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Management of yellow mite, *Polyphagotarsonemus latus* (Acari: Tarsonemidae) in chilli

AJIT PRATAP SINGH[1] and R N SINGH[2]

Institute of Agricultural Sciences, Banaras Hindu University, Varanasi Uttar Pradesh 221 005

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The yellow mite, *Polyphagotarsonemus latus* (Banks) is a serious pest of chilli crop and known as a broadly and obligatorily phytophagous pest. It has more than 250 hosts crossing family border in plant of agricultural and horticultural importance (Rai *et al.* 2007). This destructive pest causes malformation of terminal leaves and flower buds. The toxic saliva of the mite causes twisted, hardened and distorted growth in the terminal of the plant. Leaves turn downward and turn coppery or purplish. Internodes shorten and lateral buds break more than normal. The blooms abort and plant growth stunted when large populations are present (Denmark 1980). In India, this mite was recorded first time by (Mann *et al.* 1920) and Kulkarni (1922) described the tamberra disease of potato and murda disease in chilli.

Infested leaves become bronzed with down-curling margins, buds are aborted and flowers distorted, shoots grow twisted and fruit may be deformed and russeted. Heavy population of mites built profuse curling of leaves (Jeppson *et al.* 1975 and Goldsmith and James 2002). The regular monoculture of chilli without crop rotation has also aggravated the problem. At present, the situation is alarming and economic harvest is not possible without the use of pesticides. Considering these, an experiment was conducted to evaluate the reduction in mite population through pesticides [Imidacloprid 70WP, imidacloprid 17.8EC, propargite 57EC, thiamethoxam 25WG, dicofol 18.5EC, sulphur 80WP, abamectin 1.9EC, azadirachtin (10000 ppm), neem oil based formulation (5ml) and pseudomonas (1×10^6)] in the field condition at their recommended dose on chilli crop.

The present investigation was carried out under field condition, at vegetable research farm of Banaras Hindu University, Varanasi during July to December 2008 and 2009 at 27 to 30°C temperature and relative humidity (RH) 65%. The trial was replicated three times at vegetable research farm, BHU in RBD with eleven treatments including control. The plot size was 4 m × 3 m with row to row and plant to plant spacing was maintained at 60 and 45 cm apart respectively. The details of pesticides are given in Table 1 and spraying was done by the foot sprayer and cloth screen were used for avoiding the pesticide drift between the plots.

The observations were recorded from randomly selected five tagged plants. Two leaves were taken from upper, middle and lower portion and 6 leaves were collected from each plant and 30 leaves from each plot for taking observations. The mite population was counted on the basis of per leaf area.

The commercial grade formulations were used at their recommended doses along with two neem based formulation and with bio-pesticides and imidacloprid 70 WP and pseudomonas (1×10^6) was used in seed treatment in this experiment. After spraying the subsequent readings were recorded after 1, 3, 7, and 14 days.

In this field trial significant reduction in mite population was observed in all the pesticides treatments after the spray application as compared to the control treatment (water spray). The pre-spraying mean mite population was recorded on per leaf area and the pooled data was discussed. The mean percent reduction was significant compared to the check treatment.

After first day of spray, maximum reduction in mite population showed in dicofol (60.20%), propargite (59.60%) and thiamethoxam (57.80%). The abamectin (52.00%), sulphur (46.03%), imidacloprid (43.11%)(through seed treatment) and imidacloprid (42.13%) showed moderate mean per cent reduction in mite population. Azadiractin (10000 ppm) (35.00%), neem oil base formulation (0.03%) (33.77%) and pseudomonas (1×10^6) (32.33%) (seed treatment) poorly performed and showed less effect on mite population.

At the third day of spraying, propargite (64.16%), dicofol (60.40%), abamectin (59.87%) and thiamethoxam (50.18%)

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[1]Research Scholar (apsingh@gmail.com), [2]Professor (e mail: singhrnacarology58@gmail.com), Department of Entomology & Agricultural Zoology

Table 1 Effect of chemicals and bioagents on yellow mite on chilli crop in Varanasi 2008 and 2009 (Pooled)

Pesticides	Dose	Pre-spraying mean population per leaf	Mean percent reduction in mite population day after spraying				Mean
			1	3	7	14	
Imidacloprid 70 WP (for seed treatment)	3g/kg seed	6.49*	46.72 (43.11)**	55.19 (47.93)	56.31 (48.62)	43.96 (41.50)	50.54 (45.29)
Imidacloprid 17.8EC	0.3ml/lit	6.21	45.01 (42.13)	48.63 (44.20)	44.97 (42.07)	39.08 (38.65)	44.42 (41.72)
Propergite 57 EC	2 ml/lit	6.76	74.47 (59.60)	81.06 (64.16)	77.94 (61.96)	57.19 (49.08)	72.66 (58.44)
Thiamethoxam 25WG	0.3 ml/lit	8.33	71.66 (57.80)	59.09 (50.18)	67.88 (55.43)	66.03 (54.33)	66.16 (54.39)
Dicofol 18.5 EC	2.70 ml/lit	6.56	75.39 (60.20)	75.64 (60.40)	78.89 (62.58)	37.74 (37.88)	66.91 (54.88)
Sulphur 80WP	3.125gm/lit	6.40	51.82 (46.03)	46.40 (42.94)	46.61 (43.05)	52.23 (46.26)	49.26 (44.54)
Abamectin 1.9 EC	7.36 ml/lit	7.38	62.1 (52.00)	74.84 (59.87)	85.68 (67.70)	86.47 (68.36)	77.28 (61.48)
Azadirachtin (10000 PPM)	2 ml/lit	6.90	32.90 (35.00)	38.20 (38.17)	48.74 (44.26)	60.94 (51.30)	45.21 (42.250)
Neem oil based formulation 0.03 %	5 ml/lit	6.88	30.90 (33.77)	31.62 (34.20)	42.61 (40.74)	49.29 (44.54)	38.60 (38.41)
Pseudomonas 1×10^6 (for seed treatment)	1 gm/Kg seed	6.51	28.67 (32.33)	36.67 (37.23)	33.82 (35.55)	40.65 (39.58)	34.95 (36.21)
Control (Water Spray)		6.57	1.84 (7. 71)	8.92 (17.36)	16.21 (23.73)	19.49 (26.13)	11.61 (19.46)
SEM ±			0.723	1.438	1.081	1.480	
CD (.05%)			1.509	2.999	2.255	3.086	
Significance at 5 % level			S	S	S	S	

* Mean of three replication each replication consist of 30 leaves drawn randomly from five plants; **Figures in parenthesis are ArcSin? percentage transformation

performed very good and showed maximum reduction in mite population. The imidacloprid (47.93%) (seed treatment), imidacloprid (44.20%) and sulphur (42.94%), showed moderate performance on mite population. Azadiractin (38.17%), pseudomonas (37.23%) (seed treatment) and neem oil base formulation (34.20%) showed relatively less reduction and showed less effect on mite population.

The abamectin (67.70%), dicofol (62.58%) and propargite (61.96%) were given maximum mean per cent reduction in mite population on the seventh day of spraying. Moderate performance showed in thiamethoxam (55.43%), imidacloprid (48.62%) (seed treatment), azadiractin (44.26%), sulphur (43.05%), imidacloprid (42.07%) and neem oil base formulation (40.74%). The pseudomonas (35.55%) (seed treatment) showed very less effect on mite population at 30 days old chilli crop.

The abamectin (68.36%), thiamethoxam (54.33%), and azadiractin (51.30%), were given maximum mean per cent reduction in mite population on the fourteenth day of spraying. Moderate performance showed in propargite (49.08%), sulphur (46.26%), neem oil base formulation (44.54%) and imidacloprid (41.50%) (seed treatment). The imidacloprid (41.72%), pseudomonas (39.58%) (seed treatment) and dicofol (37.88%) showed poor effect on mite population.

The pesticides were ranked in the following order based on their over all performance: pseudomonas < neem oil based formulation < imidacloprid (17.8 EC) < azadiractin < sulphur < imidacloprid (70 WP) < thiamethoxam < dicofol < propargite < abamectine. The result indicates that the pesticidal management of yellow mite *Polyphagotarsonemus latus* on chilli crop, clearly shown that the maximum percent reduction of yellow mite was occurred when treated with abamectin (61.48%) and propargite (58.44%), respectively. It is revealed from Table 1 that dicofol and propargite remain effective up to 7 days at 62.58% and 61.96% reduction in mite population respectively. Abamectin gave best reduction (68.36%) up to 14 days successfully. The decrease of yellow mite population is statistically significant at 5% probability level in comparison to control.

In over all botanical pesticides azadirachtin (42.25%)

and neem oil based formulation (38.41%) have given good response reduction in population. The use of neem on chilli pepper to control yellow mite *P. latus* could also an alternative tool for mite management that fulfils the requirements of organic farmers. The seed treatment chemicals imidacloprid 70 WP and pseudomonas 1×10^6 showed moderate response 45.29 and 36.21% reduction in population. Srinivasulu *et al.* (2002) reported that imidacloprid were ineffective and cause resurgence.

Dicofol and sulphur performed moderately against *P. latus* in this trail. Mohapatra (1996) reported same results in his trial against *P. latus* on jute crop. In the present study, abamectin and propargite have been found to be almost equally effective against yellow mite. Goldsmith and James (2002) reported the abamectin gave satisfactory control against this mite. Which has been supported by many worker's (Rai *et al.* 1993, Kumar *et al.* 2005, Ismitha and Giraddi 2006, Somchoudhary *et al*. 2008 and Biswas *et al*. 2009).

SUMMARY

An experiment was conducted in the field condition to evaluate the percent reduction in mite (*Polyphagotarsonemus latus*) population with certain pesticides at their recommended dose on chilli crop. The result showed maximum reduction in mite population with abamectin (77.28%), propargite (72.66%) and dicofol (66.91%), moderate reduction with thiamethoxam (66.16%), imidacloprid 70 WP (50.54%), sulphur (49.26%). Azadiractin (42.25%), imidacloprid (41.72%) and neem oil based formulation (38.41%) found less effective in yellow mite population.

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