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Management strategy against litchi mite (*Aceria litchii* Keifer)

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Abstract

Litchi mite (*Aceria litchii* Keifer) is a serious threat to the litchi (*Litchi chinensis* Sonnerat) crop. The mite incidence can be effectively managed through pruning and destruction of affected twigs by burning during June and November along with soil application of neem cake (4 kg) and castor cake (1 kg) per tree just after the first shower of rainfall during the first fortnight of July and spraying of fenazaquin (0.15%) twice in 10 days intervals during flush emergence (September – October) where the leaf infestation was only 7.50 percent due to *A. litchi* followed by spray modules of kelthane (0.05%) which recorded 12.00 percent leaf infestation. The spray modules of pesticides with a combination of pruning and cake application were superior over the control (59.90 percent) and spraying of these pesticides alone. The impact of these treatments on the fruit yield (kg / tree) also varied significantly over the control. The maximum marketable fruit yield (131.40 kg / tree) was recorded with the spraying of fenazaquin with its combination, proved to be cost effective also (C / B = 1: 11.9).

Keywords: Litchi (*Litchi chinensis*), litchi mite (*Aceria litchii* Keifer), pest management modules

1. Introduction

Litchi (*Litchi chinensis* Sonnerat) of family Sapindaceae has been acknowledged as one of the most precious fruits of the world, have vast export potential. India is the second largest producer of litchi after China. The commercial cultivation is mainly concentrated to Bihar, West Bengal, Uttar Pradesh, Jharkhand, Assam, Tripura and Punjab. However, Bihar enjoys the monopoly in quality and quantity, as nearly 75 percent of the total production comes from this state from only 47 percent of the total cultivated area^[8]. Bihar offers salubrious climatic conditions and soil requirement for this crop.

The litchi mite, *Aceria litchii* Keifer has been reported as one of the serious pests of litchi in Bihar (Hameed *et al.*, 1992)^[2]. The litchi erineum mite is one of the most destructive pests of litchi in all litchi producing countries of the world. The nymph and adults are similar in appearance, whitish in colour, four-legged and vermiform. Most eriophyd mites prefer warm and dry weather for their breeding. Both nymphs and adults damage the leaves, inflorescence and young developing fruits by puncturing and lacerating the tissues of the leaves with their stout rostrum and suck the cell sap as a result of its feeding, under surface of the infested leaves show abnormal growth of epidermal cells in the form of hair – like velvety growth of chocolate brown colour. In some cases, the mites cause small galls or wart like swellings or depressions on the upper surface of infested leaves. The attacked leaves become thick, curled, wither and ultimately fall off and the attacked leaf buds fail to bear flower or fruit (Lall and Rahman, 1975)^[6].

2. Materials and Methods

In order to evaluate the pest management modules / strategies, field trials were conducted at the DrRPCAU Research Farm of Birauli (Samastipur), Bihar during 2012 to 2013. The experiment was laid out in randomized block design with litchi cultivar cv. Shahi. The planting distance between two trees was kept at 10 x 10 meters. The pruning and destruction of the infested leaves and shoots by burning were done during the months of June and November in both the years. The cakes (Castor and Neem) were applied to the root zones of the soil at their respective doses in the first fortnight of July in both the years. All the three pesticides (fenazaquin, kelthane and fenpropathrin) were sprayed twice at the time of emergence of new flushes (September – October) with their respective concentrations either alone or in combination with cakes and pruning and destruction of affected twigs. After the application of treatments, 10 twigs were randomly collected from all the directions of the tree to work out the

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mean percent leaf infestation to evaluate the impacts of the treatments / pesticides on the pest incidence and at the time of fruit harvest, fruit yield (kg / tree) was worked out to know the effects of the treatments on the yield. Finally data were analyzed statistically in RBD design and the impacts of the treatments were tested statistically.

3. Results and Discussion

The findings of the management strategy against the litchi mite (*A. litchii*) revealed that the pest activity and its noxious effects on the litchi crop can be effectively kept under control. The treatment of pruning and destruction of affected twigs by burning during June and November, followed by soil application of neem cake (4 kg) and castor cake (1 kg) per tree just after the first shower of rainfall during the first fortnight of July and spraying of fenazaquin during flush emergence (September – October), twice at 10 days intervals, was observed most effective in reducing mite incidence recording only 7.50 percent leaf infestation during the course of the investigation (Table -1). The application of kelthane as spray along with above combination was also found superior (12.00 percent) to spraying of fenpropathrin (14.50 percent) with above combinations. It is evident that all the test chemicals were found more effective when applied with the combination of pruning and destruction of infested twigs and application of cakes compared to application of these chemicals alone. Pruning and soil application of cakes also found less effective when tested alone and recorded higher level of leaf infestation (28.30 percent) likewise, when affected twigs were removed twice only, the leaf infestation was 36.10 percent (Table -1). However all the pest management tools were found significantly effective in controlling the pest incidence in comparison to untreated control (59.90 percent leaf infestation). The impact of these pest management modules on the fruit yield (kg / tree) also varied significantly and superior over control (Table & Fig.-1). The maximum fruit yield (131.40 kg / tree) was recorded with the spraying of fenazaquin with its combination, followed by spraying of kelthane combination (119.10 kg / tree) and fenpropathrin combination (114.30 kg / tree). These pest management modules were cost effective also recording C / B ratio of 1: 11.9, 1: 8.8 and 1: 8.1, respectively. The pulled analysis of data (Table -1) recorded during both the years (2012 and 2013), revealed that the years interaction with various treatments were statistically non significant, however

the treatments were differed significantly against the mite incidence.

Several attempts were made to manage the incidence of litchi mite (*Aceria litchii* Keifer) in India and abroad. Prasad & Singh (1981) [9] and Zhang *et al.*, (1997) [19] observed that removal and destruction of affected litchi leaves by burning, were effective in reducing mite infestation in litchi. Prasad and Singh (1981) [9] recorded better results with the spraying of carbaryl (0.03%) and sulphur (0.04%). Pinese (1981) [8], Sharma and Rahman (1982) [12], Sharma (1984) [13], 1985) [14], Wen *et al.* (1991) [18], Waite (1992) [17], Zhang (1997) [19] and Anon (1978) [1] tested various insecticides / acaricides (dimethoate, dicofol, endosulfan, phosphamidon) against the pest activity. Thakur (1991) [16], Hameed *et al.* (1992) [2], Sharma and Rahman (1982) [12], Sharma (1985) [14] and Kumar (1992) [5] reported that sulphur (0.05%) and kelthane (0.05%) were effective in reducing pest incidence. Lall and Rahman (1975) [6] reported that low infestation under neem cake treatment may be attributed to its antifeedant and deterrent properties and also these cakes have nutritional values (having rich in nitrogen) thereby enabled the tree to escape the pest injuries. Solomon *et al.*, (1993) [15] reported that fenazaquin was a selective acaricide for use in IPM. Pushpa (2006) [10] observed that the acaricide, fenazaquin was found very effective in controlling *Aceria guerreronis* Keifer on coconut and reduced mite population up to 72.00 percent, 7 days after treatment. Mukherjee *et al.* (2007) [7] and Ranjan *et al.* (2011) [11] found that pruning and destruction of affected twigs / leaves with neem / castor cake application followed by spraying of acaricides (kethane (0.05%) and trizophos (5 ml / lt. of water), respectively, reduced the pest incidence on litchi significantly. Jana *et al.* (2008) [4] observed that the spraying of synthetic pyrethroids, fenpropathrin was very effective against an eriophyd mite of coconut, *Aceria guerreronis* Keifer. But in the present scenario when the several of the broad spectrum pesticides like, dimethoate, phosphamidon, endosulphan recommended earlier for the management of pest were either banned or restricted or under scanner for their undesirable effects of residues, pest resurgence, impact on environment and for application in tender fruits like litchi due to their harmful effects on fruits and non targets, particularly the natural enemies, tested against the mite activity (Hameed *et al.*, 1999 [3] and Thakur, 1991) [16]. Thus the findings of present study would be an effective and sustainable pest management strategy against the litchi mite.

Table 1: Effect of pest management modules against litchi mite, *Aceria litchii* Keifer (Pooled)

Treatments		Mean% leaf infestation	Yield (kg / tree)	Cost : Benefit
T ₁	Pruning and destruction of all the affected twigs / leaves by burning during June and November	36.10 (36.70)	80.40	1 : 5.5
T ₂	T ₁ + soil application of neem cake (4 kg) + castor cake (1 kg) Just after 1 st shower of rainfall	28.30 (31.80)	89.30	1 : 5.6
T ₃	T ₂ + spraying of fenpropathrin 10 EC (0.01%) @ 1 ml / l of water, twice at 10 days interval during flush emergence (Sept - Oct)	14.50 (21.90)	114.30	1 : 8.1
T ₄	T ₂ + spraying of kelthane 18.5 EC (0.05%) @ 3ml / l of water twice at 10 days interval during flush emergence (Sep - Oct)	12.00 (19.70)	119.10	1 : 8.8
T ₅	T ₂ + spraying of fenazaquin 100 EC (0.15%) @ 1.5ml / l of water twice at 10 days interval during flush emergence (Sept - Oct)	7.50 (15.10)	131.40	1 : 11.9
T ₆	Spraying of fenpropathrin 10 EC (0.01%) @ 1 ml / l of water twice at 10 days interval during flush emergence (Sept - Oct)	18.90 (25.50)	79.70	1 : 3.8
T ₇	Spraying of kelthane 18.5 EC (0.05%) @ 3ml / l of water twice at 10 days interval during flush emergence (Sep - Oct)	15.90 (23.30)	83.90	1 : 5.6
T ₈	Spraying of fenazaquin 100 EC (0.15%) @ 1.5ml / l of water twice at 10 days interval during flush emergence (Sept - Oct)	12.30 (20.00)	85.40	1 : 7.1
T ₉	Untreated (Control)	59.90 (50.60)	70.20	-
CD (P = 0.05)		(6.43)	22.70	-
CV		(12.11)	12.22	-
Year x Treatment		NS	NS	-

Values in parenthesis () are angular values

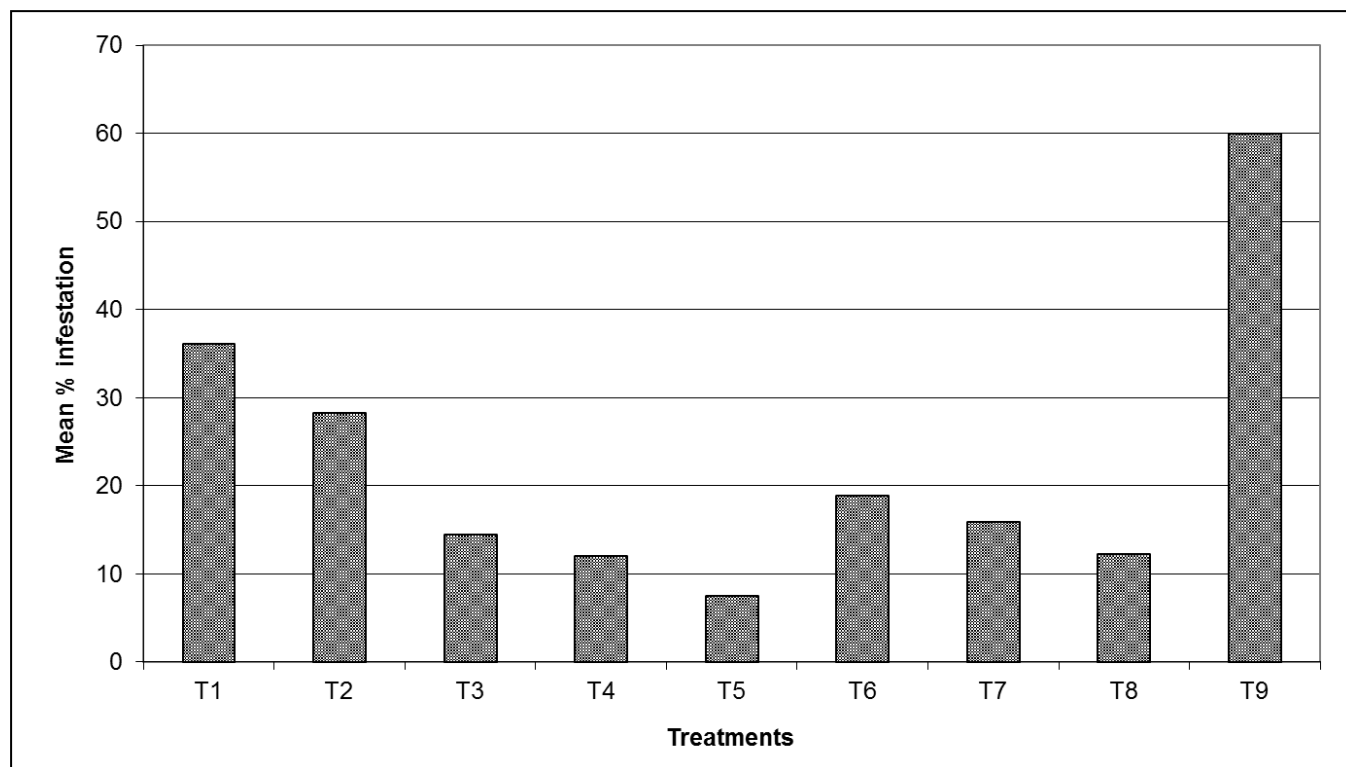


Fig 1: Effect of pest management modules against litchi mite, *Aceria litchii* Keifer

4. Conclusion

In the light of above facts, it is obvious that the present study would be a milestone for the quality litchi fruit production, providing an eco-friendly protection umbrella against the noxious pest. The pest 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, not only provide nutritional support to the litchi tree but also protect the tree with its (Neem cake) pesticidal property which have both, antifeedant and deterrent action on mite activity. When these combinations are finally covered with the spraying of effective acaricides (fenazaquin, kelthane and fenpropathrin) at the time of flush which is an initial infestation stage of the mite activity on fresh leaves, resulted in drastic reduction of mite incidence.

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