

Diversity of Natural Enemies in Organic Cauliflower, *Brassica oleracea* var. Botrytis Applied with Biopesticides from Plant Extracts

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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 natural enemies on cauliflower.

Presence of natural enemies at the experimental area was not significantly influenced by the introduction of the bio pesticide. Abnormalities in the environmental condition during the conduct of the experiment was the major contributory factor to its effectiveness. Yet, repellent and antifeedant properties of the bio pesticide must have prevented the establishment of pest species. The prevalence of natural enemies and other arthropods in the area is a clear indicator of a clean and safe environment.

Keywords— Biofertilizer, Biopesticides, Bio-resources, and Natural enemies.

I. INTRODUCTION

Utilization of bio resources is a means to meet sustainable agriculture requirements. Plant extracts have long been used to control insects. Botanicals are noted to have broad-spectrum activity, relatively specific in their mode of action and also easy to process and use.

In the recent years, reports revealed that several vegetable farmers have already shunned themselves from adopting the conventional means of pest control. Many of them have shared good testimonies and successful stories about growing crops the organic way.

Among the tried and tested organic farming practices by seasoned farmers are: use of fermented plant juices as soil drench to supply nitrogen to young plants, thorough and patient preparation of the field with organic fertilizer, and use of herbal-based pesticides (Rodriguez, 2012; Samonte, 2012; Samonte, 2013).

Farmers have proven that shifting from conventional to natural farming is economically viable and ecologically sound; that organic farming has not just enabled them to save production cost but more so has restore the natural fertility of the soil, save and promote healthier environment favorable for natural enemies and most of all produce chemical-free food on their table.

This study tried to assess the incidence of natural enemies in organically grown cauliflower in Northern Samar.

II. METHODOLOGY

The study was conducted in pot experiment under protected culture at the University Demo Farm, University of Eastern Philippines, Main Campus University Town, Northern Samar. It was laid out in a Randomized Complete Block Design (RCBD) with 4 treatments (T1-Control, T2-Biopesticide, T3-Biofertilizer+Biopesticide) in three replications.

Research Procedure

A kilogram of chopped fresh leaves of *Akapulko* and guava (combined in equal amount, 1:1 ratio) was added with 1,000 ml of ground water and a kilo of brown sugar. The mixture was kept in a jar and allowed to ferment in a dark and dry place for seven days then strained; fermented foliar bio pesticide was mixed with fresh extract of 100g ground hot pepper (*siling labuyo*) and was allowed to stand for at least 6 hours then was ready for use.

Daily scouting to monitor presence natural enemies in the cauliflower field experimental area was done through visual observation above the ground parts of cauliflower plants. 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

natural enemies in the experimental area using Simpson's index, $D_s = 1 - \sum(n_i - 1) / (N(N - 1))$ where D_s = Simpson's index of diversity; N = total number of individuals of all species; n_i = total number of the species i .

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.

III. RESULTS AND DISCUSSION

Incidence of Natural Enemies

The presence of a sizable number of different species natural enemies in the experimental area is

evident of a conducive, clean and safe environment. Non utilization of toxic and harmful chemicals allows them to hover in the area. Prevalence of these beneficial creatures in the experimental area was observed in all the growth stages of the crop, Table 1. Natural enemies present in the field was dominated by different species of spiders.

Wasps (Hymenoptera), dragonfly and damselfly (Odonata) and praying mantis (Orthoptera) were also recorded. Their presence must have controlled the establishment of small insect pests like aphids and mealybugs. Pedigo, 1988, emphasized that established pests as damaging as they may be can cause even more damage if it were not for the presence of natural enemies.

Table.1: Natural enemies, other arthropods and vertebrates observed during the different growth stages of cauliflower in UEP, Catarman, Northern Samar, Philippines.

Crop developmental stage	Name of insect	Class/Order	Life stage of the insect	Plant parts located
Transplanting to plant establishment	Flies	Diptera	Adult	Leaves , soil
Vegetative stage	Wasp	Hymenoptera	Adult	Leaves
	Praying Mantis	Orthoptera	Adult , nymph, egg	Leaves
	Dragon fly & damsel fly	Odonata	Adult	Leaves
	Lacewing	Homoptera	Adult	leaves
	Daddy longlegs	Opiliones	Adult	Leaves
	Spider	Aranaeae	Adult , nymph	Leaves, stem, web
Curd initiation and development stage	Wasp	Hymenoptera	Adult	Leaves
	Flies (different species)	Diptera	Adult	Leaves
	Spider(different species)	Aranaeae	Adult , nymph	Leaves, stem, web
	Green lizard	Reptilian	Adult, egg	Soil

Other organisms recorded were several species of Dipterans (blowfly, housefly, Tabanus fly, green fly and orange fly), daddy longlegs (Opiliones), lacewing (Neuroptera), black ants (Hymenoptera), mite (Acari) and green lizard (Reptilian). Existence of these organisms in cauliflower field is indicative of species diversity. Bio resources and carabao manure utilization of must have contributed to the species richness.

Effect of the Bio Pesticide on the Incidence of Natural Enemies

The effect of the bio pesticide on the natural enemies (NE) was significantly different among the treatments. This finding means that bio pesticides contain substances with insecticidal property, however, is less toxic than synthetic pesticides, hence, categorized as an eco-friendly alternative in pest management.

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Foliar biopesticide from fermented plant extracts did not show significant effect on the natural enemies on cauliflower plants. The use of bio pesticide from botanicals (*akapulko*, guava and hot pepper) had a positive influence on the incidence/diversity of natural enemies of cauliflower, a welcome strategy to promote and realize a clean and safe environment;

Based on the results of the study, the following recommendations are made:

1. Advocate adoption of bio resources in the farm to combat hazardous effects of using conventional farm inputs.
2. Perform experiment on improvement of the preparation and processing of the bio pesticide to increase its potency and effectiveness.

3. Conduct further verification studies on dosage and manner of application of the bio pesticides.
4. Perform the same study during the dry months to confirm efficacy and effectiveness of the bio pesticides and the incidence of natural enemies.

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