

Integrated Management of Sweet Pea (*Pisum sativum* L.) Insect Pests in Kundasang, Sabah.

J. Jipanin

Agriculture Research Centre Tuaran
Department of Agriculture Sabah, Malaysia
e-mail: cjipanin@yahoo.com

Abstract

An integrated pest management (IPM) package formulated for the control of sweet pea, *Pisum sativum* L., insect pests was assessed at Kundasang, Sabah. The study was conducted in 3 farms to compare the IPM package with farmer's conventional control method, which consisted of deltamethrin applications at weekly interval. The IPM package consisted of spraying with avermectin at the early stages of growth beginning at 20 days after sowing until 50 days after sowing (DAS) to control leaf miner larvae; setting up of yellow sticky traps for capturing adult leafminer during the fruiting period; spraying of *Bacillus thuringiensis* var. *aizawai* to control leaf eating caterpillars and pod borers; and conservation of 3 species of leaf miner parasitoids. The IPM package was effective and consistently performed better against the major sweet pea insect pests than farmer's conventional control method. It produced higher yield and pesticide residual-free produce.

Keywords: Sweet pea, *Pisum sativum*, IPM, Insect pest control.

Introduction

Sweet pea, *Pisum sativum* L., was introduced to the farmers in Kundasang in the early 1980s and soon became an important crop fetching price as high as RM8 to RM15 per kg. Farmers work hard to protect their crops from pests and diseases but more often than not, pesticides are used. Under the routine sampling programme for pesticide residue conducted from 1992 to 2000, an average of 50.5 % sweet pea samples analysed were contaminated with pesticides residues above the maximum residue level (Anon, 2001). Incidentally, farmer's preferred insecticides like methamidophos has been banned in vegetable production and new generation insecticides are very expensive. Some farmers have stopped planting sweet pea

due to severe infestation of pests and diseases, and the requirement of pesticide residues below the permitted level for export vegetables. The production of sweet pea in Kundasang had gradually dropped following the persistent infestation of pests and diseases. Sabah crop statistic report showed that only 0.8 ha of sweet pea was planted in Kundasang in 2004 (Anon, 2005) while previously it was 40 ha planted in 1990 (Anon, 1991). Similarly, a survey in Cameron Highlands reported that about 17 % of the farmers abandoned vegetable cultivation due to problems of leaf miners (Sivapragasam and Syed, 1999).

The important insect pests of sweet pea recorded were dipteran leafminer (*Chromatomyia horticola*, *Liriomyza huidobrensis*), leaf eating caterpillars (*Spodoptera litura*, *Spodoptera armigera*), and pod borers (*Helicoverpa armigera*), which could cause considerable economic losses (Anon, 2001). An integrated pest management package was thus formulated (Anon, 2001) and tested in farmers' plots. This paper presents and discusses the results of the IPM package implemented in Kundasang.

Method and Materials

The IPM package was tested in three farms owned by local farmers (Table 1) located at the foothill of Mt. Kinabalu (6° 17' N, 116° 36' E), altitude 1400 m above sea level. Each farm has two plots, one IPM package treated plot and the other plot for farmer's conventional method treatment practiced by the farmers. The plots were between 10m – 20m apart and sweet peas were planted simultaneously in both plots.

The IPM package treatment consisted of spraying avermectin beginning at 20 days after sowing (DAS) until 50 DAS at weekly intervals against leaf miner larvae. This will take about 5 to 6 rounds of spraying. Sweet pea plants will start to flower at around 50 DAS old and spraying avermectin should be stopped. Yellow sticky traps were set up at 10 m apart to capture adult leaf miner during the fruiting period (55 DAS – 90 DAS) and replaced after every 10 days. *Bacillus thuringensis* var. *aizawai* was applied when leaf eating caterpillars and pod borers showed up. There are 3 species of hymenopteran parasitoid on leaf miner identified in Kundasang, namely *Hemiptarsenus semialbiclava* (Girault): Eulophidae; *Opius* spp.: Braconidae; and *Neochrysocharis formosa* : Eulophidae (Anon 2001). Continuous planting of sweet peas without using "broad-spectrum" insecticide would help to conserve the parasitoid population.

The farmers' conventional control practices consisted of continuous spraying of deltamethrin at the recommended dose at weekly intervals through out the cropping period.

Leaf miner infestation samples were taken randomly, that is, after every 10 plants of the planting row by taking the 8th or 9th leaf below the shoot tip at 7 - 8 days intervals. Ten samples of five leaves each sample was taken and the number of larva was counted. The number of cutworm and pod borer was counted at the same sampling point within a vertical area with 30 cm broad width. The sweet pea pods were harvested at 2 – 3 days interval and the total plot yield was recorded.

Table 1. Farms involved in Sweet Pea Integrated Pest Management Package, On-farm Trial (March – June 2005)

Farm	Name	Location	Plot Size	
			IPM	Farmers'
1	Gadimah Siur	Kg. Dumpiring, Kundasang	13m x 15m	12m x 23m
2	Hamili Bahanti	Kg. Kinasaraban, Kundasang	10m x 37m	12m x 37m
3	Suridi Siur	Kg. Gimán Kundasang	11m x 18m	18m x 19m

Results and Discussion

Mean number of leaf miner larva on leaf sample of IPM package and conventional control method on each farm trial are shown in Figure 1, Figure 2 and Figure 3. Individual farm trial result showed that the IPM treatment had lower mean number of leaf miner larva than the conventional control method in all the plots. Though, in the earlier crop stage, the differences were not significantly different but subsequent weekly samples showed otherwise. Similar results were obtained in all the 3 farms involved. The 3 trials seemed to confirm that IPM package treatment plots consistently had lower leaf miner larva infestation throughout the sweet pea cropping period.

There was no infestation of leaf eating caterpillars and pod borers in both treatments in all the 3 farms. This indicated that both treatments are able to control the leaf-eating caterpillars and the pod borers effectively.

Sweet pea plot yield result showed that IPM treated plots in all the 3 farms produced higher yields compared to the farmers' plots (Figure 4). Pesticide residue analysis was not carried out in this trial. Base on the materials used and its method of application, the IPM package had the capability of producing pesticide residue-free vegetables.

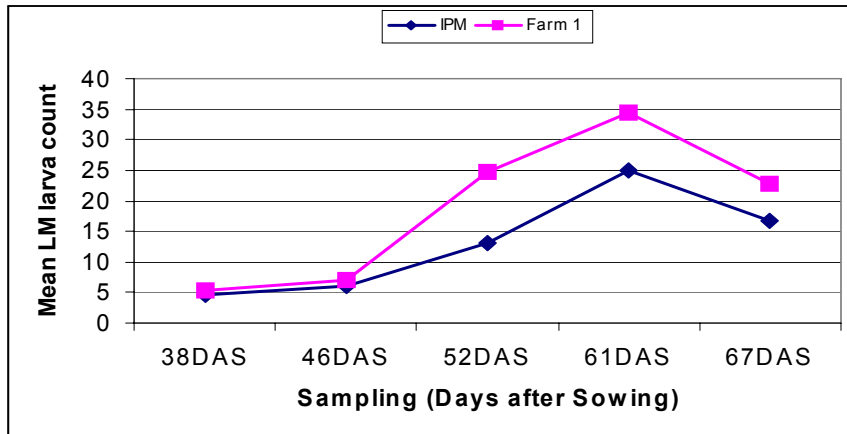


Figure 1. Mean Number of Leaf miner Larva in IPM and Conventional Control Method treatment plots at Farm 1.

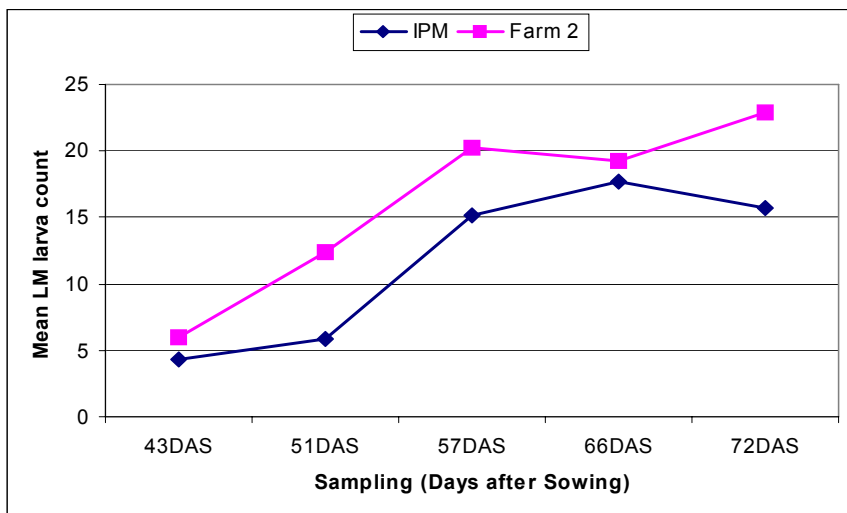


Figure 2. Mean Number of Leaf miner Larva in IPM and Conventional Control Method treatment plots at Farm 2.

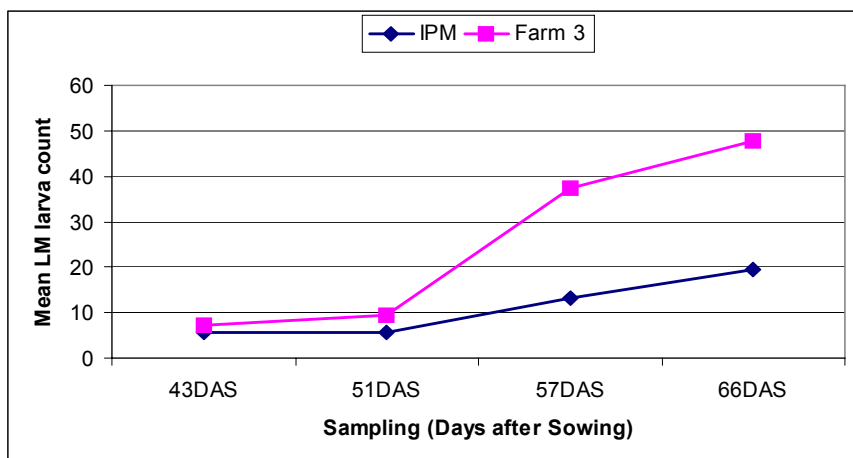


Figure 3. Mean Number of Leaf miner Larva in IPM and Conventional Control Method treatment plots at Farm 3.

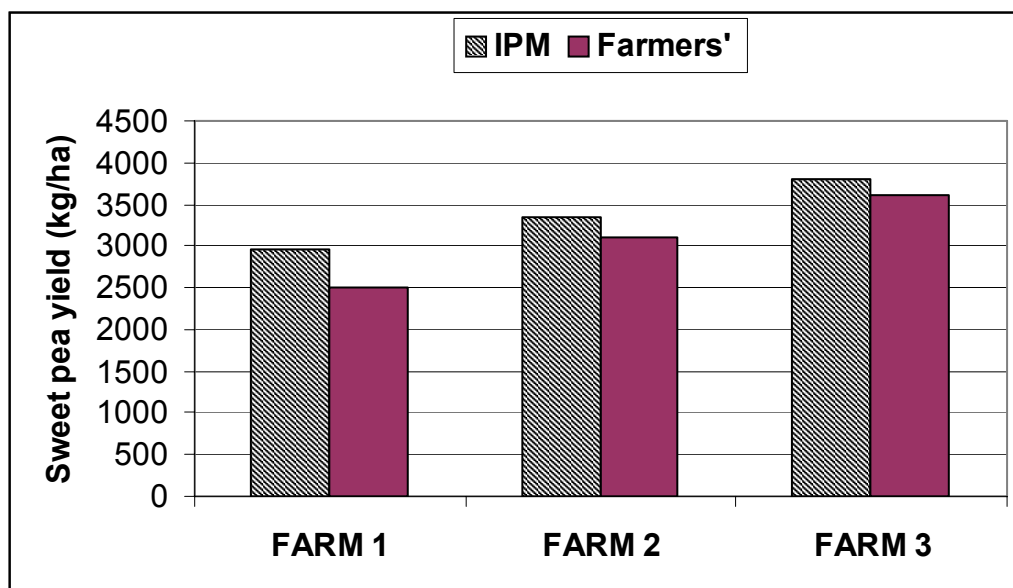


Figure 4. Extrapolated yield of sweet pea (kg/ha) in 3 farms treated with IPM package and Farmers' conventional control method.

Conclusion

The results from the 3 test farms positively indicated that IPM package treatment is effective and better compared to the farmer's conventional pest control method in sweet pea production.

Acknowledgement

The author thanks the Director of Agriculture for permission to publish this paper. Thanks are also due to the Deputy Director (Research) and the Officer-in-Charge of Agriculture Research Center Tuaran for their invaluable comments, guidance, support and encouragement. The staff and workers of the Entomology Unit (ARC Tuaran) namely; Peter Goh, Eku Hubung and others who have contributed significantly in the project are gratefully acknowledged. The cooperation of vegetable farm owners are highly appreciated. Appreciation is extended to the editorial committee for editing the manuscript.

Reference

Anon (1991). Sabah Agriculture Statistics 1990. Department Agriculture Sabah, Malaysia.

Anon (2001). Investigation for Integrated Control of Pests and Disease of Sweet Pea, *Pisum sativum* L. at Kundasang; Annual Research Progress Reports 2001, Department Agriculture Sabah, Malaysia.

Anon (2001). Monitoring of Pesticide Residues in Some Highland and Lowland Vegetables in Sabah. Annual Research Progress Reports 2001, Department Agriculture Sabah, Malaysia.

Anon (2005). Sabah Agriculture Statistics 2005. Department Agriculture Sabah, Malaysia.

Sivapragasam, A. and Syed A.R. (1999). The Problem and Management of Agromyzid Leafminers on Vegetables in Malaysia. Paper presented at CABI-FAO Workshop on Leafminers of Vegetables in Southeast Asia, 2 – 5 February 1999, Cameron Highlands, Malaysia.