PREDATION POTENTIAL OF SOME COCCINELLIDS UPON MAIZE APHID, *RHOPALOSIPHUM MAIDIS* FITCH

In Himachal Pradesh, *Rhopalosiphum maidis* Fitch. is a pest of maize which infests central whorl of leaves, tassel and the cob leaves. Among the successful biotic agents, Coccinellids occupy an important position and to a large extent these are responsible for limiting aphid populations under natural conditions. The present work was undertaken to study the predation potential of different coccinellid species of mid hill regions of Himachal Pradesh.

Coccinellids were collected from field and confined inside a glass chimney (30×8 cm dia) in the laboratory. The beetles were provided with necessary aphid food and the top of the chimney was covered with muslin. The coccinellids, *Coccinella septempunctata* L.,*C. septempunctata* var. *divericata* Ol., *Adonia variegata* Goeze., *Oenopia luteopustulata* Muls.,*Leis decimaculata, L. dimidiata* F., *Coelophora sexareata* Muls., and *Chilomenes sexmaculata* Muls., which predate upon maize aphid during rainy season were studied for their predation potential. *Chilocorus bijugus* Muls., also fed upon maize aphid in the laboratory, though it is primarily a predator of San jose scale (*Quadraspidiotus peniciosus* Com.). Coccinellids, *Coccinella* sp. and *Leis* sp. were bigger in body size, whereas *A. variegata, O. luteopustulata, C. sexareata, C. sexamaculata* and *C. bijugus* had smaller body size. Plastic vials (10 x 4 cm) were used in present studies. One coccinellid was confined with 100 wingless adult maize aphids in plastic vials. The aphids were released on a small maize leaf. The leaf turgidity was maintained by putting a water soaked cotton swab around the leaf base. The cotton swab was covered on the outside with a thin film of paraffin wax to conserve the moisture (Adlakha and Sharma, 1976). The vial mouth was covered with a piece of muslin. The coccinellids were starved for four hours before confining them with aphids. The plastic vials were kept at laboratory temperature (20-25°C) and relative humidity (70-80%). Each observation was repeated ten times. The observations were recorded on rate of feeding as the number of aphids consumed per beetle per day, and the feeding efficiency in terms of time taken to consume 100 wingless adult aphids. The vials were observed every four hours to note when a coccinellid individual finished its stock of aphids.

The speed of aphid consumption was based on the time taken (in seconds) to consume one wingless adult maize aphid by a coccinellid individual. The time was recorded with a stop watch (Rocar, Swiss make). One coccinellid individual

was confined with 100 aphids in Petridish (10 cm dia). As above, the coccinellids were starved for four hours before being used in the experiment. Time was recorded from the moment the coccinellid caught the aphid till it discarded or left the appendages like legs and antennae to search for another prey.

The means and standard errors were calculated for speed of aphid consumption, rate of aphid consumption and feeding efficiency to determine the range for these parameters of predation potential.

The results (Table 1) showed that *C. septempunctata, A. variegata, O. luteopustulata, L. dimidiata, C. sexareata, C. bijugus, C. septempunctata* var. *divaricata* and *L. decimaculata* could finish one wingless adult maize aphid in 62, 113, 108, 29, 68, 112, 48 and 72 seconds respectively. *A. variegata* took maximum of 113 seconds and *L. dimidiata* minimum of 29 seconds to consume one aphid. The coccinellids, *C. septempunctata, A. variegata, C. sexmaculata, O. luteopustulata, L. dimidiata* and *C. heptopuncta* var. *divaricata* consumed 69,53,54,83 and 59 maize aphids respectively in 24 hrs. *C. sexmaculata* consumed minimum and *L. dimidiata* maximum number of aphids. *A. variegata* s owed a consumption rate near to that of *C. septempunctata*. The feeding ranges of two subspecies of *Coccinella septempunctata* were quite near to each other. Feeding efficiency showed that *C. septempunctata, A. variegata, C. sexmaculata, O. luteopustulata, L. dimidiata* and *C. heptopuncta* var. *divaricata* took 38, 45, 40, 29 and 32 hrs respectively to consume 100 wingless adult maize aphids.

Speed of aphid consumption was found to be inversely linked with the body size of coccinellid species. *L. dimidata* being bigger and *A. variegata* being smaller in size took minimum and maximum time respectively to consume one aphid. Studies on rate of aphid consumption revealed that even when the size of coccinellid is relatively smaller, a coccinellid may possess considerable potential for aphid consumption e.g. *A. variegata* showed a consumption rate near to that of *C. septempunctata*, though the former is quite smaller in size. Similar observations have also been reported earlier on the predation potential of *C. septempunctata*. The present study and those made earlier (Bagal and Trehan, 1945; Tsvetkov, 1962 and Hukucema and Kondo, 1962) suggest that rate of aphid consumption differs with different aphid species.

L. dimidata appeared to be the most and *C. sexmaculata* the least efficaceous coccinellid. Keeping in view the period of activity and population level under the natural conditions, *C. septempunctata* is, however, the most abundant aphid predator. This species can be effectively utilized as a biological control agent.

Table 1. Predation potential of some aphidophaogous coccinellids upon maize aphid, *R. maidis*

Concinellid Species	Time (Seconds)* required to feed on one aphid	No. of aphids consumed per/day	Time (hrs) taken per beetle to consume 100 aphids
Coccinella septempunctata L.	61.5±12.8	68.7±3.2	38.1±1.6
Adonia variegata Goeze.	112.9±13.1	61.4±4.9	44.9±2.4
Chilomenes sexmaculata F.	—	53.3±1.1	59.7±0.5
Oenopia luteopustulata Muls.	107.8± 9.4	54.3±3.9	39.6±2.4
Leis dimidiata	28.7± 2.2	83.4±3.8	29.0±2.1
Coelophora sexareata Muls.	67.7± 9.8	—	—
Chilocorus bijugus Muls.	112.2±12.8	—	—
Coccinella septempunctata var. *divaricata* Ol.	47.9± 4.0	59.0±6.4	32.0±4.2
Leis decimaculata	72.0± 7.8	—	—

* Average of ten observations

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