



EFFECT OF CERTAIN MEDICINAL PLANT EXTRACT ON INSECT PEST MANAGEMENT OF WATERMELON CULTIVATION.

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Abstract

Today the human species is being challenged through a series of hurdles! Be it population explosion, pollution or the ever alarming global warming. The extensive use of chemical pesticides in the lieu of managing various pests attacking our food crops has been working towards the escalation of global warming since the last decade. Apart from global warming the injudicious use of chemicals has been lethally affecting the health of humans & other living organisms. Moreover, the total expenditure has increased, which is affecting the pockets of the farmers. Thus, the farmers have now- a-days moved towards indigenous methods to manage the insect pest attack on their field crops, where they use certain medicinal plant extracts. Keeping this in mind, an experiment has been conducted to see the effect of certain medicinal plant extracts on Insect pest management of watermelon cultivation at Lovely Professional University Field Campus, Kapurthala, and Punjab, India. In this study, the botanical extract has been prepared using garlic, ginger and chilli mixture in the ratio 2:1:1 respectively. The plant samples containing primarily leaves were dried, ground into fine powder and using distilled water different concentration viz., 2%, 5%, 8% & 10% level were made. Results show that the red pumpkin beetles were completely eradicated upon spraying 10 % concentration solution. Although, the results of botanical treatments are not as quick as compared to chemical spray, but once sustainability is kept in mind, then farmers can opt for this.

Keywords : Medicinal Plants, plat extract, Watermelon, Pest management.

Introduction

Cucurbits are an integral part of culinary world as a vegetable, fruit, or salad. Watermelon (*Citrullus lanatus*) is one of the most consumed & cherished fruit in *Cucurbitaceae* family family *Cucurbitaceae*) and had originated in Southern Africa i.e., Kalahari Desert of Africa. This annually growing andromonoecious, vine plant has coarse, hairy pinnately- lobed leaves and bears generally yellow flowers while some produce white. Watermelon has a smooth and hairless rind, usually it is green with dark green stripes or yellow spots, or completely dark green. Its interior derived from mesocarp, is filled with a juicy sweet flesh containing numerous seeds, deep red to pink, but sometimes orange yellow or white with firm to fibrous texture. This pepo fruit comes in different sizes and shapes viz., small, medium, large and oval shape, round respectively. Like its cousin's watermelon also requires high intensity light & temperature for fruit setting and development.

Watermelon is not only cherished by humans but also by various insect-pests like *Aphis gossypii*, *Liriomyza* sp., *Diabrotica seporata*, *Aulacophora foveicollis* etc. Out of these red pumpkin beetle i.e., *Aulacophora foveicollis* is rising to the status of major pest with an alarming sign. These reddish brown beetles are a destructive to all known melons. To control red pumpkin beetle many chemicals are available like Malathion, Dimethoate, Methyl demeton, Thiomethoxam etc. The main motto was to find how the chemicals present in the botanicals affect the pest infestation on the plant. Among the five kingdom classification, plant kingdom is regarded to have some biological properties which can be used against insect pest management. (Ishmanad Akhtar, 2007)

With manifold application of chemical pesticides they are making the pest population resistant against the chemical applied thus creating a nuisance in the chemical pesticide world. Just to break the resistivity double, triple or sometime manifold application of these pesticides is necessary (Stall, 2000).

Botanical extracts when used in a certain ratio and certain concentration can be used to repel away the pest population and these being non carcinogenic and non residual effect. They all possess antioxidant effects as well as antifungal effects (Prakash and Rao, 1997).

Garlic is known to have organosulphur compounds like allicin and Diallyl sulphide, where as chilly has capsaicin, Ginger has a number of compounds, the pungency is due to Gingerol and whilst flavour also comes from Zingiberne. These compounds are a part of defence system and help in warding off insect-pests. The major pests that have attacked the crop during the cultivation period was mainly Red pumpkin beetle (*Aulacophora foveicellis*). Red pumpkin beetle were abundantly present in the field. It attacks the melons at the seedling stage. It make circle shaped holes in the leaves of water melon.

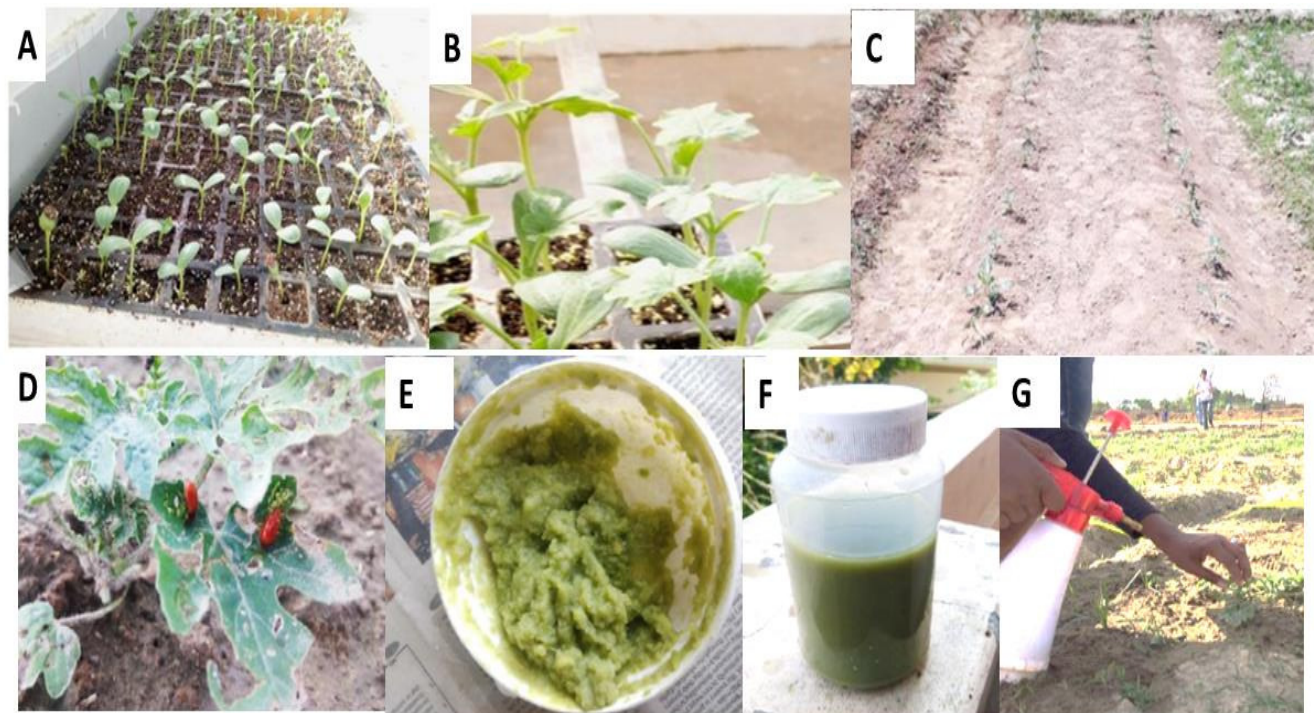
Keeping in view these points garlic, ginger & chilli were chosen for the experiment, to study the effect of medicinal plant extract on insect pest management and also to compare the above seen effect with that of chemical pesticide. The use of plant extracts in the control of stored products insects is an ancient practice (Qi and Burkholder, 1981 Arannilewa *et al.*, 2006).

Material and Methods

The experiment was conducted at Lovely Professional University Field Campus, Kapurthala, Punjab, India. The experimental plot was divided into 6 treatments, each having 15 plants at 45 X 45 cm spacing. The ginger rhizome, garlic cloves & chilli fruit each weighing 200mg were taken and grinded in distilled water. The mixing ratio of garlic, ginger chilly was 2:1:1 and was collected in a container and strained using muslin cloth. Further, this mixture was made into solution where mixture: water was 1:1. Using this as stock solution different concentration viz., 2%, 5%, 8% and 10 % were made.

At field the 1st treatment was kept as control while 2nd treatment was sprayed with Thiomethoxam (@ 1.5ml/lit of water). The plants in 3rd treatment received 2% of the extract whereas, the 4th treatment was given, 5% of the extract solution whereas, the 5th treatment was given 8% of the extract solution. The last treatment received 10% concentration of the extract solution.

Spraying was done at five different levels of crop growth which ensured that the pest infestation does not cross the ETL level and damages the crop plants. More over spraying of 2% was done one week after transplanting, 5 % was done two weeks after transplanting, 8% was done after fruiting and 10 % was done before maturity and another 10% was done before harvesting.



A:watermelon seedlings **B:** Seedlings at transplanting stage **C:**After transplanting in field **D:** Red pumpkin beetle attack **E:** ginger, garlic, chilly paste **F:**solution made from the paste **G:** Spraying of extract with hand sprayer

For the control of red pumpkin beetle extract solution of chilli ginger garlic was sprayed at fortnightly interval where as the neem extract was sprayed at weekly interval.

Results and Discussion

The plants in control had been severely affected by the infestation of red pumpkin beetle. The pest incidence had started from the 3rd week of transplanting which persisted till pre harvesting stage. Maximum incidence was noted down before harvesting while least was observed at 4 leaf stage.

The treatments sprayed with 2% & 5% spray solution had at par results with each other, followed by fifth treatment having plants sprayed with 8% of extract solution (Fig.1). Maximum control with garlic: ginger: chilli mixture was obtained when the plants in treatment no. of 6 were sprayed with 10% concentration. Richards (1978) also reported that essential oils of plant origin are highly lipophilic; and therefore have the ability to penetrate the cuticle of insects. This may be another reason for the potency of the extracts.

The results obtained at par with the control given by treatment two where plants were sprayed by Thiomethoxam.

Spraying timing	No. of pests /plant					
	T1 (Control)	T2 (Thiomethoxam)	T3 (2%)	T4 (5%)	T5 (8%)	T6 (10%)
4 leaf stage	1	1	1	1	1	1
8 leaf stage	4	2	3	4	4	4
Pre flowering	8	1	6	8	3	3
Post fruiting	10	0	6	6	2	0
Pre harvesting	12	0	4	4	2	0

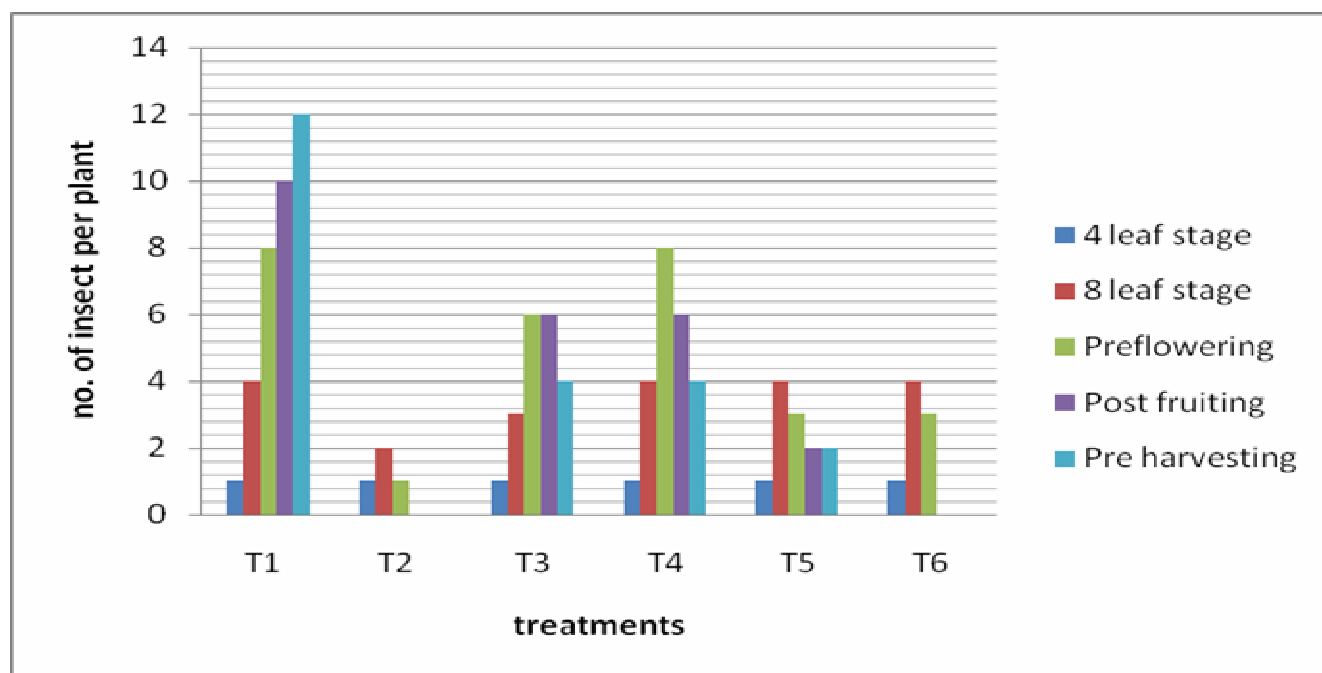


Fig. 1 : Number of insects per plant with different treatments.

Tarun *et al.*, in 2014 also reported, sprayed of Garlic and chili combination + soap 0.1% greatly resistance the effect of cabbage insect pests, and also clearly enhanced the quality in cabbage production. Therefore, we can be concluded that application of Garlic and chili combination + soap 0.1% would have substantial positive impacts, promoting agricultural productivity and human nutrition without the deleterious environment. *Al. sativum* has been discovered to be active as a repellent, antifeedant, bactericide, fungicide and nematicide (Graigne *et al.*, 1985; Mason and Linz, 1997). These compounds may be responsible for their potency.

The most effective spray was after two weeks of transplanting and after fruiting. One thing observed was that, the insects were not dying, in fact they were getting repelled off from the crop as the paste contained a sulphur compound which is antimicrobial as well as insect-pest repellent. With the publication of Silent Spring in 1962, it was clear that each chemical that we apply will have a effect it the soil health and indirectly affecting the human health. It may be carcinogenic, high and acute toxicity with harmful residual effect. (Prakash *et al.*, 1997; Dubey *et al.*, 2011).

This ensures the maintenance of ecological balance as compared with chemical spray.

Conclusion

This study reports on the variability of antioxidant components present in garlic, ginger and chilly when applied together in a paste form in the ratio 2:1:1. It also shows how the paste when applied in solution form at different concentration level varies in the eradication of the pest. The most interesting thing to notice was that the pest population was not dying instead it was just repelling away, which means that in this way we are not harming the ecological balance of nature as when compared to the harmful chemical pesticides which once applied will kill the entire population of the insect pest. This technique in the world of agriculture is not new, it has been in research for long but the only fact is farmers are not ready to adopt or implement it

due to fear of heavy losses. Now the fact is that to extend this research we need to see if our yield is dropping as compared to the conventional chemical agriculture so that we can find the sustainability from both perspective i. e. yield and insect pest management.

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