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ECONOMIC PROFITABILITY OF THE UTILIZATION OF HOMEMADE ORGANIC PESTICIDE FOR SMALL SCALE PRODUCTION OF *Brassica Napus L. Varchinensis* (PECHAY)

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Abstract

The study focused on the economic profitability of the utilization of homemade organic pesticide for small scale production of *Brassica napus* L. *varchinensis* (Pechay). An experiment was undertaken at the Palayamanan Program at the University of Eastern Philippines to determine the effectiveness of homemade organic pesticide in controlling or preventing insect infestation in Pechay, to find out the effective level of this homemade pesticide and to determine the economic profitability of using homemade organic pesticide and insecticide. To explore the use of homemade extract from garlic, *Allium sativum* L., hot pepper, *Capsicum frutescens* L., vinegar and mineral oil in the management of insect pests of Pechay. The design used was the randomized complete block design (RCBD) and the data gathered were statistically analyzed using ANOVA and DMRT at 5% level of significant. There were five treatments made up of 50% extracted organic insecticide diluted in 500ml and 1 litter of water treatment before the insects will attack (pre–treatment) in weekly intervals and separate application of the same formulation of the treatment after the insect will attack (post-treatment) two days interval and control without any treatment. The result of the study showed that those that gained higher profitable weight in treatment plots were the post – treatment.

Keywords: Brassica Napus L. Varchinensis (Pechay); Homemade Organic Pesticide; Economic Profitability.

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1. Introduction

Damage by insect pests in the field effects the yield and market value of the crop (Zehnder, et al, 1997). The frequent application of pesticides is the main control strategy by farmers in Ghana (Ntow et al., 2006). The current awareness by the public that synthetic pesticides leave harmful residues in crops produced for human consumption has led to an increased interest in using natural products for pest control. The way forward is to produce highly effective plant protection products that are readily available, safe to the environment, wildlife and consumers (Fening, et al., 2011)

Organic pesticides are derived from natural materials such as; chilli peppers, vinegar, onion, garlic, black pepper, mineral oil and many other plants. Organic pesticide tends to be less toxic, more quickly biodegradable, and more targeted to the specific pest. Among the advantages of homemade organic pesticides are: it is environment friendly as compared to conventional pesticides and are often effective in very small quantities, thereby offering lower exposure and it decomposes quickly leaving virtually residue; it can offer good crop yield while dramatically reducing the use of conventional pesticides; and it engages family labor.

Aside from the health benefits of organic pesticides, it has also economic advantages, such as its being low costs and availability of the raw materials even at home. As observed, only few local farmers use homemade organic pesticides or have knowledge on how to make organic pesticides and, the economic profitability.

Hence, these observations prompted the researcher to conduct a study on economic profitability of homemade organic pesticides with an aim that the findings of this study would give insights on the benefits of the use of homemade organic pesticides.

This study will benefit the different agricultural sectors: it would give some insights to the farmers on the benefits of the use of homemade organic pesticides in gardening that may serve as their guide in improving their production and thus, promoting organically grown crops in the market, give them awareness what the organic pesticides can contribute to the environment. Further, the result of this study could be used for future research.

2. Materials and Methods

Materials
Ten to fifteen gloves of garlic, one fourth mineral oil, ten pieces of chili pepper, on fourth cup vinegar, blender, spray bottle and strainer.

Experimental Design
Randomizing Complete Black Design (RCBD) was used for this study (Fig. 1). The treatments include:

T_1 = untreated plants without any treatment.
T_2 = 50% of homemade organic pesticides was diluted in a clean spray plastic bottle (500ml) with a composition of 250ml organic pesticides and 250 ml of water.
T_3 = 50% of homemade organic pesticide was diluted in 1 letter of water with a composition of 250ml organic pesticide and 1 liter of water.

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T_4 = 50% of homemade organic pesticide was diluted in a clean spray plastic bottle (500ml) with a composition of 250ml organic pesticide and 250ml of water.

T_5 = 50% of homemade organic pesticide was diluted in 1 liter of water with a composition of 250ml organic pesticide and 1 liter of water.

There were fifteen treatment plots. Each plot measured (1m x 3m). Each plot had four rows, with each row having 10 plants totaling to forty plants. The plot distance was 25cm in width and 40 cm in length.

Block II	T5 R2	T3 R2	T2 R2	T4 R2	T1 R2
Block III	T4 R3	T5 R3	T3 R3	T1 R3	T2 R3
Block I	T5 R1	T3 R1	T4 R1	T2 R1	T1 R1

Figure 1: Layout of the experimental plots

The study was undertaken during the rainy season from August to September 2015 at the Palayamanan Project in the University of Eastern Philippines.

The Soil type in the experimental field was clay loam. Healthy Pechay, Pavo (Black behityp) seed were bought from local retail shop, Agrivet Supply Agricultural Products, Catarman, Northern Samar. The seeds were sown in the seed beds. The seedlings were protected from insects with mosquito net. These were transplanted on to raise beds in the main field after two weeks in the late afternoon to reduce plant stress.

Preparation and Application of Organic Pesticides

The first thing to do in making the homemade organic pesticide was to peel off ten to fifteen gloves of garlic weighing 500 grams. These were chopped and were blended.

After blending, the extract was stored in a plastic canning jar 22 mL mineral oil was added. The garlic was infused with the oil for at least eight hours. This served as the base for the organic pesticide. After 8 hours, three cups of water were added to emulsify the oil and water. Fifteen grams of chopped chilli pepper and 22 mL vinegar was added to the mixture and was blended. After blending, the solid particles were strained using muslin clothes. The extract was stored at room temperature.

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Under controlled condition, the solution was sprayed before plot 2 and plot 3 were attacked by the insects (weekly), while the pechay in plot 4 and plot 5 were sprayed after the appearance of the insects at two days' interval.

Homemade organic pesticide was mixed with the same level, the capacity of the spray bottle was 500 mL, and the mixture contains the same amount of water and 250 mL organic pesticide.

Cultural Practices

The untreated condition T_1 was only sprayed with water without any treatment of organic insecticide. Under controlled condition T_2 250 mL organic insecticide was mixed with 250 mL of water a maximum of 500 mL was controlled condition T_3 250mL of organic insecticide was mixed with 1 liter of water. A maximum of 1250 mL was sprayed; the treatments were applied before the plants were attacked by the insects. Under controlled condition, T_4 250 mL organic insecticide was mixed with 250 mL of water. A maximum of 500 mL was sprayed and controlled condition T_5 250ml organic insecticide was mixed with 1 liter of water. A maximum of 1250 mL was sprayed: the treatments were applied after the plants were attacked by insects.

The plants were watered twice a day in the morning and afternoon, maintaining extra careful not to water leaves of the treated plots to maximize the effect of the treatments. The treatments were applied using 3 - 1liter sprayer. The treatments in plot T_2 and T_3 were applied two weeks after transplanting the seedlings and were repeated once a week until the Pechay was fully formed. In the treatment plot T_4 and T_5, the treatment started on the third week of August on the 17th day and it was repeated twice a week with two days interval until the Pechay was fully formed. There was a split application of manure and urea. A ten kilo well decomposed chicken dung manure was applied in each plot in lined with the farrow equivalent to 250 grams per plant before transplanting the seedlings.

After the transplanting, urea was applied separately twice week. The application rate on each plot was one tablespoon and was measured 22 grams and diluted in five liters of water. The application was for two weeks and in two days' interval, respectively. For each treatment, the number of insect pests on each plant was counted or scored in the case of aphids, using a scale of 0 to 5 signifying no infestation to the highest infestation. Similarly, the number of natural enemies was counted. The data were taken weekly from 6am to 7am. At harvest, 10 plants per treatment plots were selected at random from the two innermost rows for yield and insect damage assessment. The percent of damage in Pechay leaves and the weight was measured. All useful cultural and agronomic practices were employed during the period.

The data were gathered weekly from 6am to 7am proportionally, done always at the same time to track the insects' population week after week. The data were subjected to F-test, hence the analysis of variance (ANOVA).

Data Gathered

Weight

Fresh weight in each treatment plots were gathered and recorded.
Marketable weight in each treatment plots were gathered and recorded.
Not marketable weight in each treatment plots were gathered and recorded

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Insect Pest Monitoring

Insect pest occurrence was monitored one (1) week after transplanting until harvest at weekly interval. The number and kind of insects were counted in all the experimental plants. Insect pest population (count) was determined in each plot and recorded. Presence of natural enemies was noted simultaneously.

Evaluation on the Effect of Homemade Insecticide in Yield

At harvest, ten plants were sampled in each treatment at random from the two innermost rows, the percent of plots infestation in Pechay leaves and mean yield in each treatment plots were measured.

Economic Analysis

The economic profitability of homemade organic pesticide was treated/analyzed using the formula:

$$Return\ of\ Investment\ (ROI) = \frac{Net\ Income}{Total\ Assets} \times 100$$

Labor Cost is calculated based on man hour/plot.

3. Results and Discussion

Effectiveness and Effective Level of Homemade Organic Pesticide against Common Insect Pest of Pechay

The effectiveness of homemade organic pesticide against common insect pest of pechay was evaluated based on the population of several insects pests were seen in Tables 1 to 3. Table 1, shows the population of flea beetles at deferent sampling procedures. The data had shown that there was no significant deferent between the treatments at the first week of observation.

However, during the second and third week the population of flea beetles were significantly higher in T_4 and T_5. The deference in the population of flea beetles were attributed to actual observation of the population density in treatments of the pest flea beetles *Phyllotreta spp*., in the growing period of Pechay until harvest. T_1 had higher population based on actual observation, followed by the corresponding treatments T_2 and T_3 which had shown lower in population density. This indicates to lower population density in weeks of the growing period of Pechay. Those treatments 2 and 3 determined the effectiveness and the effective level of organic pesticide in preventing the insect population from increasing. Treatments 4 and 5 showed higher in population density in weeks of the growing period of Pechay.

The result of the ANOVA showed that (week 2) had highly significant difference and (week 3) significantly deferent while the corresponding treatments we're not significantly different

Table 1: Population of flea beetles infesting the leaves of Pechay grown under field condition[1]

Treatment	Weeks of Growing period of Pechay			
	1	2	3	4
T_1	$20.67 \pm 14.49\ a$	$11.67 \pm 13.43\ a$	$17.33 \pm 15.63\ a$	$140.33 \pm 182.72\ a$
T_2	$18.00 \pm 11.00\ a$	$5.33 \pm 1.53\ a$	$14.67 \pm 15.53\ a$	$78.00 \pm 79.64\ a$

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T_3	$25.33\pm 5.69\ a$	$8.67\pm 4.04\ a$	$21.00\pm 26.66\ a$	$75.33\pm 43.92\ a$
T_4	$26.67\pm 4.51\ a$	$39.00\pm 1.00\ b$	$29.00\pm 24.78\ ab$	$107.33\pm 10.21\ a$
T_5	$28.67\pm 3.06\ a$	$38.33\pm 1.53\ b$	$80.67\pm 24.44\ a$	$200.00\pm 86.09\ a$
P value	0.377 NS	0.001**	0.0112*	0.471 NS
[1]Data are means$\pm$sd of each treatment with 3 replications. Means followed the same letter(s) within the same column are not significantly different based on ANOVA and DMRT at 5% level of significance. NS is not significant; ** is highly significant.				

Table 2, shows the population density of the insect pest Diamond back moth (DBM), *Plutel1a xylostel1a L.*, infesting the leaves of peachy at different sampling procedures. The DEM population was significantly reduced in T_2 and T_3 during the first week of sampling. Among the treatments, T_2 showed the 1owest in population density after several weeks of observation the insects population did not increase in number. It indicates and determine the effectiveness and the effective level of organic pesticide.

The result of the ANOVA showed that (week 1) and (week 2) were significantly different while the corresponding treatments were not significantly different.

Table 2: Population of DVM infesting the leaves of Pechay grown under field condition[1]

Treatment	**Weeks of Growing period of Pechay**			
	1	2	3	4
T_1	$3.00\pm 1.00\ ab$	$4.33\pm 3.21\ ab$	$13.33\pm 23.09\ a$	$1.33\pm 2.31\ a$
T_2	$0.00\pm 0.00\ a$	$0.00\pm 0.00\ a$	$0.33\pm 0.058\ a$	$0.00\pm 0.00\ a$
T_3	$0.00\pm 0.00\ a$	$0.00\pm 0.00\ a$	$6.67\pm 10.69\ a$	$25.67\pm 24.582\ ab$
T_4	$4.00\pm 2.65\ b$	$8.00\pm 4.58\ b$	$4.67\pm 5.69\ ab$	$21.33\pm 18.72\ ab$
T_5	$4.00\pm 3.61\ b$	$8.67\pm 6.03\ b$	$26.33\pm 26.08\ a$	$64.67\pm 81.77\ a$
P value	0.033*	0.011**	0.326 NS	0.105 NS
[1]Data are means$\pm$sd of each treatment with 3 replications. Means followed the same letter(s) within the same column are not significantly different based on ANOVA and DMRT at 5% level of significance. NS is not significant; * is significantly different.				

Table 3, shows the population density of the insect pest *Attractomorpha psittacin* (Grasshopper), in weeks of growing period of Pechay until harvest. All the treatments had shown lower in population density based on actual observation and did not increase in number after four weeks of observation.

The result of the ANOVA showed that among the treatments, not including (week 2), it did not show an insect presence zero grasshopper pest appearance, followed by the corresponding treatments which were not significantly different

Table 3: Population of Grasshopper infesting the leaves of Pechay grown under field condition[1]

Treatment	**Weeks of Growing period of Pechay**			
	1	2	3	4
T_1	$0.00\pm 0.00\ a$	0.00 ± 0.00	$0.33\pm 0.58\ a$	0.00 ± 0.00
T_2	$0.00\pm 0.00\ a$	0.00 ± 0.00	$0.33\pm 0.58\ a$	0.33 ± 0.58

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T_3	0.00± 0.00 *a*	0.00± 0.00	0.00± 0.00 *a*	0.67± 1.15
T_4	0.33± 0.58 *a*	0.00± 0.00	0.67± 1.15 *a*	0.00± 0.00
T_5	0.00± 0.00 *a*	0.00± 0.00	0.33± 0.58 *a*	0.33± 0.58
P value	0.452 NS		0.842 NS	0.688 NS

[1]Data are means±sd of each treatment with 3 replications. Means followed the same letter(s) within the same column are not significantly different based on ANOVA and DMRT at 5% level of significance. NS is not significant.

Influence of Homemade Organic Pesticide in the Population of Beneficial Insect.
Simultaneously, the effect of homemade organic pesticide on beneficial insects were evaluated by monitoring the population of praying mantis and spider. The presence of natural enemies Table 4 and 5 indicates that homemade organic pesticide is not harmful to the beneficial insects, like the Praying mantis and Spider. Therefore, homemade organic insecticide is environmental friendly, organic insecticide did not deter nor eradicate the beneficial insects rather it conserving them. By conserved the beneficial insects it creates balance to ecosystem and can help to reduce the population of the harmful insects from increasing in density.

Table 4: Population of Praying Mantis infesting the leaves of Pechay grown under field condition[1]

Treatment	Weeks of Growing period of Pechay			
	1	2	3	4
T_1	0.00± 0.00	0.33± 0.58 *a*	0.33± 0.58 *a*	0.00± 0.00
T_2	0.00± 0.00	0.00± 0.00 *a*	0.00± 0.00 *a*	0.00± 0.00
T_3	0.00± 0.00	0.00± 0.00 *a*	0.33± 0.58 *a*	0.00± 0.00
T_4	0.33± 0.58	0.00± 0.00 *a*	0.00± 0.00 *a*	0.00± 0.00
T_5	0.00± 0.00	0.00± 0.00 *a*	0.00± 0.00 *a*	0.00± 0.00
P value		0. 425 NS	0. 580 NS	

[1]Data are means±sd of each treatment with 3 replications. Means followed the same letter(s) within the same column are not significantly different based on ANOVA and DMRT at 5% level of significance. NS is not significant.

Table 5: Population of Spider infesting the leaves of Pechay grown under field condition[1]

Treatment	Weeks of Growing period of Pechay			
	1	2	3	4
T_1	0.00± 0.00	0.33± 0.58 *a*	0.67± 1.15 *a*	0.67± 0.58 *a*
T_2	0.00± 0.00	0.00± 0.00 *a*	0.00± 0.00 *a*	0.00± 0.00 *a*
T_3	0.00± 0.00	0.00± 0.00 *a*	1.00± 1.73 *a*	0.00± 0.00 *a*
T_4	0.00± 0.00	0.00± 0.00 *a*	1.33 ± 1.53 *a*	0.00± 0.00 *a*
T_5	0.00± 0.00	0.00± 0.00 *a*	0.00± 0.00 *a*	0.33± 0.58 *a*
P value		0. 425 NS	0. 543 NS	0.171 NS

[1]Data are means±sd of each treatment with 3 replications. Means followed the same letter(s) within the same column are not significantly different based on ANOVA and DMRT at 5% level of significance. NS is not significant.

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Effect of Homemade Pesticide in the Infestation Level in the Leaves of Pechay

Table 6, shows the insect pest flea beetles and DVM the level of infestation in the leaves of pechay it was evaluated by monitoring at harvest ten plants were sampled in each treatment plots at random from the two innermost rows.

In most cases, losses from insect pests were directly proportion to the density of the pest population high density increases the extent or severity of damage

Table 6: Flea Beetles and DVM percent of infestation in leaves[1]

Treatment	Flea Infested Leaves	DVM Infested Leaves
T_1	5.10 ± 8.58 a	0.06 ± 0.04 a
T_2	0.13 ± 0.03 a	0.41 ± 0.65 a
T_3	0.15 ± 0.05 a	0.21 ± 0.19 a
T_4	0.14 ± 0.03 a	0.18 ± 0.16 a
T_5	0.20 ± 0.08 a	0.24 ± 0.22 a
P value	0.454 NS	0. 787 NS

[1]Data are means±sd of each treatment with 3 replications. Means followed the same letter(s) within the same column are not significantly different based on ANOVA and DMRT at 5% level of significance. NS is not significant.

Growth Response

At harvest, ten plants were sampled in each treatment plots at random from the two innermost rows. The mean yield in each treatment plots were measured. Table 7, the data was evaluated based on actual observation, showed that Post-treatment plots T_4 and T_5 had the highest weight of 5.550 kg and 6.950 kg, followed by Pre-treatment 3 (T_3), 4.425 kg, the controlled condition treatment 1 (T_l), 3.625 kg and lastly, treatment 2 (T_2), 3.210 kg.

Post-treatment (T_5) had the highest weight of all the treatments. These result showed that Post-Treatment (T_5) of homemade organic pesticide is most effective in improving yield of Pechay.

Table 7: Pechay weight was measured at harvest Ten plants were sampled in each treatment plots at random from the two innermost rows

Treatment	Weight (kg)
T_1	3. 625
T_2	3. 210
T_3	4. 425
T_4	5. 550
T_5	6. 950

Adjusted Yield

The average adjusted yield of Pechay is presented in Table 8. The data revealed that during the 30th day after harvesting Pechay in Post-treatment 5 (T_5) treated (two days interval) had the highest weight of 19.68 kg of the total adjusted yield followed by the Post-treatment 4 (T_4) treated (two days interval) with 12.84 kg of the total adjusted yield. The Pre-treatment plot 3 (T_3) treated (weekly) had 11 kg and the treatment 2 (T_2) treated (weekly) with 250ml organic insecticide had

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7.92 kg of the total adjusted yield. The control condition, treatment 1 (T_1) had 10.726 kg of the total adjusted yield.

The result of the ANOVA showed that adjusted yield of Pechay among the treatments was significantly different.

Table 8: Adjusted yield (Actual/Plot)

Treatment	kg/plot	Adjusted Yields (kg/treatment)
T_1	3.58 a	10.726
T_2	2.64 a	7.92
T_3	3.67 a	11
T_4	4.28 ab	12.84
T_5	6.56 b	19.68
P value	0.031*	

Marketable Weight

The data on the average marketable weight of Pechay is presented in Table 9. The data shows that those that gained higher weight in treatment plots were the Post-treatment (T_5) and (T_4) the highest marketable weight, followed by Pre-treatment plot (T_3), control condition treatment 1 (T_1) and Pre- treatment plot (T_2).

The marketable weight followed by the corresponding treatments and time intervals of treatments were; control condition (T_I), Pre-treatments (T_2), followed by (T_3) in weekly application before the insects will attack. Post - treatments (T_4), (T_5) treated (two days interval) after the insects will attack (Table 8) shows that (T_5) had the highest marketable yield of all the corresponding treatments. However, statistical analysis revealed that they were not significantly different based on ANOVA.

Table 9: Marketable yield (Actual/Plot)

Treatment	kg/plot	Adjusted Yields (kg/treatment)
T_1	1.88 a	5.68 a
T_2	1.67 a	5 a
T_3	1.78 a	5.325 a
T_4	2.25 a	6.75 a
T_5	3.48 a	10. 35 a
P value	0.836 NS	

Yield Losses of Pechay

The insects monitored had been infesting pechay after (4) weeks of observation that caused damage to pechay were Flea beetles, *Phyllotreta spp.*, Diamond back moth, *Plutella xylostella L.*, Grasshopper, *Attractomorpha psittacin*, and some natural enemies like Spider and Praying mantis. The insect pests attacking pechay were identified through actual field observations by means of visual observation and counting the numbers of insects in treatment plots.

Table 10 presents the average weight of not marketable pechay in each treatment plots due to damage of insect infestation in pechay, the yield losses in the control condition (T1) without any

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treatment, Pre-treatments (T2) and (T3). For post-treatments (T4) and (T5), however the statistical analysis revealed that they were not significantly different based on ANOVA.

Table 10: Not marketable weight (Actual/Plot)

Treatment	kg/plot	Adjusted Yields (kg/treatment)
T_1	883. 33 a	2.65
T_2	666. 67 a	2
T_3	1416.67 a	4.25
T_4	1816.67 a	5.45
T_5	2666.67 a	8
P value	0.310 NS	

Economic Profitability of Using Homemade Organic Pesticide in Pechay Production

The return on investment (RIO) was used to measure the economic profitability of organic formulated insecticide in different duration of application.

The study revealed that there was a difference on the effect of the time duration of application Table 11, shows the percent on the return on investment of pechay at different time duration of application of organic pesticide, T_5 had the highest return on investment (ROI) rate and 2.62% compared to Post – treatment plots T_2 and T_3 with a return on investment of 1.29% and 1.37% and the control condition (T_1) without any treatment of organic pesticide with a return on investment of 1.47%.

Base on the production condition of this study that in every P 1.0 (one peso) of the total production cost, it generated a return on investment one peso and forty seven centavos (Php 1.47), one peso and twenty-nine centavos (Php 1.29) one peso and thirty-seven centavos (Php 1.37) two pesos and sixty-two centavos (Php 2.62), one peso and seventy-one centavos (Php 1.71) for the control condition, Pre - treatment and Post-treatment plots, respectively. This generated ratio of income was used to determine and guide the production inputs in the efficiency in managing the total assets invested. The ROI generated may serve as guide in deciding which practices of using homemade pesticide would potential y profitable. However, the RCI could improve in large scale production for it is expected to improve the efficiency of the utilization of resource

Table 11: The percent return on investment of Pechay at different time duration of application of Organic Pesticide

Treatment	%ROI
T_1	1.47
T_2	1.29
T_3	1.37
T_4	1.71
T_5	2.62

4. Conclusion

At the end of the study the researcher concluded that organic pest management system is an environmental friendly, economically productive and beneficial method of pest control system.

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Gradually, this pest management system is getting popular to the farmers every now and then because of its good and beneficial effect to human's health and it helps in the improvement of the environment.

The researcher further concluded that this organic pesticide is effective against DBM but not on flea beetles that affect the yield to some extent the distance or the spacing of the treatment plots or where higher concentration and volume of organic formulated insecticide diluted in different levels of volume of water and the time interval of the treatment plots. This somewhat affect the marketable weight in the pre-treatment plots.

References

[1] Abbey L, Manso F. 2004. Correlation studies on yield and yield components of two cultivars of cabbage (*Brassica oleracea var. Capitata* L.). Ghana Journal of Science, 44:3-9.
[2] Bajwa WI, Korgan M. 2002. Compedium of IPM Definitions (CID)- What is IPM and how is it defined in the Worldwide Literature? IPP Publication, Oregon State University, Corvallis.
[3] Delahut, Karen. 2004. Scouting vegetables for pests with support from the Pesticide Use and Risk Reduction Project at the Center for Integrated Agricultural Systems. University of Wisconsin-Madison, College of Agricultural and Life Sciences.
[4] Grez AA, Prado E. 2000. Effects of plant patch shape and surrounding vegetation on the dynamics of predatory Coccinellids and their prey Brevicoryne brassicae (Hemiptera: Aphididae). Environmental Entomology, 29 (6).
[5] Guerena M. 2006. Cole Crops and Other Brassicans: Organic Production. NCAT Agriculture Specialist.
[6] Juroszek P, Tsai HH. 2008. Research Needs in Organic Vegetable Production Systems in Tropical Countries with a Focus on Asia. 16th IFOAM Organic World Congress, Modena, Italy.
[7] Kilpatrick J. 2016. Pesticides Used in Pechay. East Carolina University.
[8] Ntow JW, Gijzen HJ, Kelderman P, Drechsel P. 2006. Farmer perceptions and pesticide use practives in vegetable production in Ghana. Pest Management Science, 62: 356-365.
[9] Senerpida BJ, Suralta MB, Dungog AL, Louie RA, Durano J, Sabanal MJ, Christian D, Labayan AC, Tatud M, Reusora GA. 2013. Natural Insecticide-Investigatory Project.
[10] Zender G. 2014. Overview of Monitoring and Identification Techniques for Insect Pest. Clemson University. eOrganic Article.
[11] Zehnder G, Simonne E, Briggs T, Bannon J, Ruff M. 1997. Organic sprays effective for worm control in cabbage and lettuce. Highlights of Agriculture Res, 43(3).
[12] Zehnder G, Simmone E, Briggs T, Bannon J, Ruff M. 1997. Organix Spray Effective for Worm Control in Cabbage and Lettuce. Highlight of Agricultural Research, 43(3).

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