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INCIDENCE OF INSECT PESTS ON CAULIFLOWER, *Brassica oleracea* var. botrytis L. TREATED WITH FOLIAR BIO-PESTICIDE

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ABSTRACT

Selected botanicals used as foliar bio pesticide as a sustainable approach on insect pest management for cauliflower production was studied for three months at the University Demo Farm, University of Eastern Philippines, Main Campus, University Town, Catarman, Northern Samar to determine their effect on the incidence of insect pests on cauliflower.

Casiaalata, Psidiumguajava and Capsicum annum were processed into foliar bio pesticide spray. Incidence of insect pests at the experimental area was not significantly influenced by the introduction of the foliar bio pesticide. Abnormalities in the environmental condition were likely the major contributory factors to its effectiveness. Heavy rains, flooding and strong winds occurred during the experiment. Dosage, timing and frequency of application may also have contributed to its efficacy. Nevertheless, repellent and antifeedant properties of the foliar bio pesticide must have prevented the establishment of pest species. Prevalence of natural enemies and other arthropods in the area were evident, a clear indication of a clean and safe environment.

Keywords: Foliar bio-pesticide, Insect pests, Pest management, Sustainable approach.

INTRODUCTION

Cauliflower, *Brassicaoleracea*var. botrytis L. is noted as a "rich man's food, being a priced vegetable in the market stalls. Its demand in Northern Samar is so high as this crop is not regularly grown in the locality. To satisfy the need, cauliflower, along with other high value crops such as carrots, cabbage, Irish potato and others are bought from other regions of the country, like Bagiuo, Cordillera Administrative Region (CAR) and Mindanao.

While cauliflower has been successfully grown and its production has been tested to be favorable in Northern Samar, farmers may be hesitant to enter into this venture for fear of losing because

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of its high production requirement. Use of indigenous materials which are bountiful in the surroundings could be one among the remedies to lessen production cost. It is without question that utilizing these bio resources could make cauliflower production an affordable enterprise, producing safe food for everyone. Aside from economic advantage, use of bio resources is also environmentally safe. Yet, they just remain untapped.

This study tried to assess the incidence of insect pests of cauliflower treated with foliar bio pesticide from plant extracts with the end goal of developing location-specific organic insect pest control technology for Northern Samar vegetable farms.

MATERIALS AND METHODS

Experimental Design and Treatments

The study was conducted at the University Demo Farm, University of Eastern Philippines, Main Campus University Town, Northern Samar from October 2016 to January, 2017. The pot experiment was carried out in a Randomized Complete Block Design under protected culture in three replications.

Seedling Preparation and Planting

Cauliflower seeds, FARMERS Extra Early variety were sown in a seed box filled with sterilized soil composed of 1/3 garden soil, 1/3 compost and 1/3 fine sand. Seedlings with 3-4 leaves were pricked and left to grow and harden in a partly shaded area. Transplanting was done 2 weeks after pricking. Hardened seedlings were transplanted to the plastic pots filled with desired volume of soil medium within a month from sowing.

Transplanting was done late in the afternoon to reduce transplanting from transplanting shock.

Bio Pesticide Processing

Fresh leaves of *Casiaalata and Psidiumguajava* leaves were collected and chopped to facilitate fermentation. Every kilogram of chopped leaves was added with 1,000ml of ground water (combined in equal amount, 1:1 ratio) and a kilo of brown sugar and left to ferment in a jar stored in a dark and dry place for seven days. Fermented bio pesticide was mixed with fresh extracts from 100g ground *Capsicum annu*m and allowed to stand for at least 6 hours. The mixture was strained to remove the solid particles and the foliar bio-organic pesticide was ready for use.

Application of Foliar Bio Pesticides from Plant Extracts

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Fermented bio-pesticide from plant extracts was directly applied to the plants every after three days using an atomizer throughout the duration of the experiment. Spraying was done early morning when insects were actively feeding on the plants. A protective shield was used at every application time to prevent mist from spreading to other treatment plants.

Care and management practices on cauliflower production were followed throughout the duration of the experiment. Weeding and earthing up was regularly done to prevent food competition, exposure of the shallow roots and formation of soil crust on surface.

Visual observation of the upper ground parts of cauliflower plants was done daily to monitor presence of insect pests and natural enemies in the cauliflowers. The leaves of each plant were observed from the crown to the base. Plants were visited from 6:00 am to 9:00 am since insects come out at this time to feed. Data were recorded in observation sheets. Species richness and evenness index was computed to assess the diversity of insect pests and other arthropods in the experimental area using Simpson's index, $Ds= 1-\Sigma(n_i-1))/ (N (N-1))$ where Ds = Simpson's index of diversity; N = total number of individuals of all species; n_i = total number of the species i.

RESULTS AND DISCUSSION

Insect Pest Incidence

Insects found to inflict damage to cauliflower include field cockroach (Orthoptera), red ants (Hymenoptera), cutworm (Lepidoptera), cabbage butterfly (Lepidoptera), green, brown and slant faced grasshopper (Orthoptera). Cabbage looper and other Lepidopterans (leaf folder, leaf miner, and hornworm) were found infesting on cauliflower leaves. Several Coleopterans (squash beetle, 12-spotted lady beetle, corn silk beetle , root grub, flea beetle), Homopterans (aphids, brown hopper and leaf hopper) and brown bug (Hemiptera) were also present in the area.

Five insect pest species, field cockroach, green, brown and slant-faced grasshoppers and cutworm were found in all crop stages of cauliflower. Cabbage butterfly, cabbage looper, red ants, root grub, and spotted lady beetle were present at two crop stages, vegetative and curd initiation and development stage. While leaf folder, hornworm, brown beetle, corn silk beetle, flea beetle and brown bug were observed at the curd initiation and development stage. Green leafhopper, green tortoise beetle, cabbage moth and leaf miner were noted during the vegetative stage (Table 1).

Of all the insect pest species encountered during the study chewing insects, field cockroach was the most destructive. It was found severely infesting all plant parts at all growth stages of the

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crop. Other serious insect pests recorded were grasshoppers and caterpillars especially cutworm. Defoliation of plants, done by chewing insects was noted as the major destruction in cauliflowers.

Insect Pests Species Abundance and Diversity

Among the insect pests on cauliflower, field cockroach had the highest number, 85, representing 27.78% of the insects recorded (Table 2). Other major insect pests namely: red ants have a total population of 19.61% relative abundance; cutworm (17.64%), green grasshopper (10.13%) and cabbage butterfly (7.84%). Simpson's index of diversity connotes that insect pest species in the area was diverse.

Effect of Bio Pesticide on the Incidence of Insect Pest

The application of biopesticide on cauliflowers was found to be effective. The low population of insect pests might be due to the antifeedant and repellent properties of the organic insecticide.

Table 1: Insect pests observed from different growth stages of cauliflower in UEP, Catarman, Northern Samar, Philippines

Crop developmental stage	Name of insect	Order	Destructive stage of the insect	Plant parts damaged
Transplanting to plant establishment	Aphid	Homoptera	Nymph and adult	Leaves and flowers
	Brown hopper	Homoptera	Nymph and adult	Leaves
	Brown grasshopper	Orthoptera	Nymph and adult	Leaves
	Green grasshopper	Orthoptera	Nymph and adult	Leaves
	Slant-faced grasshopper	Orthoptera	Nymph and adult	Leaves
	Field cockroach	Orthoptera	Nymph and adult	
	Root grub	Coleoptera	Larva and adult	
	12-spotted lady beetle	Coleoptera	Larva and adult	Leaves
	Orange beetle	Coleoptera	Larva and adult	roots
	Cutworm	Lepidoptera	Larva	Leaves
	Bug	Hemiptera	Nymph and adult	Leaves
	Mite	Acari	Nymph and adult	Leaves
Vegetative stage	Green leafhopper	Homoptera	Nymph and adult	Leaves
	Brown grasshopper	Orthoptera	Nymph and adult	Leaves
	Green grasshopper	Orthoptera	Nymph and adult	Leaves
	Slant-faced grasshopper	Orthoptera	Nymph and adult	Leaves
	Field cockroach	Orthoptera	Nymph and adult	Leaves
	Green tortoise beetle	Lepidoptera	Larva	Leaves

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	Orange beetle	Coleoptera	Larva and adult	Leaves
	Cabbage butterfly	Lepidoptera	Larva	Leaves
	Cabbage looper	Lepidoptera	Larva	Leaves
	Cabbage moth	Lepidoptera	Larva	Leaves
	Cutworm	Lepidoptera	Larva	Leaves
	Leafminer	Lepidoptera	Larva	Leaves
	Red ants	Hymenoptera	Adult	Stem
Curd initiation and development stage	Brown grasshopper	Orthoptera	Nymph and adult	Leaves, curds
	Green grasshopper	Orthoptera	Nymph and adult	Leaves, curds
	Slant-faced grasshopper	Orthoptera	Nymph and adult	Leaves, curds
	Field cockroach	Orthoptera	Nymph and adult	Leaves, curds
	Cutworm	Lepidoptera	Larva	Leaves
	Cabbage butterfly	Lepidoptera	Larva	Leaves
	Cabbage looper	Lepidoptera	Larva	Leaves
	Leaffolder	Lepidoptera	Larva	Leaves
	Hornworm	Lepidoptera	Larva	Leaves
	12-spotted lady beetle	Coleoptera	Larva and adult	Leaves
	Brown beetle	Coleoptera	Larva and adult	Leaves
	Corn silkbeetle	Coleoptera	Larva and adult	Leaves
	Flea beetle	Coleoptera	Larva and adult	Leaves
	Orange beetle	Coleoptera	Larva and adult	Leaves
	Root grub	Coleoptera	Larva and adult	roots
	Red ants	Hymenoptera	Adult	Stem
	Brown Bug	Hemiptera	Nymph and adult	Leaves

In this experiment, the biopesticide's performance may have been affected by the environmental factors. Alteration of the frequency and timing of its application affected by the weather disturbances, i.e., typhoon, strong winds and heavy rain, may have caused direct impact on the efficacy and effectiveness of the pesticide. Delay in the administration of the pesticide and possibly dilution, washing or flushing from the leaves of the botanicals due to heavy rains are among the constraints/ reasons for lessening its effectiveness.

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Table 2: Insect pest species abundance and diversity recorded during the study period in UEP, Catarman, Northern Samar, Philippines.

Order	Name of Insect	No. of individuals(ni)	% Abundance	N(ni-1)
Coleoptera	12 spotted ladybeetle	2	.65	2
	Brown beetle	1	.33	0
	Corn silk beetle	2	.65	2
	Flea beetle	1	.33	0
	Root grub	2	.65	2
	Squash beetle	4	1.31	12
Hemiptera	Brown bug	1	.33	0
Homoptera	Aphids	3	.98	6
	Brown hopper	1	.33	0
	Leafhopper	2	.65	2
Hymenoptera	Red ants	60	19.61	3,540
Lepidoptera	Cabbage butterfly	24	7.84	552
	Cutworm	54	17.64	2,862
	Hornworm	1	.33	0
	Leaffolder	2	.65	2
	Leafminer	1	.33	0
	Looper	3	.98	6
Orthoptera	Field cockroach	85	27.78	7,140
	Brown grasshopper	13	4.25	156
	Green grasshopper	31	10.13	930
	Slant-faced grasshopper	13	4.25	156
	TOTAL	**306**	**100.00**	**15,370**

Simpson's index of diversity, Ds = 0.9409

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CONCLUSION

The botanical insecticide used in the study enabled both insects pests and natural enemies to exist in the area despite the environmental condition during the experiment. This is a clear indication that organic pesticides are ecologically safe and economically feasible as well.

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