

Original Research Article

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Management of Chilli (*Capsicum annuum* L.) Thrips and Mites Using Organics

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ABSTRACT

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Field experiments were conducted during kharif 2005, to study the effect of organic amendments on the activity of chilli thrips and mites. In the nursery, seedlings receiving vermicompost (500 g/m²) and neem cake (100 g/m²) resulted in higher seedling vigour index, comparable to the standard check. Subsequently these seedlings were transplanted in the main field amended with vermicompost (2.5 t/ha), neem cake (0.5 t/ha), combined application of vermicompost and neem cake at half dosages and standard check receiving inorganic fertilizers and plant protection. Significantly less population of thrips, mites and leaf curl index were observed in the crop that received vermicompost (2.5 t/ha) or neem cake (0.5 t/ha) (main plot treatments) followed by four sprays of NSKE 5% and neemazal 10,000 ppm at 2, 5, 7 and 11 weeks after transplanting alternatively. In main plots, crop receiving either vermicompost or neem cake registered significantly higher yield compared to seedlings that received inorganic fertilizers.

Introduction

Chilli (*Capsicum annuum* L.) is a tropical and subtropical crop grown all over India. Also known as 'red pepper', it is one of the most important commercial spice crops, earning valuable foreign exchange for the country. India produces about 10.70 lakh tonnes of chilli from an area of 9.08 lakh hectares. Of the total production, about 90-95 per cent is consumed within the country and about 5-10 per cent is exported in the form of dry chilli, chilli powder and oleoresins (Singhal, 2003). Among the constraints in chilli cultivation, the attack of a multitude of insect pests and mite at different crop stages is of utmost concern.

Surveys conducted the major pests that attack chilli are aphids (*Myzus persicae* Sulzer, *Aphis gossypii* Glover), mite (*Polyphagotarsonemus latus* Banks) and thrips (*Scirtothrips dorsalis* Hood) (Berke and Sheih, 2000), which have been identified as main sucking pests of Byadagi chilli in Karnataka. Due to monoculture of chilli, now-a-days pest build up is so much that farmers have to resort to minimum of 5 to 6 chemical sprays. Numbers of sprays have increased over the years, but in vein and on the contrary, cost of cultivation has increased enormously making cultivation of chilli highly risky and non-profitable. In addition to

this, these pesticidal sprays became a threat to chilli ecosystem causing resurgence of pests and menace to natural enemy fauna. Pesticide residues in chilli are also of great concern from the point of domestic consumption and exports as well. It is therefore imperative to resort to other non-chemical pest management strategies such as use of organic amendments, botanical pesticides and bioagents (key components of organic farming), which are eco-friendly and completely safe to the consumers.

Materials and Methods

Field investigations were carried out for the evaluation of organics in the management of thrips, *Scirtothrips dorsalis* and mite, *Polyphagotarsonemus latus* on chilli (cv. Byadagi) during the year 2012, at Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, under rainfed conditions. In the experiment on seedling vigour, Byadagi chilli seeds were sown during first fortnight of June in the nursery beds (0.6 x 0.9m) laid out in RBD. Vermicompost, neem cake and combined application of vermicompost and neem cake were evaluated v/s the standard practice (check) for assessing the seedling vigour. Seedling vigour index (SVI) as suggested by Abdul Bavi and Anderson (1973) was calculated for 35 days old seedlings. Fifty such plants were selected from each replication and SVI was calculated by the formula: Seedling Vigour Index = Germination (%) x seedling length (cm) The best two organic treatments (receiving vermicompost and neem cake) in nursery were selected based on the Seedling Vigour Index and transplanted in the main field along with seedlings of standard check in split plot design. Main plot treatments included two organic amendments alone, a combination of organic amendments and 100% RDF + FYM + RPP as standard check. The best two organically raised seedlings referred as above

were the sub plots along with the standard check. The sprays were taken up at 2, 5, 7 and 11 weeks after transplanting from 45 DAT, using high volume knapsack sprayer. Observations were taken on the population of thrips and mites as per the destructive sampling and the experimental crop was scored for LCI in the scale 0-4 as described by Niles, 1980. Dry chilli yield observed for each plot was converted for hectare basis. The data presented in the table is the mean of all the observations.

Results and Discussion

The results of the experiment carried out to evaluate the effects of organics on seedling vigour in the nursery revealed that, vermicompost @ 500 g/m² and neem cake @ 100 g/m² registering SVI of 941.19 and 927.10, respectively were found superior to the rest of the treatments and were comparable to the standard check (964.7) which received FYM, NPK and plant protection. Lower dosages of vermicompost (T1), neem cake (T3) and combined applications of the two at half the rates (T5, T6, T7, T8) registered significantly lower SVI vis-à-vis sole applications at higher quantities (T2 and T4) (Table 1).

The ability of vermicompost to enhance the seedling vigour can be attributed to the fact that vermicompost contains both major and minor plant nutrients in available forms, besides enzymes, antibiotics, vitamins and plant growth hormones and have definite advantage over other organic manures (Meerabai and Asha, 2001). Neem cake contains good amount of organic nitrogen (2.0 to 2.5 %) and other nutrients besides various insect antifeedent constituents which might be the possible reason for good seedling vigour found in the experimentation. The present results could be compared with the only report in the form of preliminary findings of

Giraddi and Tatagar (2004) who reported that seedlings raised with vermicompost application in the nursery were more vigorous by appearance and attracted less pests in the main field. The data on the population of thrips and mites as influenced by different soil amendments applied at planting and organically raised seedlings given in tables 2 and 3. Among the main plot treatments, sole application of vermicompost or neem cake followed by four sprays

registered lower thrips (0.45 to 0.51 / leaf) and mite (0.60 and 0.64/leaf) numbers vis-à-vis combined application (0.66 and 1.03 thrips and mites/leaf, respectively), but being at par with the check (0.34 and 0.33 thrips and mites/leaf, respectively). Although the check plots scored significantly lower LCI (0.46) the crop that received vermicompost and four sprays registered at par LCI followed by neem cake and four sprays (0.77 and 0.87, respectively).

Table.1 Germination per cent, seedling length and seedling vigour index of chilli in nursery as influenced by organics

S. No	Treatments	Germination %	Seedling length (cm)	SVI
1.	Vermicompost @ 250 g/m ²	75.30 (62.45)	9.85b	702.52b
2	Vermicompost @ 500 g/m ²	78.83 (64.69)	12.46a	941.19a
3	Neem cake @ 50 g/m ²	75.30 (62.56)	9.73b	676.76b
4	Neem cake @ 100 g/m ²	79.00 (64.56)	11.95a	927.10a
5	VC @ 250 g/m ² + NC @ 50 g/m ²	76.00 (63.59)	8.55b	627.35b
6	VC @ 250 g/m ² + NC @ 100 g/m ²	74.83 (62.66)	9.29b	650.94b
7	VC @ 500 g/m ² + NC @ 50 g/m ²	75.16 (62.70)	8.55b	643.56b
8	VC @ 500 g/m ² + NC @ 100 g/m ²	74.3 (62.09)	9.17b	658.91b
9	FYM @ 45 g/m ² +C. fertilizer @ 50 g/m ²	74.00 (62.01)	8.97b	618.09b
10	T9 + RPP (Chemical interventions)	80.30 (66.12)	12.18a	964.77a
	SEm+	1.44	0.0668	27.84
	CD	0.195	NS	82.71
	CV	3.93	3.57	6.51

Figures in parenthesis are arc sin transformed values, Means in the rows and columns followed by the same alphabet do not differ significantly by DMRT (P=0.05)

Table.2 Mean population of thrips influenced by organics in nursery and in the main field

Main plot and sub plot	Mean populations				
	Thrips/leaf				
	VC 2.5 +NN	NC 0.5+NN	Vc1.25Nc 2.5	RPP	Mean
S1	0.41(0.954)	0.47(0.985)	0.52(1.010)	0.33 (0.911)	0.43b (0.964)
S2	0.45 (0.975)	0.51 (1.005)	0.57(1.034)	0.37(0.933)	0.48ab(0.990)
S3	0.49 (0.995)	0.55 (1.025)	0.90(1.183)	0.33(0.911)	0.57a (1.034)
Mean	0.45ab (0.975)	0.51ab(1.005)	0.66a(1.077)	0.34b(0.917)	0.49 (1.049)
Comparison of mean		SEm	CDat 5%		
Main (M)		0.042	0.138		
Sub (S)		0.018	0.055		
InteractionMxS		0.183	NS		
CV (%)		9.75			

VC – Vermicompost NC – Neem cake NN – Neem seed kernel extract and Neemazal sprays, RPP – Recommended package of practices DAT – Days after transplanting, S1 – Seedlings receiving vermicompost in nursery, NS – Non-significant S2 - Seedlings receiving neem cake in nursery, S3 – Seedlings receiving RPP in nursery, Means in the rows and columns followed by the same alphabet do not differ significantly by DMRT (P=0.05), Figures in parenthesis are $\sqrt{x + 0.5}$ transformed values

Table.3 Mean population of mites influenced by organics in nursery and in the main field

Thrips/leaf	Mean mite populations/leaf				
	VC 2.5 +NN	NC 0.5+NN	VC 1.25 Nc 2.5	RPP	Mean
S1	0.57(1.034)	0.61 (1.054)	0.64 (1.068)	0.37(0.933)	0.55b(1.025)
S2	0.60 (1.049)	0.64 (1.068)	0.69 (1.091)	0.34(0.917)	0.57ab(1.034)
S3	0.63(1.063)	0.67(1.082)	1.75 (1.500)	0.29 (0.889)	0.83a(1.153)
Mean	0.60ab(1.068)	0.64ab(1.235)	1.03a(0.911)	0.33b	0.65
Comparison of mean		SEm	CDat 5%		
Main (M)		0.106	0.320		
Sub (S)		0.040	0.123		
InteractionMxS		0.452	NS		
CV (%)		10.02			

VC – Vermicompost NC – Neem cake NN – Neem seed kernel extract and Neemazal sprays, RPP – Recommended package of practices DAT – Days after transplanting, S1 – Seedlings receiving vermicompost in nursery, NS – Non-significant S2 - Seedlings receiving neem cake in nursery, S3 – Seedlings receiving RPP in nursery, Means in the rows and columns followed by the same alphabet do not differ significantly by DMRT (P=0.05), Figures in parenthesis are $\sqrt{x + 0.5}$ transformed values.

Table.4 Dry chilli yield as influenced by organics applied in nursery and main field

Sl. No.	Main /Sub	M1	M2	M3	M4	Mean
1	S1	2.75	2.54	2.50	3.90	2.92a
2	S2	2.54	2.45	2.25	3.60	2.71a
3	S3	2.20	2.20	1.25	3.47	2.28b
	Mean	2.49b	2.39bc	2.00c	3.65a	2.63
Comparison of Means	SE m+	CD at 5%				
Main (M)	0.154	0.457				
Sub (S)	0.085	0.251				
Interaction (M x S)	0.852	NS				
CV (%)	18.84					

VC – Vermicompost NC – Neem cake NN – Neem seed kernel extract and Neemazal sprays, RPP – Recommended package of practices DAT – Days after transplanting S1 – Seedlings receiving vermicompost in nursery, NS – Non-significant S2 - Seedlings receiving neem cake in nursery S3 – Seedlings receiving RPP in nursery, Means in the rows and columns followed by the same alphabet do not differ significantly by DMRT (P=0.05)

In the sub plots, seedlings raised with vermicompost in nursery and receiving organics and 4 sprays in main field supported lower thrips, mite density and LCI, being superior to the check (S3). This was followed by S2 being at par with the check (S3). Whereas Vermicompost @ 1.25 t/ha +Neem cake @ 0.25 t/ha + neem seed kernal extract and neemazal sprays was least effective with reference to leaf curl index (0.87). Varma and Supare (1997) and Varghese (2003) with low NPK observed significantly lower activity of thrips and mite in chilli amended with vermicompost and the present study is also in close agreement with these reports. The superior effect of neem cake in the present study is in line with the findings of Varghese and Giraddi (2005) who reported that neem cake @ 500 kg / ha along with 50% RDF (NPK) in combination with two and three

sprays of RPP (dimethoate 30 EC/ dicofol 18.5 EC) was superior to RPP (100 % NPK and four chemical sprays) in having least population of thrips and mite which ultimately resulted in reduction in chemical interventions in crop ecosystem.

The pesticidal action of neem seed kernel extract (NSKE) which was superimposed in organically amended crop in the present study is in agreement with the findings of Varghese (2003) who observed that neem seed kernal extract and neem oil 5% recorded lowest incidence of thrips and mites in chilli. Sashidhara (1999) reported that vermicompost along with 100% RDF recorded less leaf curl index compared to 100% RDF alone and results of the present experiment are in conformity with this. The property of neem cake in reducing the leaf

curl was reported by Varghese and Giraddi (2005) who found that neem cake in combination with 50% RDF and two and three sprays v/s four sprays of chemicals recorded least leaf curl index. Among the organics tested, maximum dry chilli yield of 2.49 q/ha was obtained in Vermicompost @ 2.5 t/ha + neem seed kernal extract (5%) and neemazal sprays followed by Neem cake @ 0.5 t/ha + neem seed kernal extract and neemazal sprays which recorded 2.39 q/ha, however maximum yield was registered in the standard check, i.e. 3.65 q/ha. Among the organically raised seedlings evaluated, S1 receiving vermicompost out yielded the rest of the treatments by recording a yield of 2.92 q/ha (Table 4).

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