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SEASONAL INCIDENCE AND MANAGEMENT OF ASH WEEVIL (*MYLLOCERUS UNDECIMPUSTULATUS)* POPULATION ON LITCHI

Kuldeep Srivastava *et al.,*

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KULDEEP SRIVASTAVA*, R. K. PATEL, AMRENDRA KUMAR, R. R. RAI AND VISHAL NATH
ICAR-National Research Centre on Litchi, Muzaffarpur - 842 002, Bihar
e-mail: kuldeep.ipm@gmail.com

ABSTRACT

Field trials were conducted consecutively for two years 2013 and 2014 at research farm of ICAR-National Research Centre on Litchi, Bihar to develop the eco-friendly techniques for managing the ash weevil, *Myllocerus undecim pustulatus* (Coleoptera: Curculionidae) which is one of the major defoliators of litchi causing severe damage to the new flush resulting poor growth of the plant. Maximum (15.33) population of ash weevil was recorded in 40th standard week (SW). No population of ash weevil was noticed in 1st to 3rd standard week. Again new generation of ash weevil population was seen in 4th SW with 1.33 adult populations and maximum 7.67 populations were recorded in 13th standard week. Thiamethoxam (12.6%)+ Lambdacyhalothrin (9.4%) @ 0.098% was highly effective with 0.00 population against 10.67 in control followed by chlorfenapyr 10 EC (0.03%) and imidacloprid 17.8 SL (0.0089%) as registered 0.33 and 1.67 weevil population respectively after three days spraying. Weevil population can be effectively managed by two sprays of thiamethoxam (12.6%) + lambdacyhalothrin (9.4%) @ 0.098% or chlorfenapyr 10 EC @ 0.03% at 30 days interval during September and October.

***Corresponding author**

INTRODUCTION

Litchi (*Litchi chinensis Sonn*) is an important evergreen subtropical fruit crop belongs to family *Sapindaceae*. It has high nutritive value and refreshing taste and consumed as fresh fruit, pulp and various processed products like squash, RTS, wine etc (Singh *et al.,* 2012 ; Kumar *et al.,* 2014_a). Litchi appears to be native to Southern province of China and northern Vietnam from where it was introduced into India during the 18th century in the North East region (Tripura) and over the period of time to eastern states and percolated in the northern states (Rai *et al.*, 2000). India is the second largest producer of litchi in the world after China, with an area and production of 84,200 ha and 585,300 t, respectively during 2013–14 (NHB, 2014). It is commercially grown in Bihar, Uttarakhand, West Bengal and Jharkhand (Rai and Kumar, 2004). Due to its high economic returns and ever increasing demand in the domestic markets, the crop is also gaining momentum in Punjab, Himachal Pradesh, Assam, Tripura, and Orissa. Considering the importance of this fruit crop in the region, efforts are made to provide technological support through research and promoting production, post-harvest management and marketing (Kumar *et al.,* 2014_c).

The litchi growers are facing serious problem of many insects pests like fruit & shoot borer, litchi mite, leaf folder, litchi looper, weevils and as such the production is reduced drastically with marketability (Kumar, 1992; Kumar and Kumar, 2007; Kumar and Kumar, 2010; Kumar *et al.,* 2014_c; Kumar *et al.,* 2014_d). Leaf cutting weevils are polyphagous pests. Adult weevils congregate on the tender leaves and nibble irregular holes on the leaves and sometimes consume the entire leaf leaving the midrib only. Weevils which attacks on litchi plants are ash weevils, *Myllocerus discolor* Boheman, *M. delicatulus* Boheman, *M. undecimpustulatus* Faust, *M. dorsatus* (Fabricius) (Coleoptera: Curculionidae) and leaf-rolling weevils, *Apoderus blandus* (Kumar *et al.*, 2011). Adult of ash weevils has long snout with grey colour, though poor flier but very active feeder on the leaves of litchi. Adult weevils of *A. blandus are* bright brownish red in colour. The ventral side (abdomen) is looking pale brown, and parts of the mouth and claws are brownish red. It attacks leaves, shoot and flower. Adult weevils congregate on the tender leaves and nibble irregular holes on the leaves and sometimes consume the entire leaf leaving the midrib only. Grey weevil (*Myllocerus* Sp.) and red weevil (*A. blandus*) are polyphagous pest therefore, besides litchi it damages other important crops like mango, citrus, *jamun*, etc. The damage caused by weevils are more severe during the new flush emergence as it prefers newly emerged leaves therefore new establishing orchard is more vulnerable for pest attack (Kumar *et al.*, 2011).

Therefore, keeping in view the importance of weevils field trials were conducted to study the influence of climatic conditions on population build up and for evaluating the bio-efficacy of some novel molecules against ash weevil *Myllocerus undecimpustulatus* on litchi.

MATERIALS AND METHODS

Present studies were conducted at experimental farm of ICAR-National Research Centre on Litchi, Muzaffarpur, Bihar, situated between latitude and longitude of

26°5′87″N and 85°26′64″ E, respectively at altitude of 210 msl during 2013 and 2014. For recording ash weevil population, ten trees of litchi cv. *Shahi* were selected randomly and trees were kept unsprayed during the period of investigation. The weevil population was recorded at standard week wise interval from 32nd standard week of 2013 to 14th standard week of 2014. Ten shoots (30 cm) from each tree were selected randomly from all side to count the weevil population. Separate experiment was laid out in RBD design with three replications to evaluate the bio-efficacy of some novel molecules against ash weevil (*Myllocerus undecimpustulatus*) on litchi. Horticultural practices were performed as per recommended package of practices for litchi cv. *Shahi* under the trials (Kumar *et al.*, 2014_b). 12 treatments were undertaken including control and replicated thrice in RBD. Treatments were imposed as per details (Table 2) twice during September and October months. Data on ash weevil population prior to treatment application was counted before spraying of insecticides on the plant. Observations on weevil population were recorded at 3, 5 and 15 days after spraying from each treatment.

RESULTS AND DISCUSSION

Seasonal abundance

Seasonal incidence of ash weevil, *Myllocerus undecim pustulatus* in litchi was recorded from 32nd standard week to 14th standard week during 2013 and after 2014 respectively at weekly interval (Table 1). Maximum population (15.33) of ash weevil was recorded in 40th SW while, no population was recorded in 1st to 3rd SW. Initial population of ash weevil was observed as 7.33 in 32nd SW and it slowly increased up to 15.33 in 40th SW and in erratic tune declined 0.00 in 1st standard week and remains 0.00 up to 3rd SW. Further in next generation, ash weevil population was noticed in 4th SW with 1.33 and in fluctuating tune maximum population (7.67) was noticed in 13th SW and gone down up to 2.33 in the 14th SW during next year. Overall examination of the population data revealed that infestation of ash weevil started after new flush growth during early August and continued up to last week of December with severe infestation during September- October. Further, due to unavailability of food (new flush) or may

Table 1: Seasonal incidence of Ash weevil (*Myllocerus undecimpustulatus*) on litchi and weather parameters during 2013-14

Fortnight	Std. Week (SW)	Mean no. of Ash weevil (*Myllocerus undecimpustulatus*)/ 30cm shoot	Temperature (°C)		Relative Humidity (%)		Rainfall(mm)
			Min	Max	07:00 hr	14:00 hr	
August I	32	7.33	25.70	31.90	91.00	71.00	66.60
	33	7.33	25.90	33.00	91.00	72.00	15.00
August II	34	9.33	26.40	33.40	85.00	65.00	3.10
	35	10.00	25.90	32.50	91.00	72.00	15.60
September I	36	11.00	25.50	33.10	88.00	65.00	105.70
	37	12.33	26.30	34.80	89.00	59.00	0.00
September II	38	13.00	25.90	34.30	87.00	60.00	1.80
	39	13.67	25.20	34.30	87.00	65.00	3.60
October I	40	15.33	24.20	30.17	90.00	72.00	16.30
	41	12.33	23.60	31.30	89.00	65.00	18.90
	42	9.00	22.10	28.40	92.00	72.00	5.60
October II	43	8.67	21.20	31.10	93.00	63.00	0.00
	44	5.00	19.80	28.20	94.00	68.00	0.00
November I	45	3.67	14.80	28.90	90.00	44.00	0.00
	46	1.67	13.00	28.20	88.00	36.00	0.00
November II	47	6.00	11.10	27.40	89.00	37.00	0.00
	48	1.33	13.00	27.20	91.00	46.00	0.00
December I	49	1.00	11.10	27.20	90.00	41.00	0.00
	50	0.67	10.30	24.40	91.00	49.00	0.00
December I	51	0.67	11.20	22.90	89.00	59.00	0.00
	52	0.67	9.70	18.80	93.00	77.00	0.00
January I	1	0.00	9.00	21.30	87.10	57.80	0.00
	2	0.00	9.00	18.50	91.10	67.00	5.30
	3	0.00	9.50	18.80	91.00	74.20	4.20
January II	4	1.33	10.50	19.70	92.00	66.10	0.00
	5	0.00	8.90	17.60	90.90	74.70	0.00
February I	6	0.67	10.40	24.20	88.40	50.60	0.00
	7	1.67	10.80	20.40	89.40	61.60	29.60
February II	8	2.33	10.80	24.00	90.00	54.70	1.40
	9	3.00	14.30	24.70	90.00	64.30	1.70
March I	10	2.67	11.70	26.70	87.60	41.60	0.00
	11	3.67	15.00	30.30	88.10	41.10	0.00
March II	12	4.33	16.60	31.70	80.70	39.30	0.00
	13	7.67	18.30	34.60	70.30	28.10	0.00
	14	2.33	19.10	35.00	78.40	35.90	0.00

Table 2: Treatment details against ash weevil (*Myllocerus undecimpustulatus*) on litchi

Treatments	Treatment details
T_1	Chlorfenapyr 10 EC (0.03%)
T_2	Thiamethoxam 12.6% + lambdacyhalothrin 9.4% (0.098%)
T_3	Buprofezin 25 SC (0.03%)
T_4	Novaluron 10EC (0.015%)
T_5	Imidacloprid 17.8 SL (0.0089%)
T_6	Fipronil 5SC (0.01%)
T_7	Chlorantranilprole 18.5% (0.007)
T_8	Flubendiamide 39.35 SC (0.008%)
T_9	Diafenthiuron 50 WP (0.06%)
T_{10}	Emamectin benzoate 5% SG (0.002%)
T_{11}	Lufenuron 5.4 EC (0.006%)
T_{12}	Control

Table 3: Bio-efficacy of some novel molecules against ash weevil (*Myllocerus undecimpustulatus*) on litchi

Treatments	Mean no. of ash weevil /30 cm shoot							
	First Spray				Second Spray			
	Before 1st day	After 3rd day	After 5th day	After 15th day	Before 1st day	After 3rd day	After 5th day	After 15th day
T_1	12.00	0.33	0.67	0.67	9.00	0.33	0.67	0.67
T_2	10.33	0.00	0.00	0.33	10.00	0.00	0.33	0.67
T_3	10.33	2.67	3.33	4.67	10.00	2.33	2.67	4.33
T_4	10.67	8.33	8.33	7.67	9.67	8.00	7.67	7.33
T_5	10.00	1.67	1.33	3.00	9.00	2.33	2.00	3.33
T_6	10.00	7.00	6.00	6.00	9.67	7.33	6.33	6.67
T_7	9.67	8.33	9.00	10.00	9.67	9.00	9.33	10.33
T_8	9.67	7.67	8.33	8.33	9.67	8.33	9.00	9.33
T_9	9.33	3.00	3.33	3.67	9.33	5.33	5.67	5.67
T_{10}	10.33	5.00	5.67	7.00	10.33	5.00	5.67	7.00
T_{11}	11.00	10.00	11.33	13.00	11.00	11.00	11.00	13.33
T_{12}	9.67	10.67	11.67	13.67	10.67	11.67	13.00	14.00
CD (5%)	NS	1.60	1.95	1.41	NS	1.77	2.03	1.74
SE(m)	0.80	0.54	0.66	0.48	0.58	0.60	0.69	0.59

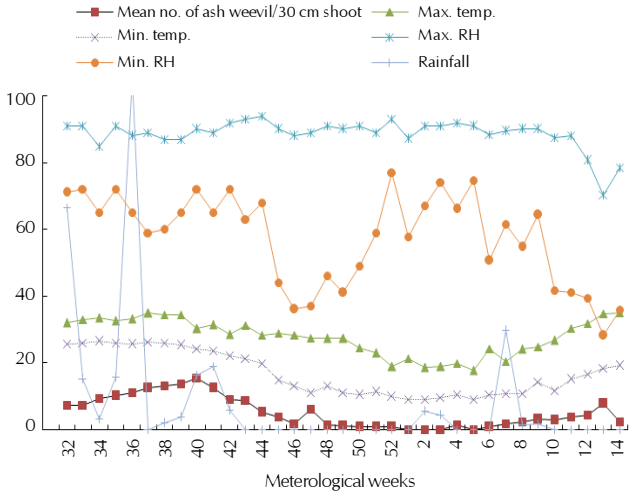

Figure 1: Seasonal abundance of Ash weevil (*Myllocerus undecimpustulatus*) on litchi during 2013 and 2014

hibernate during winter months and again reoccurred in 4th SW showed that environmental conditions and abundance of food play crucial role in ash weevil population build-up. Mazumder *et al.* (2014) observed incidence of *Myllocerus discolor* during March to May feeding on the leaves of litchi in Assam. Similar results had been been earlier reported by Atwal (1976) who noticed incidence of *Myllocerus undecimpustulatus* on cotton from April to November and weevil possess winter in the adult stage, hidden in the debris.

Evaluation of different new molecules

The data presented in Table 3 indicated that initial population of weevil before spraying ranged from 9.33 to 12.00. After 3 day of spraying thiamethoxam 12.6% + lambdacyhalothrin 9.4% (0.098%) was highly effective with 0.00 populations of ash weevil which was at par with chlorfenapyr (0.33) and imidacloprid (1.67) against highest in control (10.67). However, all treatments were statistically significant except chlorantranilprole and lufenuron. After 5 day of spraying slow increase in population build up trend was observed in all treatments except thiamethoxam 12.6% + lambdacyhalothrin 9.4%. The insecticides like thiamethoxam 12.6% + lambdacyhalothrin 9.4%, chlorfenapyr and imidacloprid though had better knockdown effect till 15 days after spraying. Similar trend was recorded during second spraying as population of weevil drastically reduced at 3 days after spraying. Singh *et al.* (2009) reported that sweet potato weevil, *Cylas formicarius* management using 3 spraying of Imidacloprid 0.004% at fortnightly interval starting from 30 DAP. It may be concluded that environmental conditions and availability of food plays crucial role in ash weevil population build up and molecules like thiamethoxam 12.6% + lambdacyhalothrin 9.4%, chlorfenapyr 10 EC, buprofezin 25 SC and imidacloprid

17.8 SL hold a great potential for management of ash weevil which is a devastating defoliator in litchi affecting the photosynthetic activity of plant and subsequently fruiting.

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