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Screening of certain chilli germplasm against yellow mite, *Polyphagotarsonemus latus* (Banks)

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ABSTRACT :

An experiment was conducted during the year 2012 and 2013 to screen out 30 chilli germplasm against yellow mite, *Polyphagotarsonemus latus* (Banks). Out of 30 chill germplasms, 7 germplasms *viz.*, 13/09, 10/09, 7/09, CH/09/8A3, 11/CHIVAR-6, 10/ CHIVAR-6, 10/ CHIVAR-3 were found to be resistant as they were found free of mite infestation and leaf curl symptoms. Entries LCA-334, ASC-06-1, KA-2, BH10/04, VR-338, CHIVAR-5, CHIVAR-7, 11/CHIVAR-7, G-8B, G-5B, G-3, G-1, 17/09, 5/A/09, BH10/04 and *Mem jolokia* were found to be moderately resistant with a damage score of 0.2 to 1.4 showing about 25 per cent leaf curling. The entries 15/02, G-2 and CHIVAR-4 showed a damage score of 2.4, 2.7 and 2.29 and per cent leaf curling of 44.23, 46.53 and 29.28, respectively and were recorded as moderately susceptible. Whereas 11/ CHIVAR-1 recorded the highest damage with damage score 3.6, showing 90.48 per cent leaf curling followed by *Bhut jolokia* and Pusa Juwala which were found to be highly susceptible showing around 82.2 to 89.7 per cent leaf curling with damage score 3.5 and 3.4, respectively.

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INTRODUCTION

Chilli, *Capsicum annuum* L. (family: solanaceae) is one of the most important ingredients in many different cuisines around the world. It adds pungency, taste, flavour and colour to the dishes. Chilli is an important spice crop in India earning valuable foreign exchange. Indian chilli is considered to be world famous for its colour and pungency levels. Chilli was introduced to India, Indonesia and other parts of Asia by the Portuguese traders, around 450-500 years ago (Berke and Shieh, 2000) and since then, it has gained importance as an important spice and vegetable crop. India produces about 10.70 lakh tonnes of chilli from an area of 9.08 lakh hectares. 5-10 per cent of the total production is exported in the form of dry chilli, chilli powder and oleoresins (Singhal, 2003 and George and Giraddi, 2007). Andhra Pradesh is the largest chilli growing state followed by Karnataka and Maharashtra. Andhra Pradesh contributes 28 per cent of area and 62 per cent of production followed by Karnataka with 17 per cent of area and 12 per cent of

production (Peter *et al.,* 2005). But in recent times the productivity of chilli has come down. A number of limiting factors have been attributed for such low productivity of chilli among which arthropod pests are the major one. The pest spectrum of chilli crop is complex with more than 293 insects and mite species debilitating the crop in the field as well as in storage (Anonymous, 1987). Among the various pests recorded, yellow mite, *Polyphagotarsonemus latus* (Banks) (*P.latus*) is one of the major production constraints of chilli. It was first described by Banks (1904) as *Tarsonemus latus* from the terminal buds of mango, in a greenhouse in Washington, D.C., USA (Denmark, 1980). It is a polyphagous pest attacking several important crops worldwide (Flechtmann, 1989; Gerson, 1992 and Pena and Bullock, 1994). Because of their small size, they initially go unnoticed in the fields and are detected only when they have multiplied in number and already caused serious damage to plants. In Karnataka, they have been identified as sucking pests of chilli and leaf curl caused by mite and thrips is serious (Puttarudriah, 1959). Leaf curl is one of the most destructive syndromes affecting chilli in India caused by both mites and thrips. It causes abaxial and adaxial curling of leaves accompanied by pluckering and swelling of veins (Muniyappa and Veeresh, 1984 and Mishra *et al.,* 1963). The yield loss due to mite pest is estimated to the tune of 50 per cent (Ahmed *et al*., 1987 and Kandasamy *et al*., 1990). Favourable weather situation leads to heavy mite population build up sometimes causing yield losses upto 96.39 per cent, to complete failure of crop (Borah, 1987). In spite of the use of various conventional acaricides, the yellow mite has attained the key pest status on this crop. The application of common insecticides against sucking pests like thrips and aphids caused resurgence of *P. latus* on chilli (David, 1986). The pesticide residues have significant influence on *P. latus* population build up. One of the probable reasons for the resurgence of *P. latus* in chilli may be due to the unusual multiplication of the mites induced by pesticide residues, (David, 1991). Under such circumstances it is, therefore, of vital importance to resort to some other non-chemical pest management strategies such as use of resistant/ tolerant genotypes for cultivation to minimize economic losses caused by mite pest.

MATERIAL AND METHODS

A field experiment was conducted in the experimental farm, Department of Horticulture, Assam Agricultural University, Jorhat to screen out various chilli germplasms against yellow mite, *P. latus*. The experimental farm is situated at 94°12´E Longitude and 24°47´ N-Latitude and at an altitude of 86.8 meters above mean sea level. The land having homogeneous fertility and uniform textural makeup was selected for conducting the experiment.

Altogether thirty germplasms were grown in thirty beds of size 1mx1m following the standard package of practices during *Rabi* seasons of 2012 and 2013. Five plants were randomly selected per entry of chilli germplasm for population count of mite. Mite population was recorded from 3 randomly selected leaves representing the top, middle and bottom canopy of each randomly selected plant. Each leaf was observed under stereo zoom binocular microscope. The observation was repeated at seven days interval starting from the 10^{th} day after planting till bearing existed.

The entries were categorised depending on extent of damage leaf in 0-4 scale ranking (Standardise scale against *P. latus*).

- 0 : No symptoms – resistant
- 1 : Upto 25 per cent of leaves showing curling – moderately resistant
- 2 : 26 to 50 per cent of leaves showing curling – moderately susceptible
- 3 : 51 to 75 per cent of leaves showing curling – susceptible
- 4 : > 75 per cent of leaves showing curling – highly susceptible.

RESULTS AND DISCUSSION

All the grown up germplasms were screened for their reaction to yellow mite, *P. latus*, during 2012 and 2013. The germplasm lines exhibited wide difference in population of yellow mite per leaf. On the basis of damage score and per cent leaf infestation, the pooled data of both the year indicated that the germplasms *viz*., 13/09, 10/09, 7/09, CH/09/8A3, 11/CHIVAR-6, 10/ CHIVAR-6 and 10/ CHIVAR-3 were free from mite infestation and graded as resistant on the basis of damage score in 0-4 scale (Table 1). No symptoms of leaf curling were noticed and randomly collected leaves were free of mite infestation. Likewise the entries LCA-334, ASC-06-1, KA-2, BH10/04,VR-338, CHIVAR-5, CHIVAR-7, 11/CHIVAR-7, G-8B, G-5B, G-3, G-1, 17/09, 5/A/09,

BH10/04 and *Mem jolokia* were found to be moderately resistant with a damage score of 0.2 to 1.4 with 1 to 25 per cent leaf infestation (Table 1). The entries 15/02, G-2, and CHIVAR-4 showed a damage score of 2.4, 2.7, and 2.29, as well as per cent leaf damage of 44.23, 46.53 and 29.28, respectively and were recorded as moderately susceptible (Table 1). Whereas the entry 11/ CHIVAR-1, *Bhut jolokia* and Pusa Juwala were found to be highly susceptible with damage score of 3.6, 3.5 and 3.4, respectively and per cent leaf damage of 89.7, 82.2, and 90.48, respectively (Table 1). The entry LCA-206 as susceptible check exhibited damage score of 3.1 with 57.04 per cent leaf infestation. The present findings are similar to the results of the experiment conducted by Kaur *et al*. (2010). They reported that out of sixty three lines, SH-HP-101-5, Perennial, SHHP-1111, EC532386, Sel.-15, Sel.-21, Sel.-36, Sel.-40, PG- 1, DCL-524, Yellow Long Sel., S-2539, ELS-82 and NP- 1513 were found resistant to yellow mite while lines/varieties: Mehma Sarja, LS-III, Laitchi- 2, LCVR, EC532399, EC532390, HDC-75, LCA-206, 1-6-4, Sel.-10, PC-1, MS- 12 and Tobasco were observed moderately resistant to yellow mite. However, lines: EC 532397, Sel. 1-1-A, JCA- 283, SCM-334, SH-HP-404 and Kashmir Long-1 were registered to be highly susceptible. Present findings are also similar to the reports of Sharma *et al*. (2009) as they screened few germplasm and found genotype HC28 × LCA was least susceptible against this pest. Present findings are also similar to the results of the experiment conducted by Sanap and Nawale (1985). They screened

Table 1 : Screening of certain chilli germplasms against yellow mite, *Polyphagotarsonemus latus* Banks (pooled data of 2012 and 2013)

Sr. No.	Entries	mites/ leaf	Damage score (0-4)	% leaf infestation
1.	LCA-206	16.74	3.10	57.04
2.	BH10/04	9.71	1.20	11.21
3.	5/A/09	10.00	1.40	7.44
4.	17/09	6.91	0.40	3.67
5.	15/09	9.19	2.40	44.23
6.	13/09	0.00	0.00	0.00
7.	10/09	0.00	0.00	0.00
8.	7/09	0.00	0.00	0.00
9.	CH/09/8A3	0.00	0.00	0.00
10.	G-1	7.04	0.80	9.03
11.	G-2	10.86	2.70	46.53
12.	G-3	6.64	1.10	5.46
13.	G-5B	5.17	0.40	5.74
14.	G-8B	6.03	0.30	5.34
15.	11/CHIVAR-7	7.86	0.50	7.7
16.	11/CHIVAR-6	0.00	0.00	0.00
17.	11/CHIVAR-1	17.60	3.60	90.48
18.	10/CHIVAR-6	0.00	0.00	0.00
19.	10/CHIVAR-3	0.00	0.00	0.00
20.	CHIVAR-4	8.70	2.25	29.28
21.	CHIVAR-7	5.16	0.60	7.63
22.	CHIVAR-5	9.45	0.20	7.09
23.	VR-338	6.84	0.40	7.21
24.	BH10/04	7.815	1.20	6.31
25.	KA-2	4.46	0.20	3.4
26.	ACS-06-1	4.42	0.20	9.44
27.	LCA-334(c)	3.83	0.20	12.78
28.	*Mem jolokia*	1.20	0.20	1.2
29.	Pusa Juwala	19.50	3.40	82.2
30.	*Bhut jolokia*	17.7	3.50	89.7

some of the promising chilli cultivars against mites and thrips and graded the cultivars into four categories as Grade 1: resistant, Grade 2: moderately resistant, Grade 3: susceptible, Grade 4: highly susceptible. On the basis of injury, they noted that only cultivar *viz.*, LIC-8 recorded grade 1 and reported as resistant. Two cultivars *viz.,* Pant C1 and LE C1 were reported to be moderately resistant while ten cultivars proved to be susceptible to the thrips and yellow mite and varieties K-2, NP46A, Jwala, G-S, were recorded as highly susceptible. In the present study, the germplasm identified as resistant and moderately resistant could be exploited for breeding resistant chilli varieties which may minimize the dependence on hazardous pesticides for controlling mites and can be included as a component of integrated pest management against yellow mite.

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