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Research Article

PESTICIDAL EFFECT OF *EUPHORBIA, NERIUM AND CALOTROPIS* LATEX ON SOME LARVAE OF CROP DAMAGINING PESTS

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ABSTRACT

Plant and animals are complimentary to each others, since the starting of civilization, when a hunter man converted himself into a cultivator he gained vast knowledge about plants and their characteristical varieties. The plant were used by human being for their food, shelter, medicines etc. Since the beginning of Ayurved the Ayurvedic vaidys have choosen the medicinal plants which were used by ancient human being traditionally. In our Vadic literatures the worship of Herbs, Shrubs and Tree have been conducted. Due to rapid deforestation, industrialization and urbanization most of the useful diversity of plants are gradually going towards endangered, some of them have been lost. Such the plants are not important only for medicinal use, but they are also important in the prevention of dangerous insects, pests, fungus and other harmful biotics for crops, vegetables,other stored food materials and animals.

The present study is based on the pesticidal effects of *Euphorbia neriifolia, Nerium indicum*, and *Calotropis gigantea* latex and its effect on some agricultural larvae of pest *Helicoverpa armigera*, *Mythimna seperata* and *Raphidopalpa forcicollis* which are harmful to the crops. The different diluted concentrations were spread over pest larvae for 12 hrs, 24 hrs and 48 hrs.

The above cited concentration of *Euphorbia neriifolia*, *Nerium indicum* and *Calotropis Gigantea* were spread over the larvae of pests *Helicoverpa armigera, Mythimna seperata* and *Raphidopalpa forcicollis*. Ten indiuals of each larvae of pests were kept in each patrydishes with triplicates against the control

The mortality (mean value in %) rates of *Mithimna separate* larvae of with different plant latex have recorded in case of *Euphorbia neriifolia* it was recorded as 32.99%, in case of *Nerium indicum* it was 36.30% and in case of *Clotropis gigantea* it was 35.36%.

The mortality (mean value in %) of *Raphidopalpa facicollis* larvae with all three plants have recorded as 30.30% with *Euphorbia nerrifolia* and 33.05% with *Nerium indicum* and 33.35 % with *Calotropis gigantea*.

The mortality (mean value in %) of *Helicoverpa (Heliothis) armigerea* larvae with different plant latex was recorded as *Euphorbia nerrifolia* 35.12%, in case of plant latex *Nerium indicum* it was recorded 37.45% and in case of *Calotropis gigantea* mortality was recorded as 37.02%.

Keywords: Pesticidal effects, Agricultural pest Larvae, Plant Latex, Mortality rates.

INTRODUCTION

Pesticides are commonly known as the chemicals used to control the harmful insects and pests to plants and animals. Now pesticides have become an important part of human life used for agricultural practices. Modern agriculture requires the use of large amount of fertilizers, insecticides, Pesticides, Biocides, Herbicides and other soil additives. Some of these washed of lands through irrigation, drainage, Rainfall and leaching in to rivers, streams, ponds, lakes and other water bodies. Some of the pesticides having the volatile characteristics are evaporated and pollute the air, thus our natural resources are being polluted by these chemical pesticides and insecticides.

The main culprit of water pollution in agriculture is the excessive use of fertilizers, insecticides and pesticides which worldwide increased farm about 28 mt in 1960 to about 140 mt. in 1995. Currently more than 1170 pesticides are registered today with U.S. Environmental Protection Agency, out of which 425 are herbicides, 335 are insecticides and 410 fungicides are available in market. In our country half kilogram of pesticides used by every man per year.

There are certain major threats which limit the continuous use of pesticides and insecticides are_

1. Some pest organism has developed the resistance capacity to their chemicals.
2. Some pesticides are not readily biodegradable chemicals which increase and tend to persist for years in environmental or ecosystem (water and soil) and moves to other part of environment through food chain or chemical cycle.
3. Pesticides pollute the water, because they produce non-biodegradable chemicals which increase the BOD, COD etc.
4. The detrimental effects of chemicals on organism other than the target pests. The soil, flora fauna may be adversely affected.
5. Birds and fishes tend to consume. These chemical in their body tissues in some cases up to toxic tends.

To prevent above cited harmful effects of chemicals, pesticides it become essential to search the alternate natural pesticides which may not be toxic for animals, human being or agricultural crops. Therefore some latex of plants are chosen to observe their pesticidal effects on some agricultural pests in this study.

MATERIAL AND METHODS

During the research study following tools and methods have been used.

(1) Selection of the plants and their identification

Three different plant species have been selected on the ground of their ethnobotanical and pesticidal importance and identified as following-

I. *Euphorbia neriifolia* (Thuja)

II. *Nerium indicum* (Kaner)

III. *Calotropis gigantia* (Madar)

(2) Selection of pests and their identification

During the present study three agricultural pest larvae have been selected, collected and identified as following-

I. *Mythimna seprata* (Haworth) Sanik keet or Arrmy worms.

II. *Raphidipulpa Foveicolli* (Luthear) Red pumpkin beetle.

III. *Helicoverpa armigera* (Hubn) Gram eater piller

(3) Collection of latex

The latex of plants have been collected from various parts of the plant body during the month of November, by piercing it by niddle, separate bottles have been used for the collection of latex.

(4) Preparation of dilutions of collected plant latex

The dilutions of latex have been prepared by adding the distilled water. 0%, 25%, 50%, 75% and 100% of dilutions have been made by the mixing of distilled water in following manner-

1. 0 ml. (control) no latex have been added there is only distilled water.
2. 25 ml. of latex and 75 ml. of distilled water used as 25%.
3. 50 ml. of latex and 50 ml. of distilled water used as 50%
4. 75 ml. of latex and 25 ml. of distilled water used as 75%
5. 100 ml. of latex and 0 ml. of distilled water used as 100%

The various concentrations of diluted latex have been spread over the collected pest larvae. In the glass petrydishes counted numbers of ten pest larvae have been kept in the triplicate to get proper results, with a control.

The experimental design for statistical investigations the three way factorial analysis have been selected and implemented as following -

Table 1: Design of Three way factorial analysis

	Latex in different concentrations								
	Plant species	**Latex type**	**0% conc.**	**25% conc.**	**50% conc.**	**75% conc.**	**100% conc.**	**Time spon**	
	Euphorbia	LT-1	T1	T2	T3	T4	T5	12hrs.	
	neriifolia	LT-2	T6	T7	T8	T9	T10		
	LT-1	LT-3	T11	T12	T13	T14	T15		
Latex of different plant species	*Nerium indicum*	LT-1	T16	T17	T18	T19	T20	24hrs.	**Duration**
	LT-2	LT-2	T21	T22	T23	T24	T25		
		LT-3	T26	T27	T28	T29	T30		
	Calotropis	LT-1	T31	T32	T33	T34	T35	48hrs.	
	gigantia	LT-2	T36	T37	T38	T39	T40		
	LT-3	LT-3	T41	T42	T43	T44	T45		

Table 2: Table design, used to analyse the correction factor.

Treatments	**Rep.-1**	**Rep.-2**	**Rep.-3**	**Totals**	**Mean**
T1	X1	X2	X3	Mx	
….	X4	X5	X6	.	
….	X7	X8	X9	.	
….	X10	X11	X12	.	
…..	X13	X14	X15	.	
T45	……	……..	X45	M45	
Totals	Rx1	Rx2	Rx3	GTx	Nx = 135

Connection Factors = $\frac{GTx^2}{Nx}$

Total ss ($x1^2$ + ………..x^2 N) – CF

SS Due to replication = $\frac{[Rx1^2 \ldots\ldots Rxn^2]}{M}$ - CF

SS Due to Treatments = $\frac{[Mx1^2 \ldots\ldots Mxm^2]}{N}$ - CF

SS Due to error = T.ss- Rss- treat ss

Where, nx = Number of Replication
GTx = Grand Total
M = Number of treatments
Mx = Total treatments
N = Number of observation

Table 3: Table design used to analyse cumulative frequency.

Latex type	**Conc.1 0%**	**Conc.2 25%**	**Conc.3 50%**	**Conc.4 75%**	**Conc.5 100%**	**Total**
LT- 1	Y1	Y2	Y3	Y4	Y5	MY1
LT-2	Y6	Y7	Y8	Y9	Y10	MY2
LT-3	Y11	Y12	Y13	Y14	Yn	MY3
Total	Ry1	Ry2	Ry3	Ry4	Ryn	GTy

C.F = $\frac{GTy^2}{Ny}$

Total SS = ($Y1^2$ +…………Yn^2)- C.F

SS Due to CS = $\frac{[Ry1^2 + \ldots\ldots Ryn^2]}{m}$ - CF

SS Due to LT = $\underline{[My1^2 + \ldots\ldots\ldots Myn^2]}$ – CF n

SS Due to CS × DT = TSS- SS (CS) - SS (LT)

Symbols,

A = Number of levels of LT factors = 3 (Latex)

B = Number of levels of CS factors = 5 (Concentrations)

C = Number of levels of DT factors = 3 (Duration)

SE = Standard error and critical differences

CD = Critical difference.

Statistical Analysis

The statistical analysis of obtained data is based on the three way factorial analysis. The formula used for the purpose is as following through (Sx) software.

RESULT

The effect of different plant latex and their different concentration at different duration on *Mythimna separata* larval mortalit

The pest mortality was 0%in case of plant latex of *Euphorbia neriifolia* with 0% conc. (control) after 12 hrs, after 24 hrs and after 48 hrs. At 25% concentration it was 19.38% after 12 hrs, 15.35% 24 hrs and 24.69 after 48 hrs. At 50% conc. mortality was 22.62 after 12hrs 30.40% after 24 hrs and 39.30 % after 48 hrs. At 75% conc. it was 54.38 after 24 hrs and 61.48 % after 48 hrs. In case of 100% latex conc. mortality were recorded 48.78 after 12 hrs, 54.50 after 24 hrs and 64, 49% after 48 hrs duration. In case plant species latex of *Nerium indicum* mortality was recorded 0% at 12 hrs, 24 hrs and 48 hrs with 0% conc. At 25% conc. it was 2.29 % after 12 hrs, 25.41% after 24 hrs and 24.34% after 48 hrs. In case 50% conc. 27.27% after 12 hrs, 35.62% after 24 hrs,35.69 after 48 hrs and at 75 % concentration 52.44%after 12 hrs, 66.72% after 24 hrs and 63.40 % after 48 hrs time span. In case of 100% concentration of latex mortality were recorded 56.56% after 12 hrs, 60.53 % after 24 hrs and 63.49% after 48 hrs duration. In case plant latex of *Calotropis gigantean* at 0% concentration (control) mortality were obtained 0% after 12 hrs and 24 hrs, 48 hrs duration. At 25% conc. of latex mortality were recorded 24.74 % after 12 hrs, 19.63% after 24 hrs and 24.72 after 48 hrs. In case of 50% latex concentration mortality was 39.30% after 12 hrs, 27.27 after 24 hrs and 35.79% after 48 hrs duration. In case of 75 % latex concentration mortality was 66.78% after 12 hrs, 51.50% after 24 hrs and 61.49 after 48 hrs. In case of 100% concentration of plant latex mortality were recorded 60.54% after 12 hrs, 53.56 % after 24 hrs and 64.97% after 48 hrs.

The highest average of pest mortality occurred 66.78% in case of plant latex of *Calatropis gigantea* with 75% concentration 1fter 12 duration and lowest was 0% after all duration and with all three latex(Table No.-4)

Table 4: The effect of different plant latex and their different concentration at different duration of *Mythimna seprata* larval mortality

Plant species	Concentrations	Duration-12hrs	Duration-24hrs	Duration-48hrs
	0%	0	0	0
Euphorbia neriifolia	25%	19.38	15.35	24.69
	50%	22.62	30.40	39.30
	75%	54.38	59.56	61.48
	100%	48.78	54.50	64.49
	0%	0	0	0
Nerium indicum	25%	24.29	25.41	24.34
	50%	27.27	35.62	35.69
	75%	52.44	66.72	63.4
	100%	56.56	60.53	63.49
	0%	0	0	0
Calatropis gigantean	25%	24.74	19.63	24.72
	50%	39.3	27.27	35.79
	75%	66.78	51.50	61.49
	100%	60.54	53.56	64.97

The effect of different plant latex and their concentration at different duration Raphidopalpa foveicollis larvae mortality

In case of latex of plant species *Euphorbia neriifolia* at 0% conc. of latex mortality were recorded 0% after 12 hrs, 24 hrs and 48 hrs. In case of 25 %latex conc. the pest mortality was recorded as 12.96% after12 hrs, !2.96% after 24 hrs and 18.44 % after 48 hrs. At 50% conc. it was 30.78%, after 12 hrs, 30.69% after 24 hrs and 35.22% after 48hrs. In case of 75 conc. mortality were obtained 41.15% after 12 hrs, 40/02% after 24 hrs and 46.92% after 48 hrs. At 100% conc. of plant latex mortality were recorded 64.02% after 12hrs, 61.22% after 24 hrs and 60.88% after 48 hrs. In case of *Nerium indicum* the pest mortality was recorded 0% at 0% conc. (control) of plant latex, after 12 hrs, 24 hrs and 48 hrs. At 25% conc. the pest mortality was recorded 21.15% after 12 hrs, 23.44% after 24 hrs and 26.44% after 48 hrs. At 50% conc. it was 33.02% after 12 hrs, 28.21% after 24hrs and 30.22 % after 48 hrs. In case of 75% conc. it was 43.08% after 12 hrs, 46.92% after 24 hrs and 48.92% after 48 hrs. Where in case of 100% conc. of plant latex mortality was recorded 61.22% after 12 hrs, 71.23% after 24 hrs and 63.93% after 48 hrs. In case of plant species *Calatropis gigantean* of 0% at 12 hrs, 24 hrs at after 48 hrs. At 25 % conc. of plant latex it was 23.30 after 12 hrs, 18.44 after 24 hrs and 23.44 after 48 hrs. In case of 50% conc. it was obtained 37.22% at 12 hrs, 26.56% at 24 hrs and 37.22% after 48 hrs. In case of 75% conc. it was 48.85% after 12 hrs, 45.00% after 24 hrs and 48.85% after 48 hrs.

At 100% conc. of plant latex mortality were obtained 59.02% after 12 hrs, 68.85% after 24 hrs and 63.44% after 48 hrs. The highest average pest larvae mortality obtained 71.23 % at 100% conc. of plant latex *Nerium indicum* after 24 hrs time span and lowest was 0% in case of all plants after all time durations. (Table No.5).

Table 5: The effect of different plant latex and their different concentration at different duration of *Raphidopalpa foveicollis* larval mortality

Plant species	Concentrations	Duration-12hrs	Duration-24hrs	Duration-48hrs
Euphorbia neriifolia	0%	0	0	0
	25%	12.96	12.96	18.44
	50%	30.78	30.69	35.22
	75%	41.15	40.02	46.92
	100%	64.02	61.22	60.88
Nerium indicum	0%	0	0	0
	25%	21.15	23.44	26.44
	50%	33.02	28.21	30.22
	75%	43.08	46.92	46.92
	100%	61.22	71.23	63.93
Calatropis gigantea	0%	0	0	0
	25%	23.30	18.44	23.44
	50%	37.22	26.56	37.22
	75%	48.85	45.00	48.85
	100%	59.02	68.85	63.44

The effect of different plant latex and their concentration at different duration on *Helico verpa (Heliothis) armigerea* larvae mortality

In case of plant species *Euphorbia neriifolia* at 0% conc.(control) of latex mortality were recorded 0% after 12 hrs, 24 hrs and 48 hrs. In the case of 25% plant latex conc. The pest mortality was 21.15% after12 hrs, 23.85 after 24 hrs and 21.48 % after 48 hrs. In the 50% conc. of plant latex it was recorded 37.22%, after 12 hrs, 37.22% after 24 hrs and 34.622% after 48hrs. In case of 75 conc. mortality was obtained 46.92% after 12 hrs, 50.85% after 24 hrs and 48.34% after 48 hrs. At 100% conc. of plant latex mortality were recorded 71.56 % after 12hrs, 66.15% after 24 hrs and 68.82 after 48 hrs.

In case of *Nerium indicum* the pest mortality was recorded 0% at 0% conc. (control) of plant latex, after 12 hrs, 24 hrs and 48 hrs. At 25% conc. the pest mortality was recorded 23.85 % after 12 hrs, 23.85 % after 24 hrs and 24.19 % after 48 hrs. At 50% conc. of plant latex it was 39.15 % after 12 hrs, 39.15% after 24hrs and 38.33 % after 48 hrs. In case of 75% conc. of plant latex mortality was recorded 54.78 % after 12 hrs, 50.85 % after 24 hrs and 55.81% after 48 hrs time span. Where in case of 100% conc. of plant latex mortality were obtained 68.85 % after 12 hrs, 68.85 after 24 hrs and 74.12% after 48 hrs.

In case of plant species *Calatropis gigantia* of 0% conc.(control) pest mortality were obtained 0% after 12 hrs, 24 hrs at after 48 hrs. At 25 % conc. of plant latex pest mortality was recorded 21.15% after 12 hrs, 23.85% after 24 hrs and 24.19% after 48 hrs. At 50% conc. of plant latex mortality was recorded 37.22% at 12 hrs, 41.15% after 24 hrs and 33.91% after 48 hrs. At 75% conc. of plant latex it was recorded 54.78% after 12 hrs, 52.78% after 24 hrs and 56.16 % after 48 hrs. At 100% conc. of plant latex mortality was recorded 68.85% after 12 hrs, 66.15% after 24 hrs and 75.19% after 48 hrs.

The highest average pest larvae mortality obtained 75.19 % after 48 hrs duration in case of plant latex *Calatropis gigantea* at 100 conc. and lowest was 0% in case of all plants after all time durations. (Table No.6).

Table 6: The effect of different plant latex and their different concentration at different duration of *Helicoverpa (Heliothis) armigerea* larval mortality

Plant species	Concentrations	Duration-12hrs	Duration-24hrs	Duration-48hrs
Euphorbia neriifolia	0%	0	0	0
	25%	21.15	23.85	21.48
	50%	37.22	37.22	34.62
	75%	46.92	50.85	48.34
	100%	71.56	66.15	68.82
Nerium indicum	0%	0	0	0
	25%	23.85	23.85	24.19
	50%	39.15	39.15	38.33
	75%	54.78	50.85	55.81
	100%	68.85	68.85	74.12
Calatropis gigantea	0%	0	0	0
	25%	21.15	23.85	24.19
	50%	37.22	41.15	33.91
	75%	54.78	52.78	56.14
	100%	68.85	66.15	75.19

DISCUSSION

Several pressures have accelerated the search for more environmentally and toxicologically safe and more selective and efficacious pesticides. Most commercially successful pesticides have been discovered by screening compounds synthesized in the laboratory for pesticidal properties. The average number of compounds that must be screened to discover a commercially viable pesticide has increased dramatically, so that new discovery strategies must be considered. Increased emphasis on reduced-tillage agriculture will make adequate control of weeds more dependent on chemical control. New herbicides will be needed to fully meet this challenge. The increasing incidence of pesticides resistance is also fueling the need for new pesticides. Furthermore, most synthetic chemicals that have been commercialized as herbicides are halogenated hydrocarbon with relatively long environmental half-lives and more suspect toxicological properties than most natural compounds. Thus, natural compounds have increasingly become the focus of those interested in discovery of pesticides.

Tens of thousands of secondary products of plants have been identified and there are estimates that hundreds of thousands of these compounds are involved in the interaction of plants with other species-primarily the defense of the plant from plant pests. Thus, these secondary compounds represent a large reservoir of chemical structures with biological activities. This resource is largely untapped for use as pesticides.

Throughout history, plant products have been successfully exploited as insecticides, insect repellents, and insect antifeedants. Probably the most successful use of a plant product as an insecticide is that of pyrethroids. The insecticidal properties of the several Chryanthemum species were known for centuries in Asia. Even today, powers of dried flowers of these plants are sold as insecticides. After elucidation of the chemical structures of six terpenoid easters (pyrethrins) responsible for the insecticidal activity of these plants, many synthetic analogs have been patented and marketed. Synthetic pyrrethroids have better photostability and are generally more active than their natural counterparts.

Another plant terpenoid, camphene, was a very successful herbicides in its polyhalogenated from. Sold as Toxaphrenereg., this product was the leading insecticides in the United States before it was removed from the market. Although this product was a mixture of over two hundred chlorinated forms of camphene, certain specific compounds in the mixture were found to be much more active than the mixture on a unit weight basis. A Many other terpenoids have been demonstrated to have insecticidal or other insect-inhibiting activities. For instance, azadirachtin and other terpenoids of the limonoid group from the families Meliaceae and Rutaceae are potent growth inhibitors of several insect species.

Physostigmine, an alkaloid from Physostigma venenosum was the compound upon which carbamate insecticides were designed. Furoquinoline and beta-carboline alkaloids such as dictamine, harmaline, respectively, are potent photosensitizing compounds that are highly toxic to insect larvae in sun light. The relative high cost toxicity to mammals, and limited efficacy have limited the use of natural alkaloids insecticides. Preparation of roots from the genera Derris, Lonchocarpus, and Tephrosia, containing rotenone were commercial insecticides in the 1930s. Rotenone is a flavonoid derivatives that strongly inhibits mitochondrial respiration. No other phenolic compound has been used commercially as an insecticides, although the content of certain phenolic compounds in plants tissues have been correlated with host plant resistance to insects and many have been demonstrated to be strong insect growth inhibitors and antifeedants.

Control of insects can be achieved by means other than causing rapid death. Plants produce many compounds that are insect repellents or act to alter feeding behavior, growth and development ecdysis (molting), and behavior during mating and oveiposition. Most insect repellents are volatile terpenoids such as terpenen-4-ol. Other terpenoids can act as attractants. In some cases, the same terpenoid can repel certain underirable insects while attractants more benifical insects. For instance, geraniol will repel houseflies while attracting honey bees. Compounds from many different chemicals classes have been reported to act as insect antifeedants. Thus, polygodial a sesquiterpenoid from Polygonum hydropiper, is a potent inhibitor of aphids feeding. Several plant-derived steroids that are close analogues of the insect molting unrelated terpenoids inhibit molting by unknown mechanisms. Plant terponoids that act as locomotor excitants juvenile hormone mimics have been found to effectively sterilize insects. Plants contain a myriad of compounds with potential for development in controlling insects.

Summary

The relationship between life and disease the plant is older as the history of mankind itself, plant play vital role for existences of life in the universe. It is evident that human being started using plant part from the very beginning and found that majority of plants was suitable as food as well as various needs of life. But present scenario need extensive research for search of novel herbal pesticides which can replace older plant product and the synthetic products and which can increase the possibility to vanish the hunger from the earth. Botanical pesticides are good alternative to chemical pesticides, because botanical pesticides are eco friendly, economic, target specific and biodegradable. The use of botanicals in pest management is not only useful for suspension of pest population but will be also helpful to maintain the sound ecological balance, which will help mankind to cope with the threat to Global warming.

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