

Compare the Effect of Chemical Pesticides and Plant Extracts on the Chilli Pests Natural Enemies

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ABSTRACT

Investigations on the comparing the effect of chemical pesticides and NPM practices on the activity of chilli pests natural enemies (Farmer Friend insects) viz., Coccinellid beetles and *Chrysoperla carnea* carried out during 2012-2013 and 2013-2014 kharif seasons at the Karchal village of Medak District, Telangana state. The experiment was laid out in RBD (Randomized Block Design). The spray schedule treatment (T3) was recorded highest number of coccinellid beetles. In this, 2 sprays of Nimbecidine (NB) (5ml/l) at 2 & 5 WAT (Weeks After Transplanting), 2 sprays of 5% Custard Apple Leaf Extracts (Cae) at 7 & 11 WAT and Neem Oil (NO) (5ml/l) at 9 WAT. The spray schedule treatment (T9) was recorded highest number of *Chrysoperla carnea*. In this, Four sprays of NSKE 5% at 2,5, 7&11 WAT and 5% Vitex Decoction at 9WAT. whereas chemical pesticide practices recorded least number of natural enemies, In this, Two sprays of Dimethoate 30EC (1.7ml/l) at 2,5 WAT and Dicofol 18.5 EC (2.5ml/l)+ Carbaryl 50WP (4 ml/l) at 7, 11 WAT.

Keywords: Natural enemies, Chemical pesticides, Custard apple leaf Extracts, Vitex Decoction, Neem Seed Kernel Extract (NSKE), plant extracts.

I. INTRODUCTION

India is the largest producer of chilli (*Capsicum annuum L*) in the world. It is being damaged by more than 20 pests of which most important ones are thrips, aphids, fruit borer and mites. Farmers use chemical pesticides for the control of these pests. As per the results of the survey conducted by Asian Vegetable Research and Development Centre (AVRDC) in Asia, the major insect pests that attack chilli are aphids (*Myzus persicae Sulzer*, *Aphis gossypii Glover*), mites (*Polyphagotarsonemus latus Banks*) and thrips (*Scirtothrips dorsalis Hood*). Chilli thrips multiply appreciably at a faster rate during dry weather periods and causes yield loss of 30 to 50 per cent in South India Vasundarajan¹ and sometime more than 90 per cent yield reduction Krishnakumar². Though the recommended schedules of pesticides sprays are 3 - 4, the farmers are spraying different pesticides more than ten times for the crop protection against these pests. This ultimately leads to high cost of production, low net returns, heavy debts and finally into a crisis situation and pesticide residues being left in the environment polluting air, water and soil. Hence it is necessary to overcome this problem, Non Pesticidal Management (NPM) is one of the best alternatives, presently attracting a lot of attention. In this approach, no chemical pesticides are used in cultivating crop. It is an 'ecological approach to pest management using knowledge and skill based practices to prevent insects from

reaching damaging stages and damaging proportions by making best use of local resources, natural processes and community action'. It involves applying sustainable solutions for managing the agro-ecosystem of field crops. It involves making best use of natural resources locally available and takes best advantage of the natural processes. NPM can reduce human and environmental exposure to hazardous chemicals, and potentially lower overall cultivation costs (Riyaz Khan.Md and Maruthi Ram.G, 2014).

II. MATERIAL AND METHODS

An experiment to evaluate the comparing the effect of chemical pesticides and NPM practices on the chilli pests natural enemies was conducted during kharif 2012-2013 and 2013-2014 at Karchal village of Medak (District) Telangana State.

Byadagi dabbi Chilli seeds were sown during 22nd and 20th June of 2012-2013 and 2013-2014, on nursery beds, after 40 days old Seedlings of chilli Byadagi dabbi were transplanted main field during 2nd and 30th August of 2012-2013 and 2013-2014 respectively. The experiments was laid out in Randomized Block Design (RBD) method with 12 treatments and three replications, Plot was laid out as per the plan before transplanting. Plots size 6.0 m x 4.2 m (Length x width) with 90 cm x 60 cm spacing (Flat bed x inter and inter row spacing). The crop was raised by following Recommended Pesticide of Practices (RPP) plant protection measures. To compare the efficacy, Four sprays of Recommended pesticide practices (RPP), In this, two sprays of Dimethoate 30EC (1.7ml/l) at 2 & 5 WAT(Weeks After Transplanting) and Dicofol 18.5EC (2.5ml/l) + Carbaryl 50WP (4 g/l) at 7 & 11 WAT as a chemical check was also maintained and a Control with no manure and chemicals were also maintained.

The population of Natural enemies coccinellids, chrysoperla carnea count was taken at 70, 100 DAT (Days After Transplanting) For counting these, five plants were selected randomly in each plot and observed, later number of *Natural enemies (grub and adult)* per plant was worked out.

The treatment effect was compared by following Duncan's Multiple Range Test (DMRT), and read at 0.05 probability,(P= 0.05). using M-STATC ® software package.

III. RESULTS

Activity of Coccinellid beetles

At 70 DAT, the untreated crop (control) recorded significantly higher number of coccinellids (1.98) and was on par with (T3) 2S NB +2S Cae + NO (1.68), 2S NB + 2S PG + NO (1.63), 2S NSKE + 2S Cae + GCKE (1.59), 2S NB+ 2S VD + NO (1.50). Significantly less number of coccinellids (0.14) were recorded in RPP (T11), which received four Chemical sprays. Whereas remaining treatments registered moderate population of Coccinellids during 2012 (Table.1). During 2013, coccinellid population varied from 0.16 to 1.65. Lowest coccinellid population was recorded in RPP (T11) (0.16), while significantly highest population

(1.65) was registered in control, and remaining treatments exhibited moderate activity of coccinellids. Pooled data also revealed similar pattern of treatment significance. At 100 DAT, control plots recorded significantly high number of coccinellids (1.93) and was on par with 2S NSKE + 2S NG + GCKE (1.38), 2S NB+ 2S PG +NO (1.36), 2S NSKE + 2Cae + GCKE (1.36), 2S NB + 2S VD + NO (1.35), 4S NSKE + VD (1.34), RPP (T11) recorded least coccinellid population (0.35) and rest of the treatments supported moderate population of coccinellids ranging from 0.79 to 0.98 during 2012. During 2013, coccinellid population varied from 0.34 to 1.64, and the effect of different treatments on coccinellids was similar as that of previous year. Pooled data also revealed a similar pattern of treatment significance.

Chrysoperl carnea

At 70 DAT, significantly least *Chrysoperla* population was recorded in Chemical Pesticide practices (T11) (0.43) followed by 2S NSKE + 2S GCKE + PG (T8) (1.25). Activity of *Chrysoperla* was quite normal in rest of the treatments and was comparable to the activity seen in control during 2012 (Table. 2). During 2013, population of *Chrysoperla* in general was quite less compared to previous year. Effect of the different treatments on the activity of *Chrysoperla* was quite similar as that of previous year. Pooled data also revealed similar trend. At 100 DAT, population of *Chrysoperla* ranged from 0.45 to 3.12. Activity of *Chrysoperla* in 2S NB + 2S PG + NO (T2) (2.17), 2S NB + 2S Cae + NO (T3) (2.19), 4S NSKE + VD (T9) (2.24) was quite normal as that of control (3.12). However, least predator activity was noticed in RPP (0.45). Moderate *Chrysoperla* population was noticed in rest of the treatments during 2012. During 2013, the treatments, 2S NB + 2S PG + NO (T2) (1.67), 2S NB + 2S Cae + NO (T3) (1.40) were found safe to *Chrysoperla* by supporting maximum population as seen in control. However, RPP (Recommended pesticides practices) proved to be detrimental to the predator by recording least population of 0.41. Pooled data also revealed similar trend

Table1.Comparing the Effect of Chemical pesticides and NPM practices on coccinellid beetles in chilli

Treatments	Coccinellid beetles (No/plant)					
	70 DAT			100 DAT		
	2012	2013	Pooled	2012	2013	Pooled
T ₁	0.93 b	1.00 bcd	0.97 cde	0.80 bc	0.93 bcd	0.87 de
T ₂	1.63 ab	1.27 ab	1.45 abc	1.36 ab	1.40 ab	1.38 abc
T ₃	1.68 ab	1.33 ab	1.51 ab	1.38 ab	1.47 ab	1.43 ab
T ₄	1.50 ab	1.33 ab	1.42 abc	1.35 ab	1.47 ab	1.41 ab
T ₅	0.99 b	1.33 abc	1.06 b-e	0.81 bc	0.93bcd	0.87 de

T ₆	1.45 ab	1.40 ab	1.43 abc	1.31 abc	1.33 abc	1.32 a-d
T ₇	1.59 ab	1.27 ab	1.43 abc	1.36 ab	1.40 ab	1.38 abc
T ₈	0.90 b	0.60 d	0.75 e	0.98 bc	0.73 de	0.86 de
T ₉	1.43 ab	1.07 abc	1.25 bcd	1.34 ab	1.20 a-d	1.27 bcd
T ₁₀	0.94 b	1.13 abc	1.04 b-e	0.81 bc	1.00 bcd	0.91 de
T ₁₁	0.14 c	0.16 e	0.15 f	0.35 c	0.34 e	0.35 f
T ₁₂	1.98 a	1.65 a	1.82 a	1.93 a	1.64 a	1.79 a
CV	10.60	6.70	5.59	9.92	7.43	5.84
S.Em±	0.09	0.05	0.05	0.08	0.06	0.05
C.D. at 5%	0.26	0.16	0.14	0.23	0.17	0.14

In a column, means indicated by the same alphabet/alphabets shows that there is no significant difference by DMRT(0.05).

In a column, means indicated by the different alphabet/alphabets shows that there is significant difference by DMRT(0.05).

Table 2. Comparing the Effect of Chemical Pesticides and NPM practices on *Chrysoperla carnea* in chilli

Treatments	<i>Chrysoperla carnea</i> (No/plant)					
	70 DAT			100 DAT		
	2012	2013	Pooled	2012	2013	Pooled
T ₁	1.99 ab	1.27 abc	1.63 abc	2.19 ab	1.40 a-e	1.80 a-d
T ₂	1.89 ab	1.33 abc	1.61 abc	2.17 ab	1.67 ab	1.92 abc
T ₃	1.99 ab	1.27 abc	1.63 abc	2.19 ab	1.40 a-e	1.80 a-d
T ₄	1.73 ab	1.07 bc	1.40 bc	1.46 b	0.87 d-g	1.17 cd
T ₅	1.83 ab	0.87 bcd	1.35 bc	1.51 b	1.00 b-g	1.26 bcd
T ₆	1.67 ab	0.80 bcd	1.24 bc	1.45 b	0.80 efg	1.13 d
T ₇	1.63 ab	0.80 bcd	1.22 bc	1.46 b	0.87 d-g	1.17 cd
T ₈	1.25 b	0.80 bcd	1.03 c	1.68 b	1.20 a-f	1.44 bcd

T ₉	2.10 ab	1.47 ab	1.79 abc	2.24 ab	1.80 a	2.02 ab
T ₁₀	2.07 ab	1.33 abc	1.70 abc	2.15 ab	1.47 a-d	1.81 a-d
T ₁₁	0.43 c	0.31 d	0.37 d	0.45 c	0.41 g	0.43 e
T ₁₂	2.80 a	1.77 a	2.29 a	3.12 a	1.89 a	2.51 a
CV	10.13	8.53	7.93	10.96	8.07	8.44
S.Em±	0.10	0.03	0.07	0.10	0.07	0.08
C.D. at 5%	0.28	0.20	0.20	0.30	0.20	0.22

In a column, means indicated by the same alphabet/alphabets shows that there is no significant difference by DMRT(0.05).

In a column, means indicated by the different alphabet/alphabets shows that there is significant difference by DMRT(0.05).

DAT: Days After Transplanting.

IV. DISCUSSION

Data from tables 33, 34 revealed that RPP (T₁₁) was found to be most detrimental for natural enemies by recording least population of coccinellid beetles (0.15 and 0.35) and *Chrysoperla* (0.37 and 0.43) at 70 and 100 DAT, respectively. However, in rest of the treatments it was quite normal as that of control, which indicated the safety of these treatments to predatory fauna in chilli crop.

Chinniah and Mohanasundaram(1999) suggested that the neem products viz., neem cake extract 10%, NSKE 5% and neem oil 3% were much safer to the predatory mites, *Amblyseus* spp. in cotton ecosystem and were ecofriendly in nature, whereas, neem based integrated treatments were found safer to coccinellid and syrphid predators of sucking pests of chilli (Chakraborti, 2000).

Smitha (2002) reported that the neem products found safer to predatory mites and coccinellids in chilli ecosystem. Various neem derivatives such as neem oil, NSKE, Nimbecidine, Bioneem, Spic neem gold and Neemarin were found safe to predatory mite, *Amblyseus* sp. and coccinellid beetles in chilli ecosystem (Varghese, 2003). In chilli, different indigenous materials viz. cow urine, garlic extract, NSKE, green chilli extract and vermiwash were found safe to *Chrysoperla* as well as coccinellid beetles (Ravikumar, 2004).

The safety of neem products and plant extracts to predatory fauna has been documented by various workers. Safety of *B. thuringiensis* to *C. carnea*, *C. septempunctata* and predaceous mite *Amblyseus persimilis* (Tandon and Nillana., 1987), neem derivatives to predatory mites (Dimetry *et al.*, 1994) coccinellids (Matter *et al.*, 1993, Mishra and Mishra, 1998, Singh and Singh, 1998) and both coccinellids as well as *Chrysoperla* (Kaethner 1991, Mann and Daliwal 2001 and Ravikumar 2004). Similarly safety of GCKE to *Chrysoperla*

and coccinellids (Ravikumar 2004) only coccinellids (Giraddi *et al.*, 2004) are on record. These reports lend support to the present findings.

V. CONCLUSION

Two sprays of Nimbecidine (NB) (5ml/l) at 2 & 5 WAT (Weeks After Transplanting), 2 sprays of 5% Custard Apple Leaf Extracts (Cae) at 7 & 11 WAT and Neem Oil (NO) (5ml/l) at 9 WAT, was recorded a highest number of Coccinellid beetles in chilli. whereas Four sprays of NSKE 5% at 2,5, 7&11 WAT and 5% Vitex Decoction at 9WAT, was recorded highest number of Chrysoperla carnea in chilli

VI. REFERENCES

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