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Research Paper

Study of relative toxicity of synthetic pesticide and a botanical pesticide against *Trichoplusia ni* on *Brassica oleracea var capitata*

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Abstract: *Trichoplusia ni* of the order lepidoptera belongs to the family noctudae, has been found to defoliage the brassica oleracea var capitata, brassica oleracea var botrytis, collards, broccoli vegetables, which are commercially grown as leafy vegetable. Sometimes cucumber, tomato, cotton are also damaged by *Trichoplusia ni* Recent awareness about the hazarads of persistent of synthetic pesticide. The role of synthetic pesticide compared with bio pesticide in insect pest control.
Keywords: *Trichoplusia ni* Endosulphan P. hysterophorus mortality count LC50.

INTRODUCTION

Trichoplusia ni belonging to the family noctudae of order Lepidoptera, has a great economic importance. Brassica oleracea var carpitata and related plants such as *Brassica oleracea var* botrytis, collards, broccoli vegetable & sometime tomato and cucumber too demaged by the *Trichoplusia ni.* Field crops which may be attacked by *Trichoplusia ni* are cotton and soyabean. Callard and cotton are preferred hosts for agg laying. The order consists of 10,000 species in India. Though noctuid adult moths don't damage directly to the host plants, yet their caterpillars larvae result into defoliating the crops also affected their yield. *Brassica oleracea var capitata* in an important leafy vegetable as it is source of the various vitamins like vitamin K (Phylloquinone) which is responsible to health in the formation of prithrombin is essential for blood clotting during external dermal injury like wounds or any cut.

Brassica oleracea var capitata is an edible crop of vegetables. It has a great economic importance covering thousand of hectare of the land in Uttar Pradesh, which is attacked by a number of papillionidae, pieridae, satyridae, sarurnidae, comprising the bulk of spp. The biology of some noctuid described by some individuals study. Brassica oleracea var capitata contents antioxidant activity.

Several worker Crumb (1934), Rajendra and Gopalan (1979), Goel and Kumar (1982), Benerjii and Haque (1983), Bhumannavar (2000) Das et al (2002), reported 57 insect pests attacking to cabbage.

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The United Nations Conference and Environmental Development (UNCED) held in Riode Janeiro (1992) prepared Agenda, to which stresses the need to increase the use of integrated pest, disease and crop management techniques to eliminate over dependence on agrochemical thereby encouraging environmentally sustainable agricultural practices.

Many disadvantages can be overcome only by persistent search for new and safer insecticides accompanied by wide use of nonchemical insect pest control. Development of alternative peast control measures involving biological control methods a dn nonharardous extract of plant can help to reduce the harmful effect of pesticides. The continuous use these conventional synthetic pesticides led to many problems.

MATARIAL & METHODS

Synthetic Pesticide:-

Numerous synthetic organic compounds differing markedly in their chemical configurations possess acariedal activity. These includes many chemical according to their chemical groups. We select the endosulphan for comparison to botanical pesticide. Endosulphan comes under chlorinated hydrocarbon it is commonly known as Thiodan 35EC.

Endosulphan:-

Chemical group :
Chlorinated hydrocarbon
Common Name: Thiodan 35EC
IUPAC Name :
6, 7, 8, 9, 10, 10-hexachlro-1, 5, 5a, 6, 9a- hexahydro-4, 9-methano-2, 4, 3-benzolipxathieine-3-oxide.
CAS number: 115-29-7
Chem spider: 21117730
Molecular formula: C9H6CL6O3S
Molar Mass: 406.95
Density: 1.745g/cm^3
Melting point: 70-100^{0}C

Botanical Pesticides:-

A small genus of herbs or shrubs distributed in America *P. hystreophons* a herb occurs as an exotic weed in India. Stem longitudinally grooved; leave, irregularly, pubescent; flower heads terminal or axillary 5mm in diameter, white in colour; fruits broadly abovoid, dark brown.

In its native habitat, the plant is reported to be used as a tonic febriguge, emmenagogue and as an analgesic in neuralgia; a decoction of the root is given in dysentery. A bitter glocyside, parthenin (parthenicin, m.p. 168-169^{0}C) and unidentified alkaloids have been reported from the herb.

Preparation of Test solution:-

The leaves of the selected plant species i.e. *parthenium hysterphours* were collected and brought to the laboratory. These leaves are spread on paper sheets and dried under shade at room temperature. The dried leaves was pulverized with electrical grinder and sieved out through 1mm mesh and kept in polythene bags and stored at laboratory conditions for further experimentation. The powered plant materials dissolved solvent in 1:4 ratio (W/V) and kept for 24 hours and filtered through the double layered muslin cloth. The extract was centrifuged at 5000rmp for 10 min and the supernatant was used for assessing the bioactivity. From the supernatant, the polar solvent (cold water) was lyophilized while in case of non-polar solvents (Acetone and methanol), it was kept at room temperature till complete evaporation. *The residue was* dissolved in different solvents (acetone, Methanol and hot water) in a ratio of 1:1 (W/V) and considered as mother extract. The dry

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films were prepared in the sterilized petriplates (9cm diameter) by spreading 1 ml of test solution all over the plate and allowed the plate to dry for 30-60 minutes under electrical fan to remove the solvent. Five replications were maintained for both control and treatment.

LC^{50} evaluation of plant extract and synthetic pesticides:-

Twenty five larva insect pest was released in each petridish containing different concentrations of aqueous and acetone/alcoholic solutions of plant extracts (leaves) or various concentrations of synthetic pesticide. That test was conducted at room temperature (27-30^{0}C). Concentration of the leaf extract was prepared fresh and used for the test. At each of the given concentrations, 5 replicates comprising 25 larva (insect pest) each was exposed, results was scored after 24 hrs of continuous exposure to the test solution and expressed as percent mortality.

Mortality count:-

Mortality count was done as per formula given by abbott (1925).

$$P^* = \frac{P - C}{100 - C} \times 100$$

Where as

P* – Corrected mortality with test insects

P – Observed mortality with test insects.

C = Mortality count in the control.

Observations:-

For observations scientific methodology has been followed for accuracy and success of the percent investigation and to access the impact of synthetic pesticide (endosulphan) and leaf extract of Parthenium hysterophorus on the most harmful stage of the life cycle Trichoplusia Brassica oleracea var carpitata.

LC50 determination for *Trichoplusia ni* after treatment with Endosulphan (35%EC:

To calculate the value of LC50 of endosulphan against *Trichoplusia ni* the larva of 10-15mm in size have been treated with different concentrations of endosulphan. The different concentration has been selected (Table -I). The survival number and percentage has been noted after 24 hours. The mortality percentage os calculate from the survival number (Table-I). It is clear that the mortality percentage increases with the increase in concentration of endosulphan against *Tricholplusa ni.*

LC50 determination for *Trichoplusia ni* after treatment with acetone and alcoholic leaf extract of *P. hysterophorus:*

To determine the LC50 value of acetone and alcoholic leaf extract of P. hysterophorus, the larva (10-15mm Size) of *Trichoplusia ni* have been treated with deferent concentrations i.e. 200, 1000, 2000, and 3000 gml^{-1}.

The survival number and percentage of larva have been recorded after 24 hours. From the survival number, the mortality percentage is calculated the clear from the table-II and III that the mirtaligy percentage increases (in both acetone and alcoholic extract) in number with increase in concentration of leaf extract of *P. hysterohours.* Table-II and III also suggests that the mortality percentage of *Tricholplusia ni* is little higher in alcoholic leaf extract.

It is clear that the value of LC50 is significantly greater in acetone leaf extract (2082.22 mml^{-1}) as compared to alcoholic extract (1644.15gml^{-1}).

Relative toxicity of synthetic pesticide (endosulphan) and plant's leaf extract to *Trichoplusia ni* (Table-IV).

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It is evident from the experimental finding that synthetic pesticide (endosulphan) is more toxic that plant extract but for environmental hazards problem we should use bio-pesticide. These findings indicate that acetonic leaf extract of *parthenium hystrerpphous* is better than alcoholic leaf extract.
Because leaf extract of *P. hysterophorus* also act as pest control but no so more as synthetic pesticide but for sustainable development and for maintain fertility of soil we should use bio-pesticide.

Table: 1. Percent mortality count of Trichoplusia ni Treatment with Endosulphan

S. No.	X	Mortality (%) Y	Log X	Expected (Y)
			2.53	0.00
1.	100	13.5	2	37.99
2.	300	27.8	2.4771213	-4.06
3.	400	32.4	2.698997	11.17
4.	600	61.5	2.845098	22.10
5.	800	69.5	2.90309	26.22
6.	1000	92.8	3.0	33.11

Table: 2. Percent mortality of Trichoplusia ni Treatment with acetonoice extract of P. hysterophorus

S. No.	Con. (ppm) X	Mortality (%) Y	Log X	Expected (Y)
			2.31	0.00
1.	200	4.1	2.30103	-052
2.	500	13.4	2.69897	19.24
3.	1000	31.5	3.0	34.18
4.	2000	51.3	3.30103	49.13
5.	3000	59.6	3.4771213	57.88

Table: 3. Percent mortality of *Trichoplusia ni* treatment with alcoholic extract of *P. hystreophours*

S.No.	Conc. (ppm) X	Mortality (%) Y	Log X	Expected (Y)
			2.28	0.00
1.	200	4.6	2.30103	1.29
2.	500	18.5	2.69897	22.47
3.	1000	36.2	3.0	38.50
4.	2000	56.2	3.10103	54.53
5.	3000	65.2	3.4771213	63.91

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Table: 4. Relative toxicity of synthetic pesticide (endosulphan) and plant (Leaf) extract of P. hystreophours

S.No.	Treatment	Regression	LC50	Relative toxicity
1.	Endosulphan	Y= -149.41+75.607X	434.02	4.80
2.	P. hysterophorus			
	(a) Acentone leaf extract	Y= -114.78+49.65X	2082.23	1.00
	(b) Alcoholic leaf extract	Y= -121.23+53.244X	1644.15	1.27

RESULT AND DISCUSSION

On the basis if present investigation it is concluded that synthetic pesticide (endosulphan) more toxic in comparison to acetone and alcoholic leaf extracts of *Parthenium hysterophous*. The growing awareness of pesticides hazards as a result of extensive and indiscriminate use of synthetic pesticides had led the scientist to search for safer and more eco-friendly pest control agents of plant origin. On the basis of above discussion and investigation, it can be concluded that synthetic pesticide (endosulphan 35%EC) is toxi and effective than plant extract (*parthenium hysterophours*) against the *Tricoplusia ni*, but it can be suggested that plant extract (parthenium hysterophours) can be used in place of the highly toxic synthetic pesticide because of its safety to beneficial insects (Pollinators) and its lower cost.

The treatment of plant extract gives higher yield and less hazards to natural enemies and therefore indicates their suitability for inclusion in integrated pest management.

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