

BIBLIOGRAPHY

TIBAO, MARLON Y. APRIL 2012. Insect Pests Succession of Organically Grown Pechay (*Brassica chinensis* Linnaeus). Benguet State University, La Trinidad, Benguet.

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ABSTRACT

The study was conducted at Balili Experimental Station, Benguet State University, La Trinidad, Benguet from July to September 2011 to identify the insect pests of pechay, determine the total number of insect pests of the growth stages of the crop, and to record the characteristic damage of the insect pests.

Insect pests observed associated with pechay are the *Phyllotreta* spp. (Fam. Chrysomelidae), *Pieris rapae* (Fam. Pieridae), *Trichoplusia ni* and *Spodoptera litura* (Fam. Noctuidae), *Liriomyza huidobrensis* (Fam. Agromyzidae), *Plutella xylostella* (Fam. Plutellidae), and *Myzus persicae* (Fam. Aphididae).

The highest insect pest population was observed in the vegetative stage with a total number of 1,410, while the lowest population of insect pests was recorded in the seedling stage with a total number of 416. The seedling stage ranked second to the vegetative stage with a total number of 1,057 insect pests, followed by a total number of 588 insect pests observed in the flowering stage.



Flea beetles were found to be the most abundant insect pest in all the growth stages of pechay with a total number of 2,196, followed by leafminers with a total number of 594. Cabbage butterflies, with a total number of 438, ranked third in abundance followed by 85 cutworms. Diamondback moth was the lowest in number of 81.

The feeding of flea beetles on pechay shows a characteristic damage of shot holes on the leaves, flowers, stem and pods. The cabbage looper and cutworm inflict rugged holes on the leaves, while the leafminer adult causes punctures on the leaves. Cuts starting from the leaf margins are inflicted by cabbage butterflies. Diamondback moth causes irregular patches on the leaves while yellowish dots are characteristic damage due to aphids.



RESULTS AND DISCUSSION

Identification of Insect Pests of Associated with Pechay

The insect pests observed and collected from the families of Chrysomelidae (flea beetle), Pieridae (cabbage butterfly), Noctuidae (cutworms and cabbage loopers), Agromyzidae (leafminers), Plutellidae (diamondback moths), and Aphididae (aphids) are presented in Table 1. With the observed list of insect pests, the diamondback moth and the cabbage butterfly as cited by Esguirra (1961) are found on all the growth stages of pechay.



ORDER: Coleoptera
FAMILY: Chrysomelidae
SCIENTIFIC NAME: *Phyllotreta*
spp.
LOCAL NAME: Timel, Flea
beetle
COMMON NAME: Flea beetle

Figure 1. Flea beetle chewing on the petals. (15x)



ORDER: Lepidoptera
FAMILY: Pieridae
SCIENTIFIC NAME: *Pieris*
rapae (Linnaeus)
LOCAL NAME: Cabbage
butterfly, Bigis
COMMON NAME: Cabbage
butterfly ,

Figure 2. Cabbage butterfly larva chewing on
leaves (10x)



ORDER: Lepidoptera
FAMILY: Noctuidae
SCIENTIFIC NAME:
Spodoptera litura (Fabricius)
LOCAL NAME: Cutworm, Bigis
COMMON NAME: Cutworm

Figure 3. Cutworm chewing on leaves (15x)



ORDER: Lepidoptera
FAMILY: Noctuidae
SCIENTIFIC NAME:
Trichoplusia ni (Hubner)
LOCAL NAME: Looper, Bigis
COMMON NAME: Looper

Figure 4. Cabbage looper walking on the leaf (5x)



ORDER: Diptera
FAMILY: Agromyzidae
SCIENTIFIC NAME: *Liriomyza*
huidobrensis (Blanchard)
LOCAL NAME: Leafminer
COMMON NAME: Leafminer

Figure 5. Leafminer larva brought out from the leaf (400x)





ORDER: Lepidoptera
 FAMILY: *Plutellidae*
 SCIENTIFIC NAME: *Plutella xylostella* (Linnaeus)
 LOCAL NAME: Diamondback moth, Tarsan, Bigis
 COMMON NAME: Diamondback moth

Figure 6. Diamondback moth larva chewing on the leaves (10x)



ORDER: Hemiptera
 FAMILY: *Aphididae*
 SCIENTIFIC NAME: *Myzus persicae* (Zulser)
 LOCAL NAME: Aphids
 COMMON NAME: Aphids

Figure 7. Aphid sucking on plant leaf (10x)

Table 1. Insect pests associated with pechay

FAMILIES OF INSECT PEST	COMMON NAME	SCIENTIFIC NAME
Chrysomelidae	Flea beetle	<i>Phyllotreta spp.</i>
Pieridae	Cabbage butterfly	<i>Pieris rapae</i>
Noctuidae	Cutworm	<i>Spodoptera litura</i>
	Cabbage looper	<i>Trichoplusia ni</i>
Agromyzidae	Leafminer	<i>Liriomyza huidobrensis</i>
Plutellidae	Diamondback moth	<i>Plutella xylostella</i>
Aphididae	Aphid	<i>Myzus persicae</i>



Total Number of Insect Pests of the Growth Stages of Pechay

The number of insect pests found in the four growth stages of pechay was presented in Table 2.

Insect pests of the seedling stage showed the lowest number of 416 from among all the growth stages of pechay. The insect pests during this stage were the flea beetles (Figure 1) found to have the highest number of 214, followed by adult leafminer with a total number of 169. Cutworms (Figure 3) ranked third with a total number of 19, while cabbage butterflies (Figure 2) with a number of 12 ranked fourth. The lowest number is found in aphids (Figure 7) with only two counts. It was only in this stage that aphids were observed. Solang (2005) cited that when adult flea beetles emerge in large number, they can quickly devastate the seedling of the host plant.

The vegetative stage recorded the highest number of insect pests which is 1,410. This is because of the longer days of exposure of the crop to the environment (23 days). Flea beetles, adult leafminers, cabbage butterflies, and cutworms were observed to increase in number from the seedling stage. The highest number is found in flea beetles 749, followed by the adult leafminers 288. The third highest count of 237 is observed in cabbage butterflies while cutworms showed a number of 57, hence ranked fourth. It is in this stage that 32 cabbage loopers (Figure 4), 31 leafminer larvae (Figure 5), and 16 diamondback moths (Figure 6) were observed.

The result corroborated the study of Wakit (1980) that the population of flea beetles was observed to increase as the crop matured due to increasing leaf surface area. However, the great infestation occurred during the vegetative stage of the plant. The result was also supported by Lumas-e (1981) that the population of leaf miner was observed three weeks



after emergence. When the plants were four weeks after emergence, they increased abruptly.

The total number of all insect pests of the flowering stage was observed to have decreased 588, compared to the total number of insect pests during vegetative stage. The highest number was found in flea beetles 451, followed by the cabbage butterflies with a count of 66. Leafminer larvae ranked third with a count of 27, looper ranked fourth with a count of 15, followed by the diamondback moth 12, which ranked sixth. The last is the cutworm with a number of six. This is because of the shorter period of the plants exposure to the environment (10 days), and the occurrence of typhoons and daily rainfalls which makes the insects immobile.

The result was again supported by Lumas-e (1981) on her study that the population of the leafminers decreased at the fifth week after emergence. She added that heavy drenching rain will wash off many of the weaker insect species.

The seeding stage showed the second highest 1,057 of all the growth stages of pechay. This is due to the number of days the crop was exposed to the environment (20 days). The population of all insect pests increased except for the cut worms which decreased in number. The flea beetles were found to have the highest number 782, followed by the cabbage butterflies with a total number of 123. Ranked third are the leafminer larvae and diamondback moth with a population of 53, while the fourth are the cabbage loopers with a total number of 28. The adult leafminer (Figure 8) has a total number of 15 which ranked fifth, followed by cutworm which decreased with a population of six.





Figure 8. Adult leafminer scratching its ovipositor on the leaves (40x)

Table 2. Total number of insect pests of the different growth stages of pechay

Growth Stages	Flea beetle	Cabbage butterfly	Looper	Cutworm	Leafminer		DBM	Aphid	Total
					adult	larvae			
Seedling	214	12	0	19	169	0	0	2	416
Vegetative	749	237	32	57	288	31	16	0	1410
Flowering	451	66	15	6	11	27	12	0	588
Seeding	782	123	28	3	15	53	53	0	1057
Total	2196	438	75	85	483	111	81	2	3471

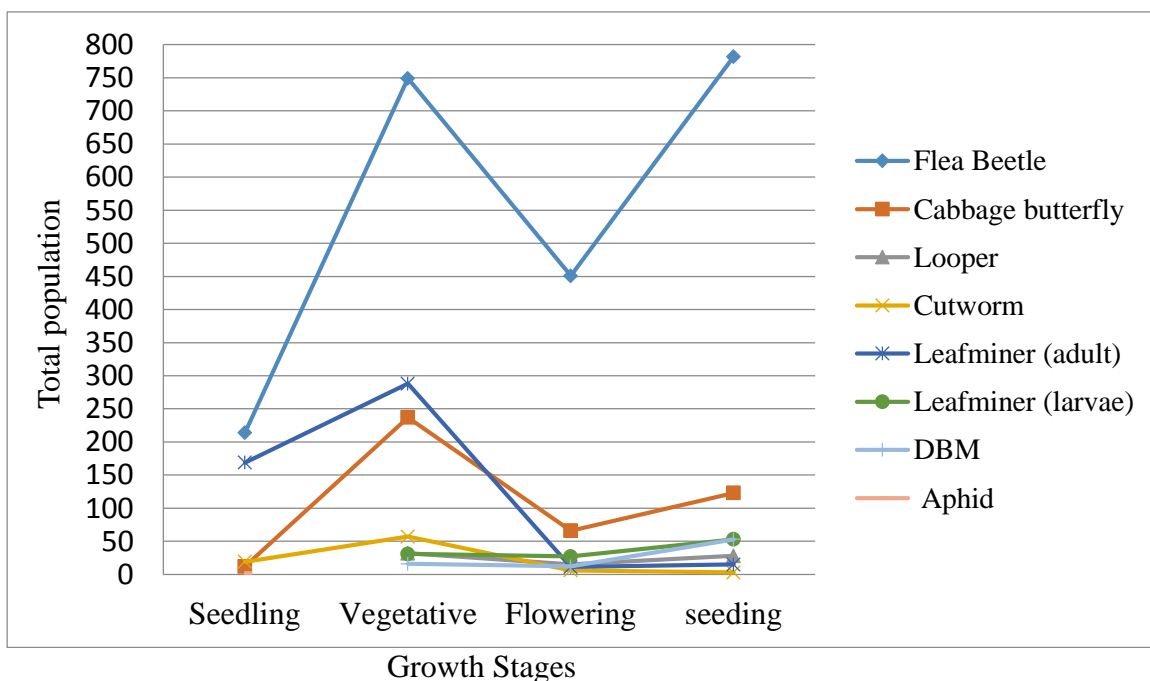


Figure 9. Insect pests population of the growth stages of pechay

Characteristic Damage Inflicted by the Insect Pests of Pechay on the Parts of the Plant

Table 3 shows the characteristic damage of the insect pests of pechay on the parts of the plant.

Flea beetles are found at the leaves, stem, flowers and pods. Possessing chewing mouth parts, they chew the different parts of the plant resulting to shot holes on the leaves (Figure 10), stem (Figure 11), flowers (Figure 12) and pods (Figure 13). The result corroborated the study of Wakit (1980) that flea beetles brought damage by chewing on the foliage of the plants at early stage of growth development. Leaves that are attacked by these insect pests showed holes.

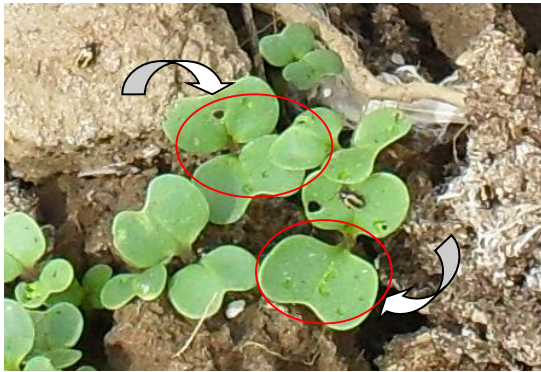


Figure 10 a. Shot holes on the seedlings caused by flea beetle (5x)

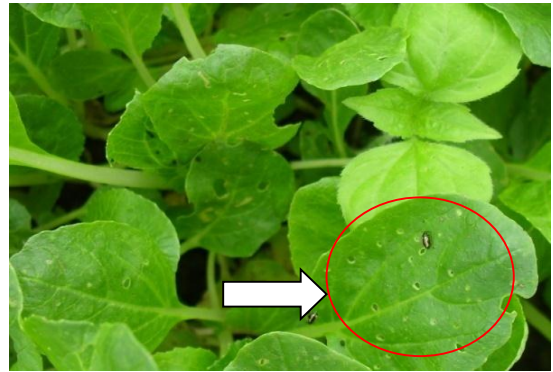


Figure 10 b. Shot holes on the leaves caused by flea beetle (5x)



Figure 11. Shot holes on stem caused by flea beetle (15x)



Figure 12. Shot holes on petals caused by flea beetles (5x)



Figure 13. Shot holes on pod caused by flea beetles (5x)

Cabbage butterflies, with chewing mouth parts, feed on the crops that result to a cut that usually starts from the leaf margin (Figure 14). The observation revealed the study of Davidson and Pears in 1996 that the larvae of the cabbage butterfly feed mostly on the lower surface of the leaves. They form a hole that usually unites into irregular shapes and sizes in the leaves.



Figure 14. Cut on the leaves starting from the leafmargin caused by cabbage butterfly larva (5x)

On the other hand, cabbage loopers (Figure 15) and cutworms (Figure 16) feed on the crop by chewing the leaves that result to rugged holes. This result revealed the study of Gacadan (1997) that the damaged leaves had larger irregular holes brought about by chewing activity of the looper larvae. On the other hand, Mula (2003) said that young larvae of cutworms make holes on the leaves. Removal of entire leaf blade is caused by the cutworm during the early stage of the plant (Figure 17).



Figure 15. Irregular holes caused by cabbage looper (5x)



Figure 16. Rugged hole on leaf blade due to a cutworm (5x)



Figure 17. Removed part of leaves caused by cutworm (5x)

Irregular patches on the leaves were caused by diamondback moth feeding (Figure18). These results corroborated the study of Amolang (2000) that diamondback moth larvae chew the leaves making irregular small and big holes on the leaves. It was also found out by Wakit (1980) that the larval stage is the most injurious. The larvae attacked the crop by chewing the tissue of the lower side of the leaves. The attacked leaves were characterized by presence of small irregular holes.



Figure 18. Irregular patches on the leaves caused by diamondback moth larva (5x)

Whitish blotches and winding trail (Figure19) on the leaves were also due to the leafminer larvae. They feed on the plant by chewing the tissues of the plant. This was supported by Colting *et al.* (2003) by saying that the larva makes serpentine and curled mines on the leaves. This was elaborated by Pyenson (1977) that the basic or primitive type of mouth part is the chewing type which permits its possessor to bite off or chew on, or into, external part of a plant or to tunnel its way to some part of the plant. Likewise, the leafminer adult also contributes to the damage of the plant. The adult leafminer scratches its ovipositor causing punctures on the leaves (Figure 20). The result corroborate the study

of Ligligen (2003) that adult female leafminer uses its ovipositor to make punctures on the leaves.



Figure 19. Whitish blotch mined by leafminer larva (5x)



Figure 20. Punctures on leaf scratched by leafminer adult (5x)

Among the insect pests of pechay that was identified in the study, aphids were the only insect pest with piercing-sucking mouth parts. When it fed on the plants, it resulted to yellowish dots on the leaves due to sap extraction. The result agrees with Wakit (1980) that aphids attacked cabbage crop by sucking the sap. As observed, attacked leaves were characterized by presence of yellowish dots.

Table 3. Characteristic damage inflicted by the insect pests of pechay on parts of the plant

INSECT PESTS	CHARACTERISTIC DAMAGE			
	Leaves	Stems	Flowers	Pods
Flea beetle	Shot holes	Shot holes	Shot holes	Shot holes
Cabbage butterfly	Cuts usually starts from the margin			
Cabbage looper	Rugged holes			
Cutworm	Rugged holes			
Diamondback moth	Irregular patches and holes			
Leafminer (larvae)	Winding trail			
Leafminer (adult)	Punctures			
Aphids	Curled leaves			
	Yellowish dots			



SUMMARY, CONCLUSION AND RECOMMENDATION

The study was conducted at the Experimental Station, Benguet State University, La Trinidad, Benguet from July to September 2011.

The study aimed to identify the insect pests of pechay, determine the total number of insect pests of the growth stages of the crop, and to record the characteristic damage of the insect pests.

Identified insect pests of pechay are from the family Chrysomellidae, Pieridae, Noctuidae, Agromyzidae, Plutellidae, and Aphididae.

The total number of insect pests in the seeding stage of pechay is 416. The vegetative stage had the highest number of insect pests which is 1,410. There are 1,057 insect pests in the flowering stage and the seeding stage had 588 insect pests.

The characteristic damage of flea beetle is shot holes on the leaves, flowers, stems and pods. The cabbage looper and cutworm larvae chew on the underneath and surface of the leaf causing rugged holes on the leaf blade, while the leafminer adult punctures on the leaves scratching its ovipositor. The leafminer larvae damage the leaf by chewing plant tissues which result to large whitish blotches, block end area and white winding trail through in the anterior surface of the leaf. The diamondback moth larvae chew the leaves which cause irregular patches on the leaves, and the aphids suck the plant sap which results to curling and yellowish dots on leaves,

Conclusion and Recommendation

The insect pests of pechay which are the flea beetles, cabbage butterflies, cutworms, cabbage loopers, leafminers, diamondback moths, and aphids occurred in all the growth



stages of pechay. It is in the vegetative stage where the insect population is highest, while the lowest population is observed in the seeding stage.

A further study of the seasonal abundance of flea beetles, cabbage butterflies and leafminers including the management practices for each insect pest could be conducted.



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