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Integrated management of litchi mite (*Aceria litchii* Keifer)

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ABSTRACT: Field trials were conducted consecutively for three years at AICRP Fruit Research Centre, Sabour, Bhagalpur, Bihar to develop eco-friendly, sustainable pest management approaches against litchi mite. Experimental results revealed that the treatment $_2$ comprising pruning of infested litchi twigs in June followed by spraying of dicofol @ 0.05% found to be the most effective in reduction (58.28 %) of litchi mite infestation as compared to other treatments. In addition to, it also obtained highest (44.24 kg/tree) yield and cost benefit ratio (1:5.78) than others. The next best treatment was T_5 comprised pruning of infested litchi twigs in June followed by spraying of dimethoate @0.05% (42.63% reduction of litchi mite infestation and yield: 39.63 kg/tree). The information generated under the study can be incorporated in the pest management modules of litchi without disturbing the ecology of natural enemy and cropping system.

Key words: Litchi mite, management, pruning, dicofol

INTRODUCTION

Litchi (*Litchi chinensis* Sonn) is an important subtropical evergreen fruit crop belonging to family Sapindaceae. Due to high nutritive value and refreshing taste, litchi is consumed as fresh fruit, pulp and various processed products like squash, RTS, wine etc. (Singh *et al.,* 2012). In India litchi is being grown in an area of 92000 ha with a total production of 686 000 ton annually, reported by National Horticultural Board (2018). It is commercially cultivated in Bihar, Uttarakhand, West Bengal and Jharkhand (Rai and Kumar, 2004). In view of the gaining importance of this fruit crop in the region, efforts are made to provide technological support through research and promoting production, insect pest's management and marketing.

Litchi cultivation is affected by the insect pests, which affect the yield and the quality of the litchi. Fifty-eight pest species have been recorded on litchi trees worldwide, including lepidopterans (fruit borer, shoot borer, bark borer, etc), scales, stink bugs, fruit flies, and eriophiid mites, and these pest mainly damage the flowers and fruits (Waite, 2012). The litchi eriophiid mite, *Aceria litchii* (Keifer) (Acari: Eriophyidae) is a major threat of litchi varieties (Menzel, 2002; Paull and Duarte, 2011). The eriophiid mites puncture and lacerate the tissues of leaf with their stout rostrum and suck the cell sap. Chocolate brown velvety growth on the ventral surface of infested leaves is the characteristic symptom of attack by this pest. In the beginning, small deep excavated pits may be found lined throughout with brownish velvety pubescence and when these coalesce, the leaves curl up epically or double over vertically forming hollow cylinders, ultimately the attacked leaves wither and fall down. Besides the leaves, sometimes flower buds and immature fruits are also attacked (Alam and Wadud, 1964). The mite also causes the leaf curl disease of litchi (Ghai, 1976). Considering the above background information in view, the present investigation was designed to evaluate the different eco-friendly pest management approaches against litchi mite.

MATERIALS AND METHODS

The present studies were conducted during 2013-14, 2014-15 and 2015-16 at AICRP Fruit Research Centre, Sabour, Bhagalpur, Bihar (latitude 87 º 2′ 54"E, longitude 25º 14′ 24"N, altitude 30 m a.s.l.). Experiments were laid out in RBD design with six treatments *viz*., Pruning of affected twigs in June (T_1), T_1 + Dicofol 0.05% spray (T_2), T_1 + *Nimbicidine* 0.4% (T_3), T_1 + Pruning of affected twigs in January (T_4), T_1 + Dimethoate 0.05% spray (T_5), and control (T_6, no pruning & spray) in three replications to evaluate the efficacy of various friendly pest management approaches against litchi mite. Horticultural practices were performed as per recommended package of practices for litchi cv. Shahi under the trials. Pruning was done as per treatment details and spraying was done twice at seven day interval in the month of September -October in all the years coinciding with the new flushing. Observations were recorded on the basis of per cent reduction of litchi mite infestation during last week of February. Data were subjected to ANOVA to test the significance of differences between treatments.

Table 1. Effect of different pest management approaches in reduction of litchi mite infestation

	Treatment details	Per cent reduction in litchi mite infestation			
		2013-14	2014-15	2015-16	Pooled
T_1	Pruning of affected twigs in June	23.28 (28.83)	18.55 (25.50)	27.18 (31.34)	23.00 (28.56)
T_2	T_1 + Dicofol 0.05% spray	52.53 (46.47)	57.93 (49.57)	64.38 (53.40)	58.28 (49.81)
T_3	T_1 + Nimbicidine 0.4%	12.33 (20.48)	10.25 (18.66)	31.75 (34.29)	18.11 (24.48)
T_4	T_1 + Pruning of affected twigs in January	9.03 (17.47)	9.33 (17.33)	48.48 (44.13)	22.28 (26.44)
T_5	T_1 + Dimethoate 0.05% spray	37.53 (37.73)	34.18 (35.74)	56.18 (48.55)	42.63 (40.66)
T_6	Control (no pruning, no spray)	2.75 (9.44)	2.50 (8.85)	0.00 (0.00)	1.75 (6.10)
	S. Em ±	2.07	1.27	1.70	4.98
	CD (p=0.05)	6.26	3.84	5.16	5.96

Figure in parenthesis are arcsine transformed value

Table 2. Effect of different pest management approaches on yield due to reduction of litchi mite infestation

	Treatment details	Yield (kg/tree)					
		2013-14	2014-15	2015-16	Pooled	Per cent increase in yield over control	B:C ratio
T_1	Pruning of affected twigs in June	24.03	20.23	18.45	20.90	68.04	2.84
T_2	T_1 + Dicofol 0.05% spray	48.00	52.00	32.72	44.24	84.90	5.78
T_3	T_1 + Nimbicidine 0.4%	19.25	21.95	23.80	21.67	69.17	2.58
T_4	T_1 + Pruning of affected twigs in January	23.03	27.73	22.20	24.32	72.53	1.76
T_5	T_1 + Dimethoate 0.05% spray	39.48	39.20	40.23	39.63	83.14	5.49
T_6	Control (no pruning, no spray)	6.50	8.00	5.55	6.68	-	2.84
	S. Em ±	2.01	1.53	0.82	2.55	-	
	CD (p=0.05)	6.08	4.61	2.47	7.75	-	

RESULTS AND DISCUSSION

The data presented in table 1 indicate that all the treatments were significantly superior over control. Among the different treatment evaluated under field condition, T_2 comprised pruning of infested litchi twigs in June followed by spraying of dicofol (0.05%) recorded highest (58.28 %) reduction in litchi mite infestation as compared to other treatments (Table 1). The next best treatment was T_5 comprised pruning of infested litchi twigs in June followed by spraying of dimethoate (0.05%) with 42.63% reduction of litchi mite infestation. Maximum infestation was recorded with T_3 comprised pruning of infested litchi twigs in June followed by spraying of Nimbicidine 0.4% with 18.11% reduction of litchi mite infestation. Regarding yield is concerned, maximum yield (Table 2) was obtained with T_2 (44.24 kg/tree, 84.90%) followed by T_5 (39.63 kg/tree, 83.14%). However, benefit cost ratio is concerned, highest cost benefit ratio (Table 3) was recorded with T_2 (5.78) followed by T_5 (5.49). Our experimental results clearly indicate that pruning of infested litchi twigs in June followed by spraying of dicofol (0.05%) was most effective against litchi mite infestation.

The present findings are in confirmatory with the finding of Kumar (1992) who has also reported that litchi mite infestation was reduced by using of mechanical approaches followed by spraying of dicofol 0.05%. Further, Kumar *et al.* (2014) recorded 98.0% reduction in mite population with pruning of affected twigs in June + Pruning in October followed by spraying of profenofos 0.05%. Aswal *et al.* (2013) also reported Dicofol was effective treatment in reducing red spider mite population in apple. The present study is also in accordance with earlier study of Rajeev *et al*. (2018) who reported that litchi mite can be managed successfully by the pruning and destruction of infested twigs twice in the month of June and November which breaks the source of infestation and its multiplication and further the application of neem and castor cakes, protect the tree. When these combinations are finally covered with the spraying of effective acaricides (fenazaquin, dicofol and fenpropathrin) at the time of flush help in effective management of litchi mite.

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REFERENCES

Alam, M. Z. and Wadud, M. A. 1964. On the biology of mites, *Aceria litchii* Keifer (Eryophyidiae: Acarina) in East Pakistan. In Review of Research Division of Entomology (1947-1964):157-166, Department of agriculture, East Pakistan, Dhaka.

Aswal, J. S., Mohapatra, S. D. and Bisht, B. S. 2013. Bio-efficacy of spiromisifen-240 SC (Oberon-240SC) against European red spider mite (*Panonychus ulmi*) and red spider mite (*Tetrenychus urticae*) in apple. *Annals of Plant Protection Sciences,* **2:** 420-421.

Ghai, S. 1976. Phytophagous mites and their control in India. Proc. Nat Acad. Sci, India, 46- B (1 2): 49 – 59.

Kumar, A., Srivastava, K., Patel, R. K. and Nath, V. 2014. Management of litchi fruit borer and litchi mite using bio-rational approaches under subtropics of bihar. *The Ecoscan* (*Special issue*), **6**: 285-289.

Kumar, K. K., 1992. Management of litchi mite *Aceria litchi* Keifer. *Indian Journal of Plant Protection,* **20**: 229- 231.

Kumar, V., Kumar, A. and Nath, V. 2011. Emerging pests and diseases of litchi (*Litchi chinensis* Sonn.). *Pest Management in Horticulture Ecosystems,* **17**: 11-13.

Menzel, C. 2002. Major pests and diseases, pp. 74-83 In C. Menzel [ed.], The lychee crop in Asia and the Pacific. FAO. Available at http://www.fao.org/docrep/005/ ac681e/ ac681e09.htm. Accessed on 23 May 2013.

Paull, R. E. and Duarte, O. 2011. Litchi and longan, pp. 221-251 In R. E. Paull and O. Duarte [ed.], Tropical fruits, 2nd ed. CABI. 400 pp.

National Horticultural Board, 2018. Indian Horticulture Database. Published by National Horticulture Board, Gurgaon, India.

Rai, M. and Kumar, A. 2004. Efficacy of insecticides including biopesticides for control of litchi fruit borer. Abstract of 1st Indian Horticulture Congress (6-9 November) held at IARI, New Delhi. 6.12.

Rajeev, R., Mukherjee, U and Vijay, K. 2018. Management strategy against litchi mite (*Aceria litchii* Keifer). *Journal of Entomology and Zoology Studies*, **6**(5): 792-795.

Singh, G., Nath, V., Pandey, S. D., Ray, P. K. and Singh, H. S. 2012. The Litchi: Food and Agricultural Organization of the United Nations, New Delhi, 219 pp.

Waite, G. 2012. Lychee erinose mite in lychees. Queensland: Dept. Plant Industries and Fisheries. Available at: http://www.daff.qld.gov.au/plants/fruitand-vegetables/a-z-list-of-horticultural-insect-pests/ lychee-erinose-mite. Accessed on 19 Aug 2013.

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