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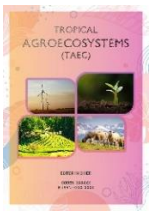

RESEARCH ARTICLE

EFFECTS OF NET BARRIER, BIO AND SYNTHETIC PESTICIDES ON RED PUMPKIN BEETLE ALONG WITH GROWTH AND YIELD OF CUCUMBER IN FAR WESTERN REGION; BAITADI DISTRICT OF NEPAL

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ABSTRACT

A thesis research was conducted at Gokuleshwor, Baitadi to evaluate the management practices of Aulacophora foveicollis on (Lucas, 1849) on cucumber during Kharif season in 2021. Field experiment was laid out in a randomized complete block design (RCBD) with 7 treatments and 3 replications. The treatments were: 1) Controlled. 2) Net barrier. 3) Cypermethrin. 4) Chloropyrifus. 5) Cypermethrin + Chloropyrifus. 6) Nimbicide. 7) Jholmol. Each plot consists of 3 m × 3 m (9 m^2). Field experiment showed that highest reduction of Aulacophora foveicollis (Lucas, 1849) was observed in net barrier followed by cypermethrin + chloropyrifus and then cypermethrin, but these three treatments were statistically at par during almost all the spray times. Thus, net barrier might be the best option in management of Aulacophora foveicollis (Lucas 1849).

KEYWORDS

Aulacophora foveicollis, Chloropyrifus, cypermethrin

1. INTRODUCTION

1.1 Background

Cucumber (*Cucumis sativus L.*) is a monoecious annual crop belongs to cucurbitaceous family that has been cultivated by man over 3000 years ago (Adetula and Denton, 2003). It is one of the most popular member of cucurbitaceous family (Lowar and Edwards, 1986; Thoa, 1998). Cucumber is fourth most significant vegetable after tomato followed by cabbage and followed by onion in Asia (Talioghu, 1997) and second most significant vegetable crop after tomato in Western Europe (Phu, 1997). The cultivated area of cucumber in Nepal is 9396.8 ha with production of 159041.8 Mt and productivity of 16.9 Mt/ha (SINA 2015-16). Cucumber could be a creeping vine that roots within the ground and grows up trellises or other supporting frames wrapping round the supports with thin spiraling tend. Cucumbers approximately contain 95 % water, 3.6% carbohydrate and 0.65% protein which are low in calories (150 kcal/kg) (Loy et al., 1990). Cucumber consists of vit-B, the fruit contains 95 % of water keeping the body hydrated while helping the body eliminate toxins (Seng, 2002). Cucumber (*Cucumis sativus* L.), is one among the foremost popular members of the Cucurbitaceae family thanks to its excellent flavor, varied usefulness, texture and medicinal value (Shrivastava & Roy, 2013; Keerthika et al., 2016). With the demand of cucumber running out of supplies, the production trend has been unsatisfactory due to attack of various insect pests. Pest and disease are the major limitations for the crop because of labor and high cost needed to manage them.

Red pumpkin beetle (*Aulacophora foveicollis*) has been noted as a major insect pest of cucurbitaceous vegetables particularly cucumber and melon. The red pumpkin beetle is a frequent serious and important pest of wide range of cucurbitaceous vegetables. It is harmful to crops causing a serious damage to plant and yield. This insect pest is distributed all over South-east Asia. The adult beetle is red oblong and almost 6-8 mm long and egg laying occurs at the base of cucumber stem. One female can lay 150-300 eggs. The adult beetles attack on the leaf lamina making irregular holes and also go after cotyledons and flowers. They feed on seedlings, fresh and tender leaves and flowers. They usually occur in large numbers (Rahman et al., 2007).

1.2 Statement of Problems

The topographical complexity of Baitadi district enforces people to use traditional farming practices. In context of Baitadi district cucumber is cultivated in an area of 40 ha with total production of 900 Mt and yield of 22.50 Mt./ha (Statistical information on Nepalese agriculture 2019/20). The major limiting factors behind this low production of cucumber are insect pest attacking plants and fruits, lack of technical know-how, poor soil status and irrigation facility. The major problem is insect pest for cucumber production. Red pumpkin beetle is one of the major insect that affects the growth and yield of cucumber. Considering the above fact finding out better and economical method for controlling red pumpkin beetle with minimum harm to agricultural ecology and less hazard to human health is imperative.

1.3 Rationale of Study

The research was intended to determine the effect of different treatments (net barrier, synthetic and biological pesticide) in red pumpkin beetle in Gokuleshwor, Baitadi. The study on different parameters of cucumber using seven different treatments allow us to determine the most effective control of red pumpkin beetle.

1.4 Objectives

Broad objectives

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- To study the effect of net barrier, bio and synthetic pesticides on red pumpkin beetle along with growth and yield of cucumber.

Specific objectives

- To determine the incidence of red pumpkin beetle.
- To know the effectiveness of different treatments over red pumpkin beetle.

2. Materials and Methodology

2.1 Site Selection and Research Site

The research was carried out in the midhills of far western region at Gokuleshwor Agriculture and Animal Science College Baitadi district in an academic year 2021-03-28 to 2021-05-24. Baitadi district lies at an altitude of 700 m above the mean sea level and lies in between 27' 30' North latitude and 83'27' East longitude. Visual display of map of Nepal indicating research site is shown below.

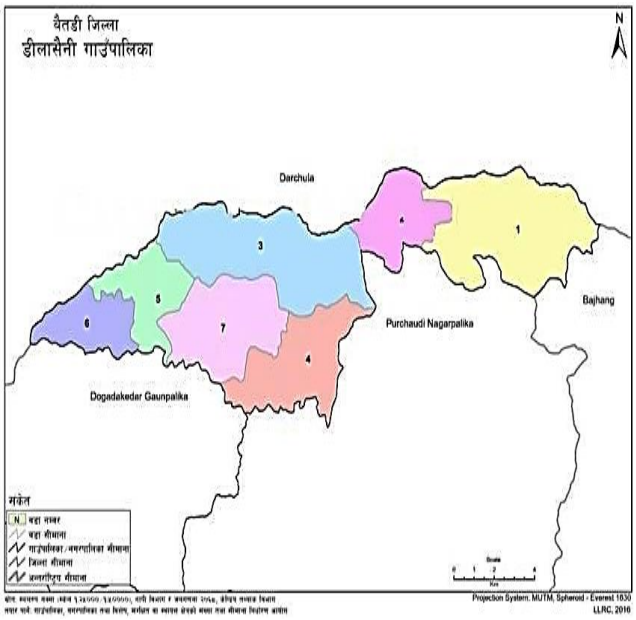

Figure 1: Figure Indicating Research Site, Gokuleshwor, Baitadi, Nepal

2.2 Source of Seed

Malini, a hybrid variety and one of the most cultivated variety of cucumber was selected for seed purpose. Seed was purchased from local market of Gokuleshwor, Baitadi.

2.3 Land Preparation and Fertilizer Applications

Our experimental site was covered with weeds and grasses. So, we thoroughly plough the land with power tiller and remove the weeds manually and it was leveled with the help of spade and rake. The soil was pulverized in the fine particles for ensuring better growth of cucumber.

2.4 Research Experimental Design

The experiment was carried out in Randomized Complete Block Design comprising three replications each containing seven treatments. Our standard plot size was 3 m × 3 m. The distance between plot to plot and replication to replication was 0.5 m and 1 m respectively.

2.5 Sowing of Seed

Seed was used as planting material for cucumber. Seeds of Malini variety of cucumber were dibbed @2 seed per holes. Seeds were soaked fortnight before dibbling to ensure rapid germination. Germination was observed 5 days after dibbling.

2.6 Inter-Cultural Operations

For ensuring proper growth and development intercultural operations like thinning out, weeding were carried out at regular interval. Thinning and gap filling were also carried out for uniform distribution of plant. Weeding was done manually to reduce the effect on cucumber. Irrigation was provided on regular interval by observing the soil moisture content.

Layout of Field

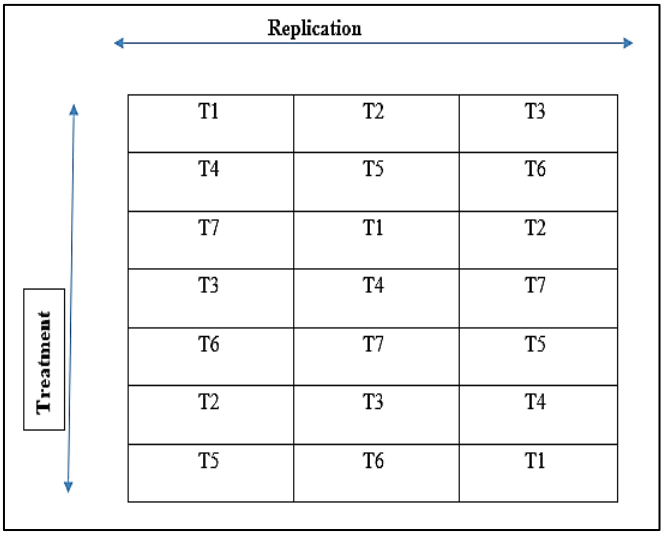

Figure 2: Layout of Field Design

2.7 Treatment combination

Table 1: Treatment Combination

Treatment Number	Treatment Used
T1	Controlled
T2	Cypermethrin
T3	Chloropyriphos
T4	Net Barrier
T5	Cypermethrin + Chloropyriphos
T6	Nimbicide
T7	Jholmol

2.8 Data Collection

Observations were taken for plant height, number of leaf, number of damaged leaf, number of insects and yield of cucumber. Both pre-treated and post-treated observation was taken for red pumpkin beetle. The data were collected in 6 days interval.

2.9 Data Entry and Analysis

First, the collected data were entered in Excel sheet in RCBD format then it was analyzed with the help of GEN stat. The output of analysis presented in forms of table and figures and interpret finding with relevant literatures.

3. Result and Discussion

Results of the field experiment titled **"EFFECTS OF NET BARRIER, BIO AND SYNTHETIC PESTICIDES ON REDPUMPKIN BEETLE AND YIELD OF CUCUMBER IN GOKULESHWOR, BAITADI"** conducted at Gokuleshwor Agriculture and Animal Science College, Baitadi from month of March to May are presented and described in the following section. Data pertaining to various criteria for different treatment evaluation were analyzed statistically to test their significance. This section contains the result for all of the main effects and interaction that were found to be significant and non-significant in our data analysis.

It is apparent from the data presented in table 2 that different treatments significantly influenced number of insects in every dates. Observation recorded on April 30, Highest no. of insect was recorded in T7(Jholmol) followed by T5 (Cypermethrin+Choloropyriphos), T3 (Choloropyriphos), T2 and T1 statistically similar. The lowest population of the insect was recorded in T4 (Net barrier).

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Table 2: Number of insects					
Treatments	**April 30**	**May 6**	**May 12**	**May 18**	**May 24**
Controlled	0.8333333 a	1.166667 b	0.9166667 ab	1.416667 a	3.000000 a
Cypermethrin	0.8333333 a	1.416667 ab	0.8333333 ab	1.416667 a	3.416667 a
Chloropyriphos	0.9166667 a	1.333333 ab	1.0000000 a	1.583333 a	3.250000 a
Net Barrier	0.0000000 b	0.000000 c	0.0000000 c	0.000000 b	0.000000 b
Cypermethrin + Chloropyriphos	1.0000000 a	1.500000 a	0.9166667 ab	1.166667 a	2.666667 a
Nimbicide	0.5833333 ab	1.250000 ab	0.8333333 ab	1.583333 a	2.583333 a
Jholmol	1.0833333 a	1.416667 ab	0.6666667 b	1.666667 a	3.166667 a
GM	0.75	1.15	0.74	1.26	2.58
SEM	0.11	0.03	0.03	0.16	0.64
CV	44.14	16.01	24.12	31.56	30.97
LSD	0.59*	0.33***	0.32***	0.71**	1.42**

Table 3: Number of leaf damage					
Treatments	**April 30**	**May 6**	**May 12**	**May 18**	**May 24**
1	3.333333 ab	6.416667 ab	7.333333 b	8.750000 ab	10.83333 ab
2	2.750000 abc	6.333333 ab	7.333333 b	9.000000 a	10.58333 ab
3	3.416667 ab	6.750000 ab	7.666667 ab	8.916667 a	10.75000 ab
4	0.000000 d	0.000000 d	0.000000 d	0.000000 c	0.00000 c
5	3.666667 a	7.250000 a	8.583333 a	9.833333 a	11.91667 a
6	2.333333 c	5.083333 c	6.250000 c	7.666667 b	9.75000 b
7	2.666667 bc	5.750000 bc	7.083333 bc	8.750000 ab	10.66667 ab
GM	2.59	5.37	6.32	7.56	9.21
SEM	0.29	0.39	0.28	0.42	0.69
CV	20.61	11.6	8.43	8.57	9.01
LSD	0.95***	1.11***	0.95***	1.15***	1.48***

Table 4: Effect of Different Treatment on Yield	
Treatment	**Yield (Mt/ha)**
Controlled	24.43917 g
Cypermethrin	31.35667 f
Chloropyriphos	33.23333 e
Net Barrier	44.22603 b
Cypermethrin+ Chloropyriphos	51.37417 a
Nimbicide	37.50833 c
Jholmol	36.15970 d
GM	36.89
SEM	0.42
LSD	1.15**
CV	1.76

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