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Short Communication

EFFICACY OF GREEN CHILLI, GINGER AND GARLIC (3G) SOLUTION FOR THE CONTROL OF CHILLI THRIPS (*Scirtothrips dorsalis.*HOOD)

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INTRODUCTION

Chilli (*Capsicum annuum* L.) is the most important commercially grown vegetable and the second largest commodity in the international trade as a condiment. The area under green chilli cultivation and the annual production in Sri Lanka were around 13,978 ha and 71,767 tons, respectively in the year 2014 (Agstat, 2015). Chilli yield is highly affected by pest and diseases, which is the major constrain in Chilli production. Chilli leaf curl complex (CLCC) is the most devastating disease reported from all chilli growing areas in Sri Lanka, and it causes a serious yield loss (Rajapakse *et al*, 2003). This malady is associated with four insect pests (thrips, whiteflies, aphids and mites, and several viruses (Galanihe *et al.*, 2004). Among these pests, chilli thrips causes losses up to 40-50% (Karnataka, 2009). The incidence of thrips starts from nursery and continues till harvest. A severe infestation of chilli thrips makes the tender leaves and buds brittle, resulting in complete defoliation and total crop loss. Infested fruits develop corky tissues (Seal *et al.*, 2006).

Green chilli, Garlic and Ginger (3G) mixture solution is one of the bio pesticide. This solution can help to reduce most of the foliage pests on various crops because of their smell and thus, can repel these pests or affect their growing cycle resulting considerable disease control. Thus, this study was

conducted to test the effectiveness of green chilli, ginger and garlic solution mixture on controlling leaf curl complex diseases in chillie crop

MATERIALS AND METHODS

The experiment was conducted at the Regional Agricultural Research and Development centre (RARDC), Kilinochchi, Sri Lanka, during August 2016 to November 2016. The cultivar MI-2 of chilli was used in this study; Garlic (1 kg), Ginger (1/2 kg), Green Chilli (1/2 kg), Surfactant, Kerosene, Water and Abamactin (18 g/l Ec) were used as materials to prepare the solution. Thirty-five days old healthy seedlings of local variety (MI-2) were used for transplanting. Before transplanting, the chemical Abamactin 18 g/l EC was applied to each seedling to control any thrips that would live on seedlings. Other management practices were carried out as per the recommendations of Department of Agriculture. The treatment combinations are shown in the Table 1 which was laid in a Randomized Complete Block Design (RCBD) with three replications. The chilli seedlings were planted with the spacing of 60 × 60 cm in plots having dimension of 4 × 3 m.

Preparation of 3G solution

Garlic bulb was prepared by removing dried outer layer and one kg of bulbs were soaked 1:1 of kerosene for overnight. Garlic was taken after drain kerosene and ground with a mixer grinder to obtain garlic paste. Similarly, 500 g of green chilli and ginger were mixed separately with 1 cup of water and ground with a mixer grinder to obtain paste. All three pastes were thoroughly dissolved with two liters of water. Then, the mixture was filtered through muslin cloth, and 1 ml of surfactant was mixed with the filtered solution to increase the sticky nature of solution.

Application of 3G solution

Hand pump sprayer was used to apply the solution on plants in experiment plots. The first application was done at 2 weeks after the planting, followed by weekly spray. The solution was sprayed immediately after preparation.

Three plants per plot were selected randomly to count the population of thrips. Three leaves were selected as one from each top, middle and bottom part of the randomly selected plants. The population count of the thrips was recorded on the following day after each application of 3G solution. The data obtained from the study were analyzed using SAS 9.1.3 statistical software. The least significant different was calculated following a Duncan's Multiplication Range Test (at $p<0.05$).

Table 1.The treatments of the experiments

Treatment	Dilution dosage
3G solution : water	1:5
3G solution : water	1:10
3G solution : water	1:20
Abamectin 18 g/l EC	1: 1,666
Untreated control	

RESULTS AND DISCUSSIONS

Table 1 shows the effectiveness of various treatments on the population on chilli plants 24 hours after treatments. The different dilution of 3G solutions and chemical treatments caused a reduction on the population of chilli thrips 24 hours after treatment. 1:5 dilution of 3G solution significantly ($p<0.05$) controlled thrips 24 hours after application compared to other four treatments. Chemical Abamectin was also resulted reduction in thrips infestation, but did not perform better than plant extracts mixtures.

Higher yield was obtained per land area in all treated plots compared with untreated plots (1.66 kg/m^2). However, plots treated with 1:5 dilution had recorded significantly higher yield ($p <0.05$) than that of all other treatments (2.49 kg/m^2).

Table 2. Means population of thrips and average yield of green chilli

Treatments	Dosage	No of thrips/ 3leaves	Yield (kg/m^2)
3G solution: water	1:5	3.0 c	2.49 c
3G solution: water	1:10	4.0 b	2.2 b
3G solution: water	1:20	4.0 b	2.03 a
Abamectin 18 g/l EC	1:1,666	4.66 b	2.26 b
Untreated control		15.33 a	1.66 a
CV %		37.2	12.4

Bio pesticide is safe, sustainable and environment friendly pest and disease control method which can be used for chilli thrips control. Green chili contains a capsaicin that creates the hot, spicy effect. Capsaicin at ppm causes a persistent burning sensation. Capsaicin works by opening doors in the cell membranes that enable calcium ions to flood into the cell, making it trigger a pain signal that is transmitted to the adjoin cell. Capsaicin destroys cells by stopping the production of certain neurotransmitters that enable cellular communication. As thrips are small, soft-bodied insects a sufficient high concentrations of capsaicin can destroy cells and kill them.

Garlic produces allicin, which gives its aroma and healthful properties to humans. Garlic does not contain allicin itself; but when the cloves are crushed the allicin will be released which may be toxic to certain insect eggs.

The results presented in this study showed that application of 3G solution on chilli crop significantly increased the efficiency on control chilli thrips when compared with control treatments. It seems that garlic, ginger and green chilli acts as a repellent for insects. Because, garlic and chilli produces a pungent alliaceous compound, which probably is responsible for its pest repellent attribute. On the other hand, efficacy of Abamactin (0.15EC) on control insect pests in chilli crop was also significantly higher compared to untreated control.

CONCLUSIONS

It can be concluded that the application of garlic, ginger and green chilli (3G) solution mixture greatly reduces the thrips population in chilli resulting higher yield compared to control. The 1:5 ratio of the solution is the most effective ratio among tested mixing ratios which is comparable with performance of application of Abamectin chemical at the rate of 18 g/l EC

REFERENCS

AgStat. 2015. Socio-Economic and Planning Centre, Department of Agriculture, Peradeniya, Sri Lanka. 16.

Galanihe, L.D., M.G.D.L. Priyantha, D.R.Yapa, H.M.S. Bandara and J.A.D.A.R. Ranasinghe. 2004. Insect pest and disease incidences of exotic hybrids chilli pepper varieties grown in the low country Dry zone of Sri Lanka. Annals of Sri Lanka. 6:99-106.

Karnataka J. 2009. Evaluation of eco-friendly approaches for the management of sucking pests in chilli. Agricultural Science. 22(3): 720–721.

Rajapakse, R.G.A.S., W.A.P.G. Weerarathna and M.G.D.L. Priyantha. 2003. In Fifty Years of Research 1950-2000: Review of Past Findings of Agricultural Research at Mahailluppallama. (Edition) P.B. Dharmasena, H. Samarathunge and M.S. Nijamudeen. Field Crops Research and Development Institute, Department of Agriculture, Mahailluppallama, Sri Lanka.

Seal.D.R., M. Ciomperlik, M.L. Richards and W. Klassen. 2006. Comparative effectiveness of chemical insecticides against the chillithrips, Scirtothrips dorsalis Hood (Thysanoptera: Thripidae), on pepper and their compatibility with natural enemies. Crop Protection. 25: 949-955.