



Research Article

IMPACT OF GINGER-GARLIC-GREEN CHILLI (3G) EXTRACT FOR THE MANAGEMENT OF SUCKING PESTS IN ORGANIC COTTON

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Abstract: Studies on the impact of cow urine-based ginger-garlic-green chilli (3G) extracts in organic cotton were conducted during Rabi 2018 and 2019 in Tamil Nadu Agricultural University. The jassid population was less (2.52/3 leaves) in 5% ginger-garlic-green chilli (3G) extract applied plots which was on par with NSKE (5%) application (2.76 nos./3 leaves). The mean per cent reduction of thrips population over control was more (50.35) in 3G extract (5%) applied plots which was on par with NSKE application (47.68). PROC for whiteflies was also more (62.74) in 5% 3G extract sprayed plots. The highest cotton kapas yield (2446 kg/ha) and BCR (2.09) was registered in 3G extract (5%) applied plots.

Keywords: Organic cotton, Sucking pests, Botanicals, 3G extract efficacy study

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Introduction

Cotton ecosystems throughout the world harbor a wide variety of insects. One hundred and sixty-two species of phytophagous insects have been recorded on cotton crop in India, of which 24 species have attained pest status and nine are key pests in one or more cotton growing zones of the country. Organic cotton is more warranted in pharmaceutical industries particularly in band-aid cloth manufacturing and baby cloth hosiery manufacturing.

In recent years, the minor pests (sucking pests) become major pests and causing serious problems in reducing the productivity and quality of organic cotton. Botanicals are considered as best alternatives for sucking pest management in organic cotton due to their eco-friendly nature. Considering the need of eco-friendly approaches to manage the insect pests in organic cotton, a study is designed to determine the relative efficacy cow urine based ginger-garlic-green chilli extract against sucking pests in organic cotton [1].

Materials and Methods

Two field experiments were conducted in Tamil Nadu Agricultural University, Coimbatore during 2018-19 and 2019-20. Field layouts were done in RBD with three replications. The cotton variety Surabhi was sown in the field during Rabi season. Recommended crop production practices were followed throughout the crop period. Ginger, garlic and green chilli were ground separately with equal quantity of cow urine, allowed for fermentation for 10 days and utilized for the study. In each treatment, three plants were randomly selected and in each plant three leaves (top, middle and bottom) were observed and pest incidences were observed and expressed in numbers per three leaves.

In each year during the crop period two rounds of sprayings were given as and when the sucking pests population exceeds economic threshold level. Pre-treatment and post treatment counts (3 & 7 DAS) were taken and the per cent reduction per cent over control (PROC) was calculated and given in [Table-1].

Treatment details

T₁ - Ginger extract 5 % T₂ - Garlic extract 5 %

T₃ - Green chilli extract 5 % T₄ - Ginger + Garlic + Green chilli extract 5%
T₅ - Cow urine alone 5% T₆ - NSKE 5 % (Std. check) T₇ - Untreated check

Results and Discussion

The results revealed that there were no significant differences among treatments in pre-treatment counts for all the sucking pests viz., jassids, thrips and whiteflies.

Jassids

In post treatment count at 3 DAS, the jassids numbers were drastically reduced in all the treatments except untreated check. The numbers were less (2.52/3 leaves) in ginger-garlic-green chilli (5%) extract applied treatment which was on par with NSKE (5%) application (2.76 nos./3 leaves). Medium control of leaf hoppers population was noticed in garlic (4.02 nos./3leaves), ginger (4.23 nos./3leaves) and green chilli (4.59 nos./3 leaves) extracts applied separately at 5% concentration. The cow urine alone was less effective with more jassids population of 5.55 nos./3 leaves. At 7 DAS slight variation in populations were observed in all the treatments except control when compared to 3 DAS count. The PROC was more (60.63) in 3G extract application followed by 5% NSKE application (58.25) and less (15.22) in cow urine alone sprayed plots. The lesser population of jassids in ginger-garlic-green chilli extract might be due to the active compounds like gingeberene, allicin and copsaicin present respectively, in ginger, garlic and green chilli. This study was in accordance with the findings of Natarajan, *et al.*, (2000) [2] in okra crop.

Thrips

The thrips population was more in all the experimental plots when compared to the jassids. In pre-treatment count, the thrips numbers in three leaves were in the ranges from 9.09 to 10.08. Whereas, in post treatment count at 3 DAS, the numbers were in reducing trend (5.10-11.49) and on 7 DAS the numbers were further reduced (4.23-11.37). The mean PROC was more (50.35) in ginger-garlic-green chilli extract (5%) applied plots followed by 5% NSKE application with the PROC of 47.68.

Table-1 Effect of treatments on sucking pests (No./3 leaves) in cotton (Mean of 2 years)

Treatment	Jassids			Thrips			Whitefly			PROC (%)		
	PT	3DAS	7DAS	PT	3DAS	7DAS	PT	3DAS	7DAS	Jassids	Thrips	Whitefly
T ₁	6.18	4.23	4.08	10.08	7.32	8.16	3.24	2.43	3.51	32.31	28.57	27.23
T ₂	6.06	4.02	4.05	9.09	6.72	7.80	3.09	2.25	3.18	33.56	28.69	28.97
T ₃	5.97	4.59	4.74	9.27	7.05	9.18	3.02	2.34	3.93	23.20	24.24	20.59
T ₄	6.27	2.52	1.95	9.93	5.10	4.23	3.33	1.41	1.53	60.63	50.35	62.74
T ₅	6.39	5.55	5.82	9.36	8.41	11.37	3.09	2.91	4.68	15.22	12.96	6.07
T ₆	6.24	2.76	1.86	9.72	5.43	5.13	3.18	1.53	1.62	58.25	47.68	59.64
T ₇	6.12	7.17	11.49	9.61	11.49	18.99	3.18	4.74	7.26	-	-	-
S Ed	0.72	0.75	0.66	0.84	1.65	1.81	0.81	0.55	0.75	-	-	-
C.D (p=0.05)	NS	1.62	1.41	NS	3.57	3.9	NS	1.23	1.62	-	-	-

Table-2 Effect of treatments on yield and economics of cotton grown organically

Treatment	Yield (kg/ha)	Cost of Cultivation (Rs. / ha)	Gross Return (Rs. / ha)	Net Return (Rs. / ha)	BCR
T ₁	1843	57920	96543	38623	1.61
T ₂	1981	57225	101286	44061	1.74
T ₃	1752	55975	89403	33428	1.56
T ₄	2446	59100	121227	62127	2.09
T ₅	1059	55600	51306	-4294	0.95
T ₆	2329	57850	114342	56492	2.01
T ₇	960	55350	46767	-8583	0.87
S Ed	188	-	-	-	-
C.D (p=0.05)	411	-	-	-	-

The cow urine alone applied treatment recorded the minimum PROC of 12.96. The better efficacy of 3G extract might be due to the presence essential oils present in ginger, garlic and green chilli. This result was corroborated with the findings Ursani, *et al.*, (2014) [3].

Whiteflies

The pre-treatment whitefly population of the experiment in was less when compared to jassids and thrips populations. In post treatment at 3 DAS, the whitefly numbers were in the ranges of 3.02-3.33 / 3 leaves. Whereas, at 7 DAS the numbers were in increasing trend (1.53-7.26/3 leaves). The PROC was more (62.74) in ginger-garlic-green chilli 5% extract sprayed plots followed by 5% NSKE applied treatment (59.64). The PROC was minimum (6.07) in 5% cow urine alone sprayed plots. This result was in accordance with the findings of Prishanthini and Vinobaba (2014) [4].

Yield and economics

The highest cotton kapas yield of 2446 kg/ha was recorded in 5% each of ginger, garlic and green chilli extract applied plots which was on par with 5% NSKE applied treatment (2329 kg). The next best treatment was 5% garlic (1981 kg/ha) and 5% ginger (1843 kg/ha) extracts applied plots. The lowest kapas yield of 960 kg/ha was observed in untreated check [Table-2].

The cost of cultivation was more (Rs.59100/ha) in ginger-garlic-green chilli extract (5%) applied treatment and less (Rs.55350/ha) in untreated control. The gross return was more (Rs.121227/ha) in 3G extract applied treatment followed by NSKE (5%) applied plots (Rs.114342/ha) and garlic extract (5%) applied treatment. In net return the same trend as that of gross return was observed. The highest BCR of 2.09 was found in ginger-garlic-green chilli extract (5%) allied treatment followed by NSKE (5%) application and garlic extract (5%) treated plots.

Conclusion

Application of 3G extract was effective against sucking pests like leaf hoppers, aphids and whiteflies in cotton. More kapas yield (2446 kg/ha) and BCR (2.09) was recorded in 3G extract application. Hence, it is concluded that the 3G extract might an alternative to NSKE for the management of sucking pest in organic cotton.

Application of research: Study of impact of ginger-garlic-green chilli (3g) extract for the management of sucking pests in organic cotton

Research Category: Pest Management

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Study area / Sample Collection: Agricultural Research Station, Bhavanisagar, 638 451

Cultivar / Variety / Breed name: Cotton

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
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