



Effect of Sowing Dates and Abiotic Factors on Infestation of Yellow Mite, *Polyphagotarsonemus latus* (Banks) In Jute

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Abstract: Field trials were conducted during two years (2010-11 and 2011-12) with *olitorius* jute variety, JRO-8432 to observe the effect of dates of sowing on infestation of yellow mite, *Polyphagotarsonemus latus*. The crop was sown in different sowing intervals of 15 days starting from 1st March to 15th June. The earlier date of sowing (second fortnight of March) showed higher infestation of *P. latus*, whereas the later date of sowing (second fortnight of June) invariably had the lowest infestation. The yield was highest in 1st April sown crop in both the cropping seasons. Considering the yield as and mite infestation, the first week of April sowing appeared to be the most suitable. Differences in the infestation of mite as also yield may be attributed to variations in weather parameters.

Key Words: Dates of sowing, Fibre yield, Jute, *Polyphagotarsonemus latus*, Abiotic factors

Jute is an important fibre crop and is grown mainly in eastern part of Indian sub-continent including in the States of West Bengal, Assam, Bihar, Eastern Uttar Pradesh and Odisha. Currently, jute is cultivated in an area of approximately 8.5 lakh ha in India with an average productivity of 25.3 q/ha (Anonymous, 2013). The intensive cultivation of high yielding fertilizer responsive cultivars of jute brought forth the problem of insect pests and mites. Among the pest complex of jute, yellow mite, *Polyphagotarsonemus latus* (Banks) (Acarina: Tarsonemidae) is considered as one of the major pest of the crop (Rahman and Khan, 2006). The fibre yield loss due to this pest has been estimated between 10 and 42% depending upon the level of infestation in jute (Pandit *et al.*, 2002).

Changes in agronomic management including change in sowing time, use of short duration cultivar and optimum use of water and nutrients are determined to be important for sustaining crop productivity (Mondal *et al.*, 2013). Effect of date of sowing and varieties on the relative abundance of yellow mite, *P. latus* was worked out by many workers in different crops. Very few worker such as Hath and Ghosh (2001) and Hath (2004) conducted experiments in jute crops. Information on time of peak activity of pest, relative susceptibility, influence of variety and abiotic factors to the pest are important prerequisites in formulating mite management programme. However, adequate information is not available in the terai region of West Bengal. It thus, becomes important to evaluate the effect of sowing date on yellow mite infestation in jute. Keeping the problems associated with agro-ecological, socio-economic and plant

protection aspects of jute cultivation in view, an attempt has been made to study the effect of time of sowing of jute on relative abundance of pest and fibre yield with an ultimate objective to find out the optimum time of sowing to escape the maximum pest infestation which can be utilized to formulate future IPM programme.

MATERIAL AND METHODS

The experiment was conducted in two consecutive years viz., 2010-11 and 2011-12 *kharif* season in randomized block design (RBD) at Central Research Institute for Jute and Allied Fibres (CRIJAF) Research farm with the variety, JRO-8432. The soil was sandy loam and P^H, 6.5-7.5. Standard agronomic practices were followed except advancing and delaying of sowing dates as required for different treatments and no plant protection measures. The treatment comprised of sowing on 7/8 different dates at 15 days interval beginning with 15th March and continued late upto 15th June during 2010-11 and 2011-12 cropping season. The treatments were termed as very early (Second fortnight of March), early (First week of April), normal-I (Second fortnight of April), normal-II (Last week of April), late (Second fortnight of May), very late (Last week of May) and extra very late (Second fortnight of June) sowing. The per cent infestation of yellow mite was observed at fortnightly intervals starting from 25 days after sowing (DAS). The observations on the infestation of jute yellow mite was as percentage damage of leaves based on symptoms of damage produced on top six leaves from their first appearance. A total of six observations were taken in both the years. The data obtained from two years were pooled together and analysed statistically.

RESULTS AND DISCUSSION

The date of sowing influenced the infestation of yellow mite as indicated in terms of percent damage of plants. There were highly significant differences in infestation among the different dates of sowing during the 2010-11 cropping season, except first, second and third dates of sowing (Table 1). However, the mite infestation in all the dates of sowing was significantly higher in earlier sown crop (15th March to 15th April 2010) as compared to that of the later sown (31st April, 2010 and beyond) crop. The peak infestation of yellow mite was 23.66% during 2010-11 cropping season at 70 DAS during 1st April sown crop while in 15th June sown crop it showed a reduction and was maximum (6.36%) during peak infestation period of 70 DAS. This decline may be due to onset of monsoon. During 2011-12 cropping season, the early sown crop (1st March, 2011) suffered with least infestation of yellow mite however, the peak infestation of 12.87% and 11.50% was observed at 85 and 100 DAS respectively (Table 1). The crop grown after 1st April was infested and the peak infestation of 20.37% was at 70 DAS. The difference in level of yellow mite infestation over time of sowing was significant. Although variation was recorded in yellow mite infestation level among the different dates of sowing, yet the difference was statistically significant.

The pooled data from two years revealed that the effect of date of sowing and yellow mite infestation was significant. Early sown crop suffered higher fibre yield losses due to yellow mite. Significantly lower mite infestation was observed in the late sown crop (second fortnight of April). This finding is in conformity with Hath and Ghosh (2001) and Hath (2004) who found that the infestation of *P. latius* on jute decreased with delayed sowings; highest being on crop sown during 3rd week of April with 32.40% leaf damage. Population growth was faster during early period and peak infestation attained at 55 DAS on very early sown crop (Second fortnight of March) thereafter it followed the decreasing trend.

Delay in sowing time resulted in lower fibre yield (Table 3). During both the cropping season 2010-11 and 2011-12 the highest fibre yield of 29.13 and 30.25 q/ha respectively, was obtained during on 1st April sown crop. Pooled data of both the year showed that, the peak infestation of yellow mite was observed at 70 DAS on early sown crop (last week of March) and least infestation (8.13%) was on late sown crop (mid-June). However, the maximum fibre yield of 29.97, 29.25 q/ha) was observed on early sown and normal-I sown crops respectively. The study was concluded that irrespective of mite infestation at different crop growth stages, the date of sowing had significant positive impact on fibre yield. Hence, the optimum time for sowing jute crop for maximum fibre yield in West Bengal

Table 1. Mean per cent infestation of yellow mite, *Polypogonatornemus latius* on different dates of sowing of jute crop different cropping season

Treatments	Date of sowing	Per cent infestation of yellow mite during 2010-11 and 2011-12 at different DAS*						Fibre yield (q/ha)	Fibre yield (q/ha)
		25	55	85	100	100	100		
T ₁	-	-	-	-	-	-	-	-	-
T ₂	Very early sowing	0.00 (0.00)	10.50 (18.91)	6.10 (14.30)	0.75 (4.97)	0.00 (0.00)	12.87 (21.02)	28.45	26.61
T ₃	Early sowing	0.00 (0.00)	3.00 (9.97)	0.50 (4.05)	0.33 (3.29)	0.00 (0.00)	8.00 (16.43)	29.13	27.79
T ₄	Normal sowing I	0.00 (0.00)	7.00 (15.34)	2.28 (8.68)	0.12 (1.99)	0.00 (0.00)	0.00 (0.00)	28.55	30.25
T ₅	Normal sowing II	1.14 (6.13)	4.11 (11.70)	1.14 (6.13)	0.42 (3.72)	0.00 (0.00)	0.00 (0.00)	25.94	29.72
T ₆	Late sowing	1.65 (7.38)	2.69 (9.44)	0.12 (1.99)	1.29 (6.52)	0.00 (0.00)	0.00 (0.00)	27.80	27.86
T ₇	Very late sowing	0.90 (5.44)	0.53 (4.17)	1.86 (7.84)	0.63 (4.55)	0.00 (0.00)	0.00 (0.00)	25.34	23.11
T ₈	Extra very late sowing	0.72 (4.87)	0.30 (3.14)	1.33 (6.62)	0.45 (3.85)	0.00 (0.00)	0.00 (0.00)	12.61	16.66
CD (P=0.05)	-	8.63	17.64	11.95	5.83	4.87	7.62	4.95	14.88
									4.42

*DAS= Days after sowing, Figures in the parentheses are arc sin transformed values

Table 2. Mean per cent infestation of yellow mite, *Polyphagotarsonemus latus* on different dates of sowing of jute crop (Pooled data of 2010-11 and 2011-12 cropping season)

Treatment	Date of sowing	Per cent infestation of yellow mite at different DAS*				Fibre yield (q/ha)
		25	55	85	100	
T ₁	Very early sowing	0.00 (0.00)	15.75 (23.38)	12.19 (20.43)	1.19 (6.26)	28.20
T ₂	Early sowing	0.00 (0.00)	4.00 (11.54)	0.56 (4.30)	0.69 (4.76)	29.97
T ₃	Normal sowing I	0.00 (0.00)	11.13 (19.48)	3.00 (9.97)	0.19 (2.48)	29.25
T ₄	Normal sowing II	2.13 (8.38)	6.31 (14.55)	1.69 (7.46)	0.56 (4.30)	27.20
T ₅	Late sowing	4.06 (11.63)	4.31 (11.99)	0.19 (2.48)	2.50 (9.10)	25.65
T ₆	Very late sowing	1.56 (7.18)	0.75 (4.97)	3.38 (10.59)	1.31 (6.58)	21.56
T ₇	Extra very late sowing	1.00 (5.74)	0.38 (3.51)	2.13 (8.38)	0.63 (4.53)	13.94
CD(P=0.05)		8.29	14.59	11.78	4.79	6.22

*DAS= Days after sowing, Figures in the parentheses are arc sin transformed values

Table 3. Correlation between per cent infestation of yellow mite, *Polyphagotarsonemus latus* with abiotic factors at different days after sowing during 2010-11 and 2011-12

Weather Parameters	Cropping season during 2010-11 and 2011-12				Fibre yield (q/ha)
	25	55	85	100	
Temperature (°C Max.)	0.08	0.40	-0.05	-0.25	0.46
Temperature (°C Min.)	0.62	-0.44	-0.66	-0.21	-0.27
Relative Humidity (%)	-0.07	-0.40	0.04	0.16	-0.41
Rainfall (mm)	-0.25	-0.08	-0.50	-0.38	-0.36
Sunshine (Hrs.)	-0.41	0.34	0.48	-0.13	0.53

situation may be recommended as last week of March to mid-April.

Effect of abiotic factors on yellow mite, *P. latus*, infestation in jute

A simple correlation co-efficient was worked out between the percent infestation of yellow mite and the weather factors (Table 3). The maximum temperature had a positive effect on yellow mite infestation except at 25 and 100 DAS during 2010-11 and at 85 and 100 DAS at 2011-12 cropping season, but minimum temperature had negative influence at later stages of crop during both the cropping season. Similar observations were also reported by Ahuja (2000), Somchoudhury *et al.* (2008) and Kamruzzaman *et al.* (2014). The relative humidity had little effect on the influence of yellow mite infestation. The present study results were in close agreement with Montasser *et al.* (2011). The correlation studies also revealed that the rainfall mostly had negative effect in both the years. However, bright sunshine hours had a positive effect during 2011-12 cropping season as compared to negative effect in early and late stage of crop during 2010-11 cropping season.

It can be concluded that yellow mite infestation was higher on early sown crop than late sown crop, hence for

ensuring higher yield with less pest infestation, jute crop should be sown within the period of first fortnight of April. However, the extent of damage or incidence varied with prevailing abiotic conditions of season. The temperature-humidity combination is an important regulatory factor affecting mite development and that the warm and humid conditions prevailing during cropping period is more suitable for the increase of population densities of *P. latus*.

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REFERENCES

- Ahuja D B 2000. Influence of abiotic factors on the population of mite, *Polyphagotarsonemus latus* (Banks) infesting sesame (*Sesamum indicum* L.) in the arid region of Rajasthan (India). *Journal of Entomological Research* **24** (1): 87-89.
- Anonymous 2013. State of Indian Agriculture 2012-13. Government of India. Ministry of Agriculture. Department of Agriculture and Cooperation. Directorate of Economics and Statistics. New Delhi, p. 247.
- Hath T K 2004. Effect of sowing and jute varieties on the incidence of yellow mite (*Polyphagotarsonemus latus* Banks) and jute

- semilooper (*Anomis sabulifera* Guen.) under terai region of West Bengal. *Journal of Entomological Research* **28**(4): 311-315.
- Hath T K and Ghosh J 2001. Influence of date of sowing on the incidence of yellow mite, *Polyphagotarsonemus latus* Banks on different varieties of jute under terai agroecology of West Bengal. *Journal of Entomological Research* **25**(2): 87-92.
- Kamruzzaman A S M, Alam M Z and Miah M R U 2014. Impact of weather factors on seasonal abundance and population dynamics of yellow mite, *Polyphagotarsonemus latus* (Banks) on different varieties of Jute, *Corchorus olitorius* L. under net house condition. *Munis Entomology and Zoology* **9** (1): 457-467.
- Mondal S, Singh R P, Crossa J, Huerta-Espino J, Sharma I, Chatrath R, Singh G P, Sohu V S, Mavi G S, Sukuru V S P, Kalappanavarg I K, Mishra V K, Hussain M, Gautam N R, Uddin J, Barma N C D, Hakim A and Joshi A K 2013. Earliness in wheat: a key to adaptation under terminal and continual high temperature stress in South Asia. *Field Crops Research* **151**:19-26.
- Montasser A A, Marzouk A S, Hanafy A R I and Hassan G M 2011. Seasonal fluctuation of the broad mite *Polyphagotarsonemus latus* (Acari: Tarsonemidae) and its predatory mites on some pepper cultivars in Egypt. *International Journal of Environmental Science and Engineering* **2**: 9-20.
- Pandit N C, Rao P V and Chakraborty A K 2002. Studies on the biotic and abiotic factors on the incidence of yellow mite of jute. In: *Annual report: 2000-2001 and 2001-2002*. Central Research Institute for Jute and Allied Fibres, Barrack pore, pp 71.
- Rahman S and Khan M R 2006. Incidence of pests and avoidable yield losses in jute. *Annals of Plant Protection Sciences* **14** (2): 304-305
- Somchoudhury A K, Jana S K, Nair N, Samanta A and Sarkar P K 2008. Studies on the effect of different abiotic factors and bio-efficacy of different chemicals on yellow mite, *Polyphagotarsonemus latus* (Banks) infesting jute. *Journal of Entomological Research* **32**(2):105-107.

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