HortFlora Research Spectrum
Vol. 5, Issue 2; 157-160 (June 2016)
www.hortflorajournal.com
ISSN: 2250-2823

EVALUATION OF NUMBER OF IRRIGATIONS ON HOPPER MANAGEMENT

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ABSTRACT : Effect of different number of irrigations on hoppers showed that maximum hopper populations were recorded in nine irrigations where one irrigation each in October, December and February and two irrigations each from April to June were given, whereas hopper population were at par in five irrigations where two irrigations each in April and May and one irrigation in June were given, in two irrigations where one irrigation each in April and May were given and in control where no irrigation was done. The fruit set was significantly different in all treatments as compared to control whereas maximum fruit set (190.42 and 126.42 fruits/panicles) was recorded in five irrigations. Fruits harvested were maximum (108.57 fruits/100 panicles) in five irrigations that were significantly different from control. Weight of fruits per 100 panicles was maximum (18.80 kg) in five irrigations, which were at par with the two irrigations, and nine irrigations, however all these were significantly different from the control where minimum (16.38 kg/100 panicles) fruit weight was recorded.

Keywords : *Mango hopper, irrigation, management.*

The mango (*Mangifera indica* Linn.), king of fruits, is the single most important tropical/subtropical fruit in the world (Rahman *et al.,* 6). Tandon and Vergheese (14) reported more than 400 pests which attack mango. Over the period of time insect pests have been the key factors in healthy mango production, in terms of quality as well as quantity (Dwivedi *et al.,* 2; Rahman and Kuldeep, 7; Rahman *et al.,* 8). Among these, the mango leaf hoppers, *Amritodus atkinsoni* (Leth), *Idioscopus clypealis* (Leth.) and *Idioscopus niveosparasus* (nitidulus) Leth. (Cicadellidae : Homoptera) are most severe all over India on the basis of extent of damage during the flowering and fruiting periods (Rahman *et al.,* 9; Rahman *et al.,* 10; Rahman *et al.,* 11 ; Rahman *et al.,* 5). Sap sucking insects like aphids, jassids and whitefly are sensitive to changing water levels in their host plants. It was reported that maximum fecundity of mustard aphids occurred when the water level was maintained continuously (Arora and Sidhu, 1). Lower soil water regimes created nutritional imbalance and due to this, economic threshold of this pest in the field was reached only at the highest soil water regime. Singh (13) reported that water can accentuate or hinder growth and development of insect pests, or the availability of water in requisite amount at the appropriate time is crucial to the very lives of the plants.

Article's History:
Received : 04-05-2016 ***Accepted : 15-06-2016***

MATERIALS AND METHODS

The objective of conducting this experiment was to see the effects of different number of irrigations on hopper population and subsequently on fruit setting and yield. The experiment was conducted on cv. Dashehari at the Horticultural Research Centre, Patharchatta, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (Udham Singh Nagar), Uttarakhand, consisting of four treatments with seven replications each. Each tree was considered as one replication. The treatments (irrigations) given were as nine irrigations (where one irrigation each in October, December and February and two irrigations in each month form April to June were given), five irrigations (where two irrigations in each month, April and May and one irrigation in June were given) and two irrigations (where One irrigations each in April and May was given) whereas in control no irrigation. Soil around the tree trunk was elevated to hold the irrigated water, which was manually supplied from a nearby canal. About 200 liters of water were irrigated to one tree. Fertilizer application, ploughing, spraying etc. were done as per schedule. Observations of hopper population were taken on 25 panicles of each tree four times, 1st on 9.3.2001, 2nd on 9.4.2001, 3rd on 25.4.2001 and 4th on 3.6.2001. Fruit set at pea size; marble size and full size and fruit weight of 100 panicles of one tree were also recorded.

RESULTS AND DISCUSSION

Effect on hopper population

Hopper population as recorded on 9.3.2001 (1st observation) was maximum (11.49 hoppers per panicle) in 1st treatment *i.e.* in nine irrigations (where one irrigation each in October, December and February and two irrigations in each month form April to June were given), which was significantly different from the control (Table1). The hopper populations were 8.81 and 8.95 per panicle in 2nd and 3rd treatments, which were at par with each other and control (8.52 hoppers per panicle) where no irrigation was given. Hopper population as recorded on 9.4.2001(2nd observation) was again maximum (11.52 hoppers/panicle) in 1st treatment that was significantly different from other treatments. The hopper population in 2nd treatment (8.83 hoppers per panicle) where five irrigations, two irrigations each in April and May and one irrigation in June were given were at par with the 3rd treatment (7.98 hoppers per panicle) where only two irrigations, one irrigation each in April and May were given, both of which were however, at par as compared to control (7.55 hoppers/panicle). Hopper population as recorded on 25.4.2001 (3rd observation) was maximum (5.43 per panicle) in 1st treatment (nine irrigations), which was significantly different from other treatments. Minimum population (2.89 hopper per panicle) was recorded in control followed by 3.92 and 3.01 hoppers per panicle in 2nd (five irrigations) and 3rd treatments (two irrigations), which were at par. Maximum hopper population (6.38 hoppers per panicle) was recorded on 9.5.2001(4thobservation) in 1st treatment. The hopper populations were at par in rest of the treatments as in 2nd treatment (4.06 hopper/panicle), 3rd treatment (3.97 hoppers per panicle) and control (4.06 hoppers/ panicle). Hopper population on 3.6.2001 (5th observation) was again maximum (5.85 hoppers per panicle) in 1st treatment, which was significantly different from control. Minimum hopper population (3.87 hoppers per panicle) was recorded in control followed by 4.06 and 4.14 hoppers per panicle in 3rd (two irrigations) and 2nd (five irrigations) treatments, which were at par.

Effect on fruit set

Fruit set as observed on 7.4.2001 presented in Table 2 was highest (190.42 fruits per 100 panicles) in 2nd treatment (five irrigations) which was significantly different from other treatments. Fruit sets in 1st treatment (nine irrigations with 154.57 fruits per 100 panicles) and 3rd treatment (two irrigations with 151.42 fruits per 100 panicles) was at par whereas a lowest fruit set (117.42 fruits per 100 panicles) was observed in control, which was significantly different from other treatments. Fruit set as recorded on 25.4.2001 was maximum (126.42 fruits per 100 panicle) in 2nd treatment (five irrigations) followed by 125.00 and 122.28 fruits per 100 panicles in 1st (nine irrigations) and 3rd (two irrigations) treatments which were at par Minimum fruits set (107.21 fruits per 100 panicles) was recorded in control which was significantly different from other treatments.

Effect on fruit harvest

Fruits harvested per 100 panicles as observed on 26.6.2001 was maximum (108.57) in 2nd treatment, which was significantly different from control. Fruits harvested per 100 panicles were 103.28 and 106.42 in 1st and 3rd treatments which were at par with each other as well as control where lowest fruits (101.14 per 100 panicles) were harvested. Weight of fruits per 100 panicles was maximum (18.88 kg) in 2nd treatment

Table 1: Effect of irrigation on hopper population.

	Treatments	Hopper population /panicle				
		1st Obs.	2nd Obs.	3rd Obs.	4th Obs.	5th Obs.
I	Nine irrig- One irrig. each in Oct., Dec., & Feb. and two irrig. each from April to June	11.49[a]	11.52[a]	5.43[a]	6.38[a]	5.85[a]
II	Five irrig-Two irrig. each in April & May and one irrigation in June	8.81[b]	8.83[b]	3.92[b]	4.06[b]	4.14[b]
III	Two irrig-One irrigation each in April & May	8.95[b]	7.98[b]	3.01[b]	3.97[b]	4.06[b]
IV	Control (no irrigation)	8.52[b]	7.55[b]	2.89[b]	4.06[b]	3.87[b]
	CD (P=0.05)	0.77	2.00	1.15	1.25	0.87
	CV	7.34	19.89	26.94	24.09	17.31

(five irrigations) followed by 18.72 and 18.14 kg in 3rd (two irrigations) and 1st (nine irrigations) treatments which were at par, but significantly different from the control. Where minimum fruit weight per 100 panicles (16.38 kg) was observed (Table 2).

It is clear from the above findings that the 1st treatment where maximum (nine irrigations) were given was least effective as maximum hopper population was maintained here whereas in 2nd and 3rd treatments, hopper population was nearly equal to the control. As far as the fruit set was concerned significant difference were observed in all treatments when compared to control. Whereas maximum fruit set was recorded in 2nd treatment Fruit harvested was maximum and significantly different from control in 2nd treatment whereas it was more or less same in other treatments when compared to control. Weight of fruits per 100 panicles was maximum in 2nd treatment which were at par with 1st and 3rd treatments, but significantly different from the control. Therefore, the 2nd treatment with medium irrigation *i.e.* total five irrigations, two irrigations each in April and May and one irrigation in June proved most suitable when all the parameters like fruit set, fruit harvest and fruit weight were taken into account.

Singh and Singh (12) found that the irrigation of bearing orchards at regular intervals (10-15 days) is prime necessity during fruit set and for full fruit development. It is helpful in attaining full fruit size and reducing fruit drop, improves the quality of fruits and fruits obtained are of better size and quality from irrigated plants than those from tree under deficit soil moisture. So regular and timely irrigation of bearing plants becomes necessary. They also reported that in North India, 3-5 irrigations are required starting from February (at panicle emergence stage) to May (at full fruit size) at 15 days interval. Pongsomboon (4) reported that slight reduction in plant water status during the first 4-6 weeks following fruit set can have adverse effects on fruit growth and retention. Lower soil water regimes created nutritional imbalance which increased burden on the excretory mechanism of the aphid that were mainly responsible for reduction in the fecundity. Due to this reason, economic threshold of the pest in the field was reached only at the highest soil water regime (Narang *et al.,* 3).

Table 2 : Effect of irrigation on fruit set, fruits harvested and fruit weight.

	Treatments	Fruit set /100 panicles		Fruits harvested /100 panicles	Fruit weight/100 panicles
		At pea stage	At marble stage		
I.	Nine irrig- One irrig. each in Oct., Dec., & Feb. and two irrig. each from April to June	154.57^{a}	125.00^{a}	103.28^{ab}	18.14^{a}
II.	Five irrig-Two irrig. each in April & May and one irrigation in June	190.42^{b}	126.42^{a}	108.57^{b}	18.88^{a}
III.	Two irrig-One irrigation each in April & May	151.42^{a}	122.28^{a}	106.42^{ab}	18.72^{a}
IV.	Control (no irrigation)	117.42^{c}	107.71^{b}	101.14^{a}	16.38^{b}
	CD (P=0.05)	30.37	7.75	5.49	1.05
	CV	17.62	5.73	4.66	5.19

REFERENCES

1. Arora, R. and Sidhu, A. S. (1982). Effect of plant water deficit on the fecundity of the mustard aphid, *Lipaphis erysimi* (Kalt.). *Indian J. Ecol.,* **9** : 346-347.
2. Dwivedi S. C., Kuldeep, Singh S. M., Katiyar R. R. (2003). Seasonal incidence of insect-pests associated with mango crop. *Ann. Plant Protect. Sci.,* **11** (1):159-160
3. Narang, D. D., Josan, V. S. and Dilawari, V. K. (1993). Control of mustard aphid, *Lipaphis erysimi* (Kalt.) on *B. juncea* and *B. campestris* L. grown in field under different soil water regimes. *J. Insect. Sci.,* **6**: 195-196.
4. Pongsomboon, W. (1991). Effects of temperature and water stress on tree growth, flowering fruit growth and retention of mango (Mangifera indica L.). *Ph.D. Thesis,* Kasetsart Univeristiy, Bangkok, Thailand.
5. Rahman S. M. A., Srivastava K., Kumar R. and Singh G. (2016a). Loss assessment by releasing hoppers on young shoots and flowering and fruited panicles of mango. *HortFlora Res. Spectrum,* **5** (1) : 78-80.

6. Rahman S. M. A., Srivastava K., Kumar V. and Singh G. (2016b). Field efficacy of some insecticides and biopesticides for the management of shoot gallpsylla, *Apsylla cistellata* Buck. *HortFlora Res. Spectrum,* **5** (1) : 72-74.
7. Rahman S. M. A. and Kuldeep (2007).Mango hopper: bioecology and management- a review, *Agric. Rev.,* **28** (1): 49-55
8. Rahman S. M. A., Kuldeep and Singh V. P. (2007a). Mango shoot gall psylla: bioecology and management-areview. *Prog. Res.,* **2** : 7-10.
9. Rahman S.M.A.; Singh, G.; Kuldeep and Singh V. P. 2007b. Effect of plant density on the population of mango hopper. *Prog. Res.,* **2** : 185.
10. Rahman S. M. A., Srivastava, K. and Singh, G. (2015a). Population dynamics of mango hopper on panicle of Dashehari and its interaction with abiotic factors. *HortFlora Res. Spectrum,* **4** (4) : 324-328.
11. Rahman S. M. A.,Srivastava, K. and Singh, G.(2015b). Population dynamics of the mango hopper on trunk of Dashehari and its interaction with abiotic factors. *HortFlora Res. Spectrum,* **4** (4) : 337-341.
12. Singh, R. and Singh, C. P. (1997). Planting and care, propagation, rootstock and irrigation in mango crops. In : Srivastava R.P. (ed.). *Mango Cultivation.* International book Distributing Co. Lucknow. pp. 101-126.
13. Singh, S. P. (1999). Pest management-The ecofiriendly approach. *The Hindu Survey of Indian Agriculture,* Chennai. pp. 175-184.
14. Tandon, P. L. and Vergheese, A. (1985). *World list of insect mite and other pests of mango.* IIHR, Bangalore. *Tech. Doc.* No. 5.

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Citation : Rahman S.M.A., Srivastava K. and Singh G. (2016). Evaluation of number of irrigations on hopper management. *HortFlora Res. Spectrum,* **5**(2) : 157-160.