

- hybrids using Genic Male sterility in pigeonpea. *Indian J. Genet.* **52**: 292-296.
- Satpute, R.G., Khare, D. and Bargale, M. (1992). Diallel analysis in pigeonpea. *Indian J. Genet.* **52**(3): 288-291.
- Saxena, K.B., Byth, D.E., Wallies, E.S. and Delacy, L.H. (1980). Genetic analysis of diallel crosses of early flowering pigeonpea Lines. Proceedings of International Workshop on Pigeonpea, 15-19 Dec., 1980., ICRISAT Patancheru, A.P., India. **2**: 81-92.
- Sharma, H.K., Laxman Singh and Sharma, D. (1973). Combining ability in diallel crosses of pigeonpea. *Indian N. Agrl. Sci.* **43**: 25-29.
- Sidhu, P.S. and Sandhu, T.S. (1981). The role of genetic studies in developing new cultivars of pigeonpea in non-trational areas of north India. Proceedings of International Workshop on Pigeonpea, 15-19 Dec., 1980. ICRISAT, Hyderabad, **2**: 112-129.

(Received : October 1998; Revised : January 2001).

Madras Agric. J., 87(7-9): 424 - 427 July - September 2000

<https://doi.org/10.29321/MAJ.10.A00489>

Developmental period and survival of *Coccinella septempunctata* var *divaricata* predating on *Lipaphis erysimi* Kalt in mustard.

SEEMAKUMARI, I.P. SINGH AND SANJIVAN KUMAR

Dept. of Entomology and Agril. Zoology, Rajendra Agric. Univ., Bihar, Pusa (Samastipur) 848 125

Abstract : The average duration of first, second, third and fourth instar larvae of *C. septempunctata* var *divaricata* was observed to be 3.56 and 3.66, 2.60 and 2.38, 2.48 and 2.49 and 4.35 and 3.86 days during February and March, respectively. The survival rate of larvae varied between 86.25 and 99.50 per cent in different instars during February and March, respectively. The mean pupal period was 41.16 and 3.46 days with survival rate of 97.14 and 90.97 per cent during February and March, respectively. The average duration of adult longevity was higher in February than March. The survival rate of adult up to 15th day of emergence was higher in March. The adult mortality was recorded to be more after 20, 25, 30 and 35 days of emergence. (**Key words** : *Coccinella septempunctata* var *divaricata*, *Lipaphis erysimi* Kalt, Mustard)

Mustard is an important oilseed crop grown throughout India. As many as 38 species of insect pests have been reported by Bakhetia (1987) causing damage to the mustard and rapeseed crops at various growth stages, important among them being mustard aphid (*Lipaphis erysimi* Kalt.), mustard saw fly (*Athalia lugens proxima* Klug.), painted bug (*Bagrada hilaris* Burni.), Bihar hairy catterpillar (*Spilosoma obliqua* walker), Cabbage butterfly (*Pieris brassicae* Linn.) and diamond back moth (*Plutella xylostella* Linn.). Out of these, the mustard aphid (*L. erysimi*, Kalt.) has been considered as the key pest of this cruciferous crop (Bakhetia, 1987). Biocontrol agents like predating coccinellids play an important role in the population regulation of mustard aphid (Singh and Malhotra, 1979, Sinha *et al.* 1982) *Coccinella septempunctata* var *divaricata* olive is an important predatory coccinellids preying upon *L. erysimi* in mustard.

With a view to know the effectiveness of aphids in mustard, it is imperative to know the duration and survival rate of coccinellids under the agro-ecosystem of North Bihar.

Materials and Methods

The experiment on the developmental period and survival rate of *C. septempunctata* var *divaricata* was conducted at P.G. Department of Entomology and Agricultural Zoology, Rajendra Agricultural University, Bihar, Pusa, during rabi 1996.

The pupae collected from field were reared in laboratory at room temperature for adult emergence. Freshly emerged as well as field collected adults were released in pairs in petridishes (15 cm) and provided with cardboard paper over its surface. The adults were provided with adequate number of live aphid

Table 2. Adult longevity and survival rate of *Coccinella septempunctata* var *divarcata* on *Lipaphis erysimi* Kalt. during February - March, 1996

Month	Adult longevity (days)			Days after emergence of adult	Mean adult survival (%)	Mean adult mortality (%)
	Minimum	Maximum	Mean			
February - March, 1996	2.0	35.0	16.5	5.0	90.00	10.00
				10.0	87.50	12.50
				165.0	79.16	20.84
				20.0	75.00	25.00
				25.0	66.66	33.34
				30.0	25.95	74.05
March - April, 1996	5.0	32.0	13.00	35.0	16.66	83.34
				5.0	95.83	4.17
				10.0	91.66	8.34
				15.0	83.33	16.67
				20.0	70.83	29.17
				25.0	45.83	54.17
				30.0	25.00	75.00
				35.0	8.33	91.67

survival rate was found to be 87.14 per cent during February. In March, the mean pupal period was found to be 3.46 days with minimum and maximum duration of 2 to 5 days with a survival rate of 90.97 per cent.

A critical analysis of the data (Table 1) revealed that there was no marked difference in the larval period during February and March with slight difference in mortality of the larva. The pupal period differed significantly during February and March but highest survival was observed in March. Reports of Singh and Malhotra (1979), Butler (1984) and Singh *et al.*, (1994) are also in conformity with the above findings.

The data in Table 2 indicated that the mean adult longevity was 16.5 days with minimum and maximum duration of 2 to 35 days during February. The mean adult survival was in the range of 16.66 to 90.00 per cent with minimum and maximum being 35 and 5 days after adult emergence, respectively in February. The adult mortality in the same period was found in the range of 10 to 83.34 per cent with minimum and maximum being 5 and 35 days of adult emergence.

During March, the mean adult longevity was recorded to be 13.0 days with minimum and maximum duration of 5 and 32 days. The mean survival rate of adult was found decreasing from 95.83 to 8.33 per cent, maximum and minimum being at 5 and 35 days of adult emergence. The mean mortality of adult was observed to increase from 4.17 to 91.67 per cent, minimum and maximum being at 5 and 35 days of adult emergence, respectively.

A critical perusal of the data in Table 2 revealed that the average value of adult longevity was higher in February than March. The survival rate of adult upto 15th days of emergence was higher in March but the adult mortality was more after 20, 25, 30 and 35 days of emergence. The present findings are in conformity with the results of Sethi and Atwal (1964) and Debraj and Singh (1990).

References

- Bakhetia, D.R.C. (1987). Insect pests of rapeseed and mustard and their management in field crops, (Eds). M. Veerabhadra Rao and S. Sithanatham, PPAI, Rajendra Nagar (Hyderabad) p. 249-59.

- Butler, C.D.J.R. (1984). Development time of *Coccinella septempunctata* L. in relation to constant temperature. *Entomophaga*. 27(3): 249 -352.
- Debraj, Y. and Singh, T.K. (1990). Biology of an aphidophagous Coccinellid predator, *Coccinella transversals* Fab. *J. Biol. Contr.* 4: 93-95.
- Sethi, S.L. and Atwal, A.S. (1964). Influence of temperature and humidity on the development of different stages of lady bird beetle, *Coccinella, septempunctata* L. (Coleoptera : Coccinellidae). *Indian J. Agric. Sci.* 34: 166-171.
- Singh, R. and Malhotra, R.K. (1979). Some studies on the biology of *Coccinella undecimpunctata* Memtriesi Muls - a predator of mustard aphid. *Curr. Sci.* 48(20) : 904-905.
- Singh, V.S. Yadav, R.P. and Singh, R. (1994). Post-embryonic development, survival rate and predation potential of *Coccinella septempunctata* Linn in relation to the Mustard aphid. *J. Ento. Res.* 18(1) : 5-10.
- Sinha, T.B., Pandey, R.K., Singh, R. and Tripathi, C.D. (1982). Differential response of mustard varieties to aphid, *Lipaphis erysimi* Kalt., *Indian J. Ent.* 44(4) : 408.

(Received : November 1999 ; Revised : November 2000)

Madras Agric. J., 87(7-9): 427 - 428 July - September 2000

Soil moisture depletion pattern as influenced by irrigation regimes, methods and management practices in soybean

S. ELAMATHI AND S.D. SUNDAR SINGH

Dept. of Agronomy, Agricultural College and Research Institute, TNAU., Coimbatore - 641 003

Abstract : Field experiments were conducted on soybean (var. Col) to study the effect of irrigation regimes, methods of irrigation and stress management practices. In the investigations, data on soil moisture parameters were recorded. The results revealed that higher available soil moisture (ASM) was noticed when irrigation was given at 0.6 IW/CPE ratio than at 0.40 IW/CPE ratio. Similarly higher ASM was observed under all furrow method and double row furrow method than under alternate furrow method. Application of coirpith at 12.5 t ha⁻¹ was found to increase the ASM whereas, foliar spray of either kaolin or KCl had no influence on the ASM. With regard to moisture depletion pattern, the ASM in the furrow depletes more rapidly during the initial few days after irrigation, irrespective of irrigation regimes. Crop growth and productivity depends, mostly on moisture availability, study on moisture depletion pattern is a useful phenomena in irrigated agriculture. (*Key words : Irrigation regimes - methods of irrigation - Available soil moisture - depletion pattern*).

The water holding capacity of a soil profile can be determined easily by knowing the water held at field capacity and permanent wilting point. However, what fraction of this stored water is used by the crop without affecting the growth process is difficult to ascertain. Therefore, a detailed analysis of soil moisture was done. The present investigation is an attempt in devising suitable irrigation method with different management practices. Coirpith application increased the soil moisture content (Subramanian, 1980). However, very little information is available for assessing the consumptive use of water, water use efficiency and moisture extraction pattern of soybean in different situations of water availability in semi arid regions. Therefore,

the present investigation was made to evaluate the effect of irrigation on consumptive use, water use efficiency and soil moisture depletion pattern of soybean.

Materials and Methods

Field experiments were conducted at Agricultural College and Research Institute, Coimbatore during summer and monsoon seasons of 1996 in soybean variety Col. The soils of experimental field were sandy clay loam with low in available N, medium in available P and high in available K; the pH of the soil was 8.1 and 7.9 with 0.42 and 0.50 per cent organic carbon ; the field