Phytology

Development and evaluation of Karaveera and Dhatura biopesticide on *Spodoptera litura* - a field study

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Abstract

The total population of earth is 767 crore1 and available land for cultivation is only 39 crore2 with increase in population new agriculture techniques developed1, with them developed exploitation of land with chemicals, pesticides are organic or chemicals used to kill, prevent pests. Pesticides are found to have bioaccumulation property and are hazardous for animals. The increased social hazard has led to a search of other alternatives. Biopesticide a pesticide consisting of naturally occurring or genetically engineered micro-organisms3. Use of bio-pesticides for pest control today is an evolving field. This article is in view with the current knowledge on the potential use of biopesticides for pests control, the concept of biopesticides, their categories, utilization in pest management, formulations and use in the control of pests for agricultural crops, and finally with information on mechanisms of actions of biopesticides on pests control. One such study using Ayurveda Visha dravyas were used to formulate, develop biopesticide and for control of biopesticide.

Keywords: pesticides, visha dravyas (toxic drugs), pesticide, exploitation

Introduction

Deterioration of crops due to pests and plant pathogen reduces the yield and is a big burden for harvestors all over the world, about 40 per cent reduction in the worlds crop yield due to pests has been, Pest management has been done with pesticides. To increase the yield, exploitation if these techniques has been seen. The globen burden of pesticide is increasing day by day, may it be a direct exposure, indirect. With increasing demand for food products for the growing population, the use of more and more harmful techniques in agriculture is seen evidently. Pest resistance, bio accumulation are the most dreadful effects of chemical pesticides.

The rules and regulations to abide harmfull effects of pesticides were drafted way back in 1968 as Insecticides Act, but continuous breaking of the rules is been seen by from manufacturers to farmers. Hence the need for newer techniques is needed for the organic culturing of plants and crops.

Materials and Methods

Geographical Position and Experimental Site

We chose the Belagavi of India for our study. Because of the diversity of soya bean grown and the consistently high yields, it is one of the most important regions for soya bean cultivation. In 2020 an inception meeting was organized with local farmers, co-author and evaluated about the pest, its lifecycle and crop damage. Also the purpose of this meeting was to determine an appropriate experimental field site and target pest. It was decided that *Spodoptera litura* would be designated as the major Soya bean pest for this study. Site selection done which was fertile and rotational crops were sown, land was prepared for the sowing.

Experimental Design

The experiment was conducted during December–February growing season of 2019-20 in the Belagavi region in the location of the cultivation. The land was prepared for sowing and blocks of 1*1 ^{m2} 20 blocks as per Randomized blind data study were made, on day 0 seed were sown and water was given to the field on alternative day. On day 2 the whole sites were randomly assigned for 5 treatments (KK, DK, KA, DA, Control- Lambda- cyhalothrin 5% EC.) with each getting 4 replications (Table 1). On day 15 eggs and larvae with leaf damage was noted.

Table 1: Description of all field treatments

Randomised Blind Data Study

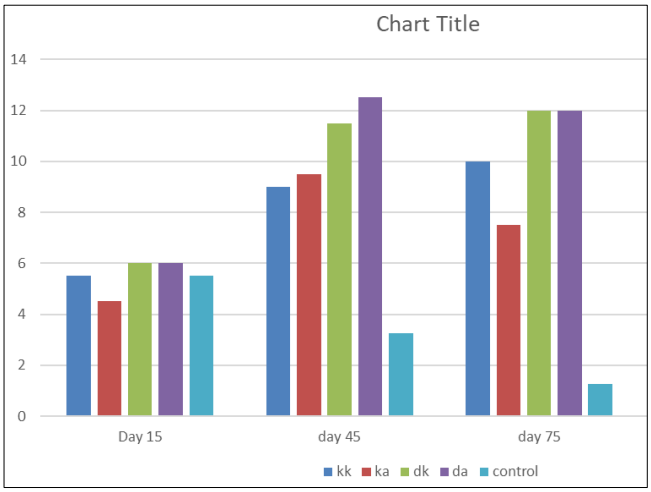
Control group	Karaveera Kashaya	Dhatura Kashaya	Dhatura Aquous extract
Dhatura Kashaya	Karaveera Aquous extract	Dhatura Aquous extract	Karaveera Aquous extract
Dhatura Aquous extract	Control group	Dhatura Kashaya	Control group
Karaveera Kashaya	Dhatura Kashaya	Karaveera Kashaya	Karaveera Aquous extract
Karaveera Aquous extract	Dhatura Aquous extract	Control group	Karaveera Kashaya

Description of Pest Control Methods

SL eggs are spherical, flattened slightly. Eggs are laid on the leaves in a group, each group consisting of thousands of eggs. Eggs usually hatched 2-3 days afterwards hatching. Larvae ranged from 2.3 to 32 mm. for psodoptera Lambda- cyhalothrin 5% EC.

Data Collection

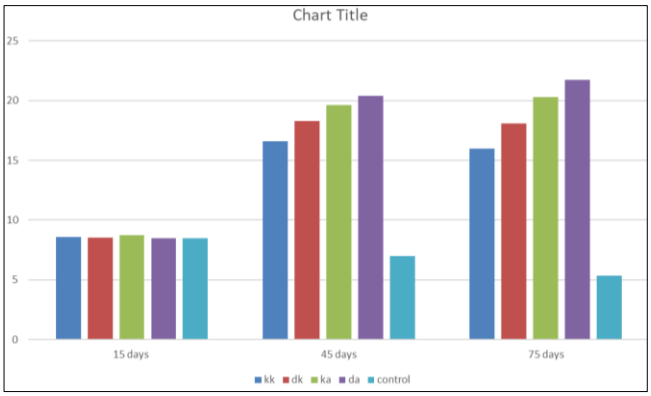
At each block larvae count and leaf damage data was collected on 15th, 45th and 75th day were collected of all the 20 blocks (Tables 2).



Graph 1: Showing mean larvae count

Table 2: Mean larvae count analysis

	kk	dk	ka	da	control
Day 15	5.5	4.5	6	6	5.5
day 45	9	9.5	11.5	12.5	3.25
day 75	10	7.5	12	12	1.25



Graph 2: Mean Leaf destruction

Table 3: Larvae count and mean leaf damage

days	kk	dk	ka	da	control
15 days	8.6	8.525	8.75	8.5	8.5
45 days	16.6	18.3	19.625	20.375	7
75 days	15.95	18.1	20.3	21.725	5.325

Data Collection

We took a site for cultivation of 20*20 m^2 was taken. Land was prepared and soyabean was cultivated, pesticidal spraying was done on 30 th and 60th day after sowing with data for leaf destruction and larvae counts were seen on 15th 45th and 75th day respectively and the results were analyzed for pesticidal activity of the formulated biopesticide in comparison with control i.e Lambda Cyrothrrin.

Observations

- In pest control with the kashaya blocks weeds around the crops were less in these blocks.
- Pods weight were also seen to be more in comparison with the previous yield (Observation of workers).
- Reduced new larvae formation seen.

Statistical Analysis

The experiment was laid out as a Randomized Blind data study model and we used two-way annova and post hoc dunett test for analysis of results of before and after, effect in comparison with control.

Results

- P (for < 0.005) value shows significant for leaf destruction suggesting that leaf destruction is present.
- Though the larvae count increased but leaf destruction is considerably stable.
- Further in comparison with the control there was significant change in action of the formulated biopesticide.

Comparison with the control pesticide

- The table signifies that sprayed biopesticide had completely different action than the control in leaf destruction.
- Further, the action can be concluded as Control>KK>DK>KA>DA.

Larvae count

- P (for < 0.005) value shows significant for larvae suggesting that larvae are present.
- Mean larvae count suggest that formation of new larvae in next generation was considerably as the same number as the previous generation.
- Mean Larvae count was reduced only in *Datura Kashaya* group.
- Further in comparison with the control there was significant change in action of the formulated biopesticide.

Comparison with control

- In comparison with control the biopesticides formed have different action and were not significant in action against control
- Further, the Action can be concluded as Control>KK>DK>KA>DA.

Discussion

- The Pesticidal activity observed among extracts of *Karaveera* could be explained by the action or effect of phytochemical components: flavonoids, sterols, terpenes, triterpenes, and coumarins [4].
- Flavonoids, are antioxidants or enzyme inhibitors, are part of photosynthesis and may serve as precursors of toxic particles [4].
- Indeed, the leaves contain a mixture of a very toxic cardiac glycosides of cardenolides like digitoxigenin, nerizoside oleandrigenin, digoxin, oleandrin, digitonin, neritaloside, and odoroside [4].
- *Datura Stramonium* plants contain hyoscyamine atropine, scopolamine, which are toxic, hallucinogenic and produces delirium and possibly death [3].
- Also, the deficiency of dissolved oxygen in water due to active presence of the chemical components of these plants cannot be ignored as also reported by Farid *et al* (2002) [5].

- Further new larvae were not formed because of the reduction of pest population in first generation.
- The action of formulated bio pesticides can be considered as it decreases conversion of larvae into pupa and adult moths.

1 2 3

Fig (1-3): Soil Preperation (1-2), Collection of Drug (3)

(4)

(5)

(6)

(7)

(8)

Fig (4-8): Preperation of Kahsaya and aqueous extract with spraying

N+7days

N+10 days

N+ 12 days

N+15 days

N+25 days

Fig (9-13): TimeLine of life of Pest *Spodoptera litura*

Conclusion

- Biopesticide formulated successfully.
- All the prepared bio pesticides controlled the increase in next generation of pests.
- The formulated bio pesticides were successfully in controlling the conversion of larvaes into pupas and leaf destruction but was not effective in comparison with control.
- In comparison with control few blocks of Bio pesticide sprayed showed weedicide effect.
- In the comparative study Control>KK>DK>KA>DA.
- However the study can be taken forward by trying different concentration gradients to evaluate larvae and leaf destruction.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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