded in maximum number (9.0 and 8.4 per tree respectively) with a relative abundance of 17.79 and 16.60 per cent respectively while *Cryptogonus* spp. was recorded lowest (0.9 per plant with relative abundance of 01.79 per cent).

KEY WORDS: Assam lemon, coccinellids, predators, diversity, relative abundance

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Assam lemon is one of the most important perennial fruit crops of Assam and is widely grown throughout the state and used for culinary, pickles, beverages and medicinal purposes. The productivity of the fruits are hampered by insect pests and diseases and some of the major pests include, *Phyllocnistis citrella* (Stainton), *Toxoptera aurantii* (Boyer de Fonscolombe), *T. citricida* (Kirkaldy), *Aleurocanthus woglumi* (Ashby), *Diaphorina citri* (Kuwayama), *Planococcus citri* (Risso), *Thrips nilgiriensis* (Ramakrishna), *Icerya purchasi* (Maskell), *Papilio* spp. etc. and some of them are important vectors of many plant viruses. However, many coccinellid beetles have been observed feeding on many insect pests of citrus and therefore, there is a potential of using coccinellid beetles as biological control agent, which will facilitate farmers to avoid use of harmful pesticides which in turn create a number of economical, ecological and health problems. The present study was undertaken to explore the diversity of predacious coccinellid of pests of Assam lemon in Assam Agricultural University, Jorhat.

The survey was carried out during 2015-16, at the orchard of Assam Agricultural University, Jorhat on the predatory coccinellids associated with the sucking pests of Assam lemon of local variety. The study involves the collection of coccinellid beetles followed by preservation and identification. Ten plants were selected randomly from the field and the beetles were collected by using several methods *viz.,* sweep net, aspirator and hand picking. The beetles collected were killed in the killing jar and mounted on pins and labeled. The collected beetles were sent for identification to NBAIR, Bangalore. The mean number of coccinellid beetles were calculated and expressed as number per tree and their relative abundance were also calculated.

Twelve species of coccinellid predators belonging to 8 genera of family Coccinellidae were found to predate on various sucking pests of Assam lemon *viz.,* citrus aphid (*Toxoptera aurantii* Boyer de Fonscolombe), citrus psyllid (*Diaphorina citrii* Kuwayama), citrus mealybug (*Planococcus citri* Risso), citrus blackfly (*Aleyrocanthus woglumi* Ashby), citrus butterfly (*Papilio demoleus* Linnaeus) and citrus white mealy bug (*Icerya seychellarum* Westwood) under natural condition**.** The observed coccinellid predators were *Coccinella transversalis* (Fabricius), *Coelophora bowringii* (Crotch), *Coelophora saucia* (Mulsant), *Cryptogonus bimaculatus* (Kapur), *Cryptogonus* spp., *Cryptolaemus montrouzieri* (Mulsant), *Harmonia conglobata* (Linnaeus),

Table 1. List of coccinellid predators collected from citrus orchard (var. Assam lemon)

Identified species	Hosts Preference in Assam Lemon	Nos./tree	Relative abundance (%)
Coccinella transversalis (Fabricius)	Citrus aphid, Citrus psyllid	9.0	17.79
Coelophora saucia (Mulsant)	Citrus aphid	3.4	06.72
Coelophora bowringii (Crotch)	Citrus aphid	2.5	04.94
Cryptogonus bimaculatus (Kapur)	Citrus aphid	1.1	02.17
Cryptogonus sp.	Citrus aphid	0.9	01.79
Cryptolaemus montrouzieri (Mulsant)	Citrus psyllid	6.8	13.44
Harmonia dimidiata (Fabricius)	Citrus psyllid	8.4	16.60
Harmonia conglabata (Linnaeus)	Citrus psyllid	5.0	09.88
Illeis confuse (Timberlake)	Citrus aphid, coccids and mites	4.5	08.89
Propylea sp.	Citrus aphid	1.5	02.96
Platynaspis kapuri (Chakraborty and Biswas)	Citrus aphid	1.6	03.16
Scymnus sp.	Citrus mealybug	5.9	11.66

Harmonia dimidiata (Fabricius), *Illeis confusa* (Timberlake), *Propylea* spp., *Platynaspis kapuri* (Chakraborty and Biswas) and *Scymnus* spp. Among the coccinellid beetles, *Coccinella transversalis* was recorded in maximum number per tree (9.0) followed by *Harmonia dimidiata* and *Cryptolaemus montrouzieri* (8.4 and 6.8 per tree respectively) and the lowest was *Cryptogonus* sp. (0.9 per tree) (Table 1). *Scymnus* spp., *Hamonia dimidiata, Illies confuse, Coelophora saucia, Coelophora bowringii, Platynaspis kapuri*, *Propylea* spp., *Cryptogonus bimaculatus* were recorded 5.9, 5.0, 4.5, 3.4, 2.5, 1.6, 1.5 and 1.1 per tree respectively (Table 1). The highest relative abundance was recorded in *Coccinella transversalis* (17.79 %) followed by *Harmonia dimidiata* (16.60%), *Cryptolaemus montrouzieri (*13.44%), *Scymnus* spp. (11.66%) and *Hamonia conglobata* (9.88%). However, *Illies confuse, Coelophora saucia, Coelophora bowringii, Platynaspis kapuri, Propylea* spp. *Cryptogonus bimaculatus* and *Cryptogonus* spp. Were recorded 8.89, 6.72, 4.94, 3.16, 2.96, 2.17 and 1.79 per cent respectively (Table 1).

Michaud (2002) Reported 7 species of coccinellid predators *viz., Coelophora inadequalis* (F.), *Coleomegilla maculate fuscilabris* Mulsant, *Cycloneda sanguinea* L., *Harmonia axyridis* Pallas, *Olla v-nigrum* Mulsant, *Curinus coeruleus* Mulsant and *Exochomus childreni childreni* Mulsant feeding on *Diaphorina citri* in Florida. Takagi (2003) reported the usage of vedalia beetle, *Rodolia cardinalis* (Mulsant), for controlling cottony cushion scale, *Icerya purchasi* Maskell in citrus plantation in Japan and Kaneko (2013) also reported the occurrence of the exotic predatory ladybird *Platynaspidius maculosus* in citrus groves in Shizuoka city of Central Japan. Franco *et al*. (2004) introduced *C. montrouzieri* and *Nephus reunioni* Fursch into citrus-growing areas of the Mediterranean Basin for the management of mealy bug in citrus. Singh (2010) also reported 17 coccinellid beetles feeding on different insect-pests of citrus from Punjab. Grubs/adults of coccinellid beetles including *Coccinella septempunctata* (Linnaeus), *Coccinella transversalis, Brumoides suturalis* (Fabricius), *Cheilomenes sexmaculata* (Fabricius), *Chilocorus nigrita* (Fabricius), *Anegleis cardoni* (Weise), *Micraspis allardi* (Mulsant), *Psyllobora bisoctonotata* (Mulsant), *Illeis cincta* (Fabricius), *Harmonia dimidiata* (Fabricius), *Rodolia breviuscula* Weise, *Hippodamia variegata* (Goeze), *Propylea dissecta* (Mulsant), *Propylea japonica* (Thunberg), *Pharoscymnus flexibilis* (Mulsant) and *Scymnus* sp. were observed feeding on different insect-pests including mealy bugs, *viz., Planococcus citri* (Risso), *Planococcus lilacinus* (Cockerell), *Nipaecoccus viridis* (Newstead) and *Maconellicoccus hirsutus* (Green), aphid complex comprising citrus black aphid, *Toxoptera aurantii* (Boyer de Fonscolombe), green peach aphid *Myzus persicae* Sulzer melon or cotton aphid, *Aphis gossypii* Glover, scale insect, *Aonidiella aurantii* (Maskell), whitefly, *Dialeurodes citri* (Ashmead), blackfly, *Aleurocanthus woglumi* Ashby, citrus psylla, *Diaphorina citri* Kuwayama and citrus mite, *Eutetranychus orientalis* (Klein). Prakash (2012) also mentioned that the coccinellid beetles are useful predators of pests of citrus. *Coccinella rependox* prey upon nymphal psylla, *Cryptolaemous montrouzieri* on citrus mealy bug and *Cheilomenes sexmaculata* on citrus aphid.

Majumder *et al.* (2013) reported 24 species of coccinellids under 17 genera from different agro and forest habitats of Tripura state and their relative abundance showed that *Micraspis discolor* (F.), *Cheilomenes sexmacula* and *Coccinella transversalis* showed maximum population with a relative abundance of 24.52%, 18.13% and 11.99%, respectively. Sharma *et al.* (2015) also reported 36 species

of predatory coccinellids belonging to 24 genera, 11 tribes and 4 sub-families from different agroclimatic zones of Himachal Pradesh. Among them, 18 species *viz. Brumoides suturalis*, *Chilocorus nigrita*, *Rodolia octoguttata*, Sumnius vestita, *Coccinella luteopicta* (Mulsant), *Coelophora bissellata* Mulsant, *Coelophora saucia*, *Phrynocaria perrotteti* (Mulsant), *Propylea dissecta*, *Psyllobora bisoctonotata*, *Cryptogonus orbiculus* (Gyllenhall), *Cryptogonus trioblitus* (Gorham), *Ortalia vietnamica* (Hoang), *Ortalia* sp., *Scymnus nubilus* (Mulsant). *Stethorus* sp., *Pharoscymnus flexibilis* and *Pharoscymnus horni* (Weise) were reported for the first time and *Coccinella septempunctata*, *Hippodamia varigieta* and *Cheilomenes sexmaculata* occupied all the 4 agro-climatic zones. Swaminathan *et al.* (2015) reported three coccinellids *viz., Coccinella septempunctata* (Linnaeus), *Cheilomenes sexmaculatus* (Fabricius) and *Brumoides suturalis* in Maize ecosystem feeding on aphid (*Rhopalosiphum maidis* Fitch). Goswami *et al.* (2016) reported four coccinellids namely, *Coccinella septempunctata*, *Coccinella transversalis*, *Micraspis discolor* and *Menochilus sexmaculatus* from mustard, linseed, chickpea and lentil crops at Sabour region during Rabi season. Amongst these, *Coccinella septempunctata* was found to be the most abundant species.

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REFFERENCES

Franco JC, Suma P, da Silva EB, Blumberg D, Mendel Z. 2004. Management strategies of mealybug pests of Citrus in Mediterranean Countries. *Phytoparasitica* **32**(5): 507–522.

Goswami TN, Anil, Chandran N. 2016. Lady bird beetles in major rabi oil seeds and pulse crops at Sabour, Bihar. *Intl J Sci Env Technol.* **5**(4): 2382–2386.

Kaneko S. 2013. Occurrence of the exotic predatory ladybird *Platynaspidius maculosus* (Coleoptera: Coccinellidae) in citrus groves in Shizuoka City, Central Japan: Seasonal prevalence of adults captured on sticky traps. *Appl Entomol Zool.* **48**(2): 189–194.

Majumder J, Bhattacharjee PP, Agarwala BK. 2013. Diversity, distribution and habitat preference of predacious coccinellids (Coleoptera: Coccinellidae) in agro- and forest habitats of Tripura, Northeast India. *Intl J Curr Res.* **5**(5): 1060–1064.

Michaud JP. 2002. Biological control of Asian citrus psyllid, *Diaphorina citri* (Hemiptera: Psyllidae) in Florida: A preliminary report. *Entomol news* **113**(3): 216–222.

Prakash O. 2012. *IPM schedule for citrus pests*. Extension bulletin no. 4. National Horticulture Mission Ministry of Agriculture Department of Agriculture & Cooperation. pp. 13–26.

Sharma PL, Chauhan U, Sharma KC. 2015. Studies on the diversity of predatory coccinellid beetles (Coleoptera) in different agro-climatic zones of Himachal Pradesh. *The Bioscan* **10**(3): 981–985.

Singh S, Sharma DR. 2010. Coccinellid predators beetles of insect pests of citrus in the Indian Punjab. *Crop Improvement* **37**(2): 207.

Swaminathan R, Meena A, Meena BM. 2015. Diversity and predation potential of major aphidophagous predators in maize. *Appl Ecol Env Res.* **13**(4): 1069–1084.

Takagi M. 2003. Biological control of citrus scale pests in Japan. In: *1st International symposium on biological control of arthropods. USDA-Forest Service,* pp. 351–355.