



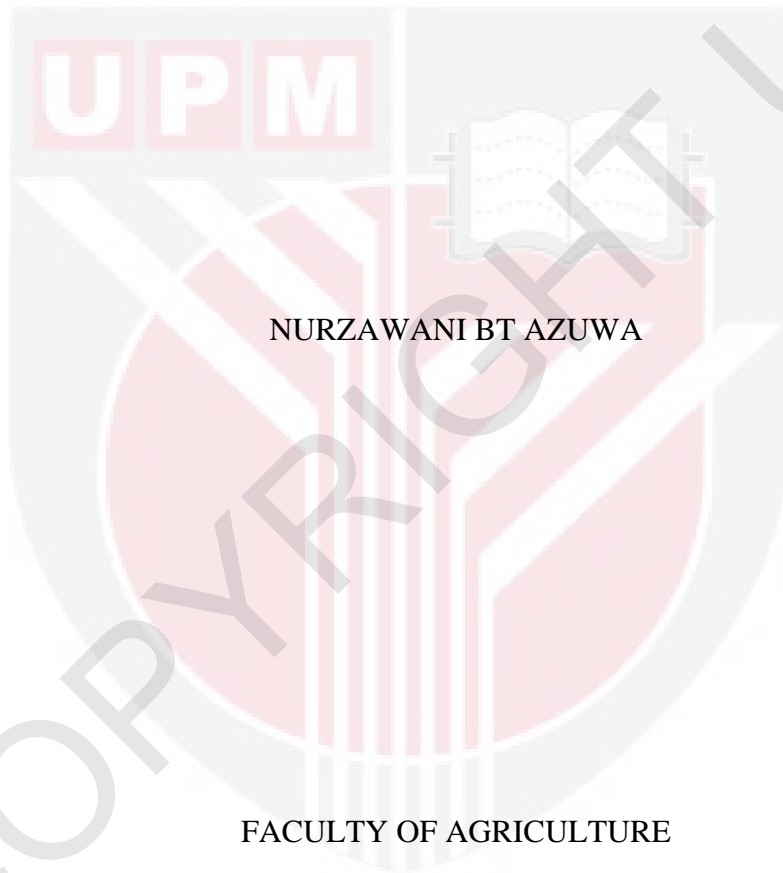
UNIVERSITI PUTRA MALAYSIA

***COMPARISON OF PEST MANAGEMENT PRACTICES BETWEEN
HIGHLAND AND LOWLAND VEGETABLE FARMERS***

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by

NURZAWANI BT AZUWA

This thesis submitted to the faculty of Agriculture Universiti Putra Malaysia in fulfillment of the requirement for the Degree of Bachelor of Horticulture Science.

FACULTY OF AGRICULTURE

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DECLARATION

This project report “Comparison of Pest Management Practices between Highland and Lowland Vegetable Farmers” prepared by Nurzawani Bt Azuwa and submitted to the Faculty of Agriculture in fulfilment of the requirement of Final Year Project (PRT4999) for the Degree of Bachelor of Horticultural Science.

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ABSTRACT

Vegetable production is seen as one of the important food productions in Malaysia, with total production of 874,602 tonnes in 2011. In ensuring only safe fresh food is being produced, it is crucial to understand the pest practices management practices among vegetable farmers in Malaysia. There are two types of area for vegetable productions that can be found in Malaysia, which are lowland area and highland (temperate) area. A survey with 147 of vegetable farmers in Johor, Pahang, Selangor, Perak Negeri Sembilan and Kedah have been conducted to understand the influence of highland and lowland farming on pest management practices. The number of respondents varied in every district and random sampling method. Structured questionnaire which include background of the study, status of pest and disease incidence, type of pesticides use, pesticides application technique and pest management practices have been developed and used for face-to-face interviewed. All the data was analyzed using the SPSS statistical software (Version 16.0). Farmers in lowland and highland area have similar practices, therefore, there is no significant different in their pest management practices. From the result, it was identified that the respondents in both area depended on chemical pesticides for the management of pest and diseases. Farmers in both areas usually used 3–4 types of pesticide to control the pest over a season and moderately toxicity pesticides are commonly used. Most farmers mentioned that extension officer did not gives much help in giving guidance on the use of pesticides and they do not understand very well about Integrated Pest Management (IPM). Eventually, the objectives of keeping food safe fresh produce can be achieved if there is involvement of all parties in vegetable crops and improving IPM methods.

ABTRAK

Pengeluaran sayur-sayuran merupakan salah satu daripada pengeluaran makanan yang penting di Malaysia, dengan jumlah pengeluaran 874.602 tan metrik pada tahun 2011. Oleh itu, adalah penting untuk memahami amalan pengurusan perosak di kalangan petani sayur-sayuran di Malaysia untuk memastikan makanan yang segar dan selamat dapat dihasilkan. Terdapat dua jenis kawasan sayuran yang terdapat di Malaysia iaitu kawasan tanah rendah dan tanah tinggi. Seramai 147 petani sayur-sayuran di Johor, Pahang, Selangor, Perak Negeri Sembilan dan Kedah telah ditemubual untuk memahami pengaruh tanah tinggi dan tanah rendah ke atas amalan pengurusan perosak tanaman. Bilangan responden diubah di setiap daerah dan kajian dijalankan secara rawak. Soal selidik berstruktur termasuk latar belakang responden, status perosak dan penyakit, jenis racun perosak digunakan, teknik racun perosak dan amalan pengurusan makhluk perosak telah digunakan untuk menemuramah petani. Semua data telah dianalisis dengan menggunakan perisian SPSS statistik (Versi 16.0). Tiada perbezaan amalan pengurusan perosak di kawasan tanah rendah dan tanah tinggi.. Daripada analisis keputusan, responden di kedua-dua kawasan bergantung kepada racun perosak kimia dalam pengurusan perosak dan penyakit. Petani biasanya menggunakan 3-4 jenis racun perosak untuk mengawal perosak sepanjang musim dan racun perosak yang mempunyai tahap ketoksikan sederhana biasa digunakan. Kebanyakan petani menyatakan bahawa pegawai pengembangan tidak banyak membantu dalam memberi panduan mengenai penggunaan racun perosak dan mereka tidak memahami dengan baik tentang cara Pengurusan Perosak Bersepadu (PPB). Objektif untuk mengeluarkan sayuran segar dan selamat boleh dicapai jika terdapat penglibatan semua pihak dalam tanaman sayur-sayuran dan meningkatkan kaedah PPB.

CHAPTER 1

INTRODUCTION

The climatic conditions in Peninsular Malaysia are suitable for the cultivation of a wide range of crops. Vegetable production is one of the important parts of the food production in Malaysia. The cultivation practices currently adopted by local farmers are described as small scale mixed farming system and larger commercial scale system. Every year, vegetable production in Malaysia was increasing since 2007 till 2011. According to statistics in 2011, the total area under vegetable cultivation in Malaysia reported to be 53,057 ha, with total production of 874,602 tonnes (DOA, 2011). Johor is the main state that highly produces of vegetable in the lowland area and Cameron Highlands is the highest producer for highland area. Based on the statistic, vegetable productions in Malaysia become important industries due to high demand from consumers. Vegetable comprises about 15% of the daily food intake of the Malaysia population (Ding et al., 1981) Consumers have been realizing that vegetable is important to the human diet for several reasons. For example, vegetable provide essential carbohydrates, fibers and vitamins. All the minerals in the vegetables can make us healthier apart from being able to give additional health benefits such as reduced cancer risk, improve circulatory system and etcetera.

Vegetable industries provide fresh food supplies to the consumer and this sector has become an important component of agriculture in Malaysia. Nowadays, Malaysian consumers tend to increase their demand for quality vegetables in response to higher purchase power. To be more specific, urban consumers are expected to demand more of higher quality vegetables (except root and tuberous vegetable) than rural consumers (Tey et al., 2008). Vegetable productions becomes a challenge for farmers in Malaysia due to market demand for a steady supply of high quality and disease free products especially to the farmers that dealing or making investment in the specific retailers such as supermarket.

Increasing consumer demand for better quality vegetables would entail for the development of food markets in terms of market segments and quality improvements. Quality vegetable to consumers means healthy, succulent and fresh looking vegetables with no visible rashes or holes caused by pests or diseases. It is not easy to get the best quality in vegetable production. Farmers work hard year round to ensure their crops are the best quality. All of this hard work, however, can be quickly ruined by pests which can cause a lot of damage every year. If pests are not managed, it will cause yield reduction and reduce it's quality.

In dealing with specific quality based on the consumer and retailer specifications, farmers have to overcome pest and disease problems by all means. Farmers have been relying on pesticide in protecting their farm produce. Pesticide has been found to have immediate effect in controlling pest and cheaper way to produce unblemished vegetables and increased farm productivity. Without the use of pesticides, high yields may not be sustained. Thus, the usage of pesticide is one of the compatible ways to be use in these farming. Furthermore, chemical companies

selling the pesticides have an incentive to push their use by advertising and promotion and this may create a bias in favor of their use (Tisdell et al., 1984). As the result, high pesticide residues in food crops always have been reported due to the excessive usage of pesticide (Oruonye and Okrikata, 2010). Farmers can use the pesticide as the one of the effective ways to control the pest but farmers should know that pesticides are safe only when used as recommended. When the pesticides usage is not use as recommended it will cause natural hazard to people, build up of resistant and contamination of the environment (Mazlan and Mumford, 2005).

The way of pesticide usage by farmers may be affected from the demand of consumer which putting extrinsic quality when buying fresh produces. This situation may encourage farmers to use pesticide continuously, and leading to high pesticide residue in food. Food safety issues regarding to pesticide residue is a major concern in food production. It is believe that food policies regarding food safety in handling fresh produce are not uniformly practiced by farmer.

The general objective of the study is to assess the pesticide management practices among vegetable farmers in highland and lowland and to explore how the food safety procedures are apply in all stages of vegetable production between two areas. The specific objectives are to:

- 1) To investigate highland and lowland pest management practices.
- 2) To identify pesticide utilization practices of the farmers in the study areas.
- 3) To determine the level of knowledge of farmers on integrated pest management (IPM).

REFERENCES

- Abdollahi, M., N. Jalali, O. Sabzevari, and S. Nikfar. 1999. Pesticide poisoning during an 18 month period (1995–1997) in Tehran, Iran. *Iranian Journal of Medical Science* 24:77- 81.
- Abdollahi, M., A. Ranjbar, S. Shadnia, S. Nikfar, and A. Rezaie. 2004. Pesticides and oxidative stress: a review. *Medical Science Monitor: International Journal* 10:RA141- 147.
- Ajayi, O.C & Akinnifesi, F.K (2008). Farmers understanding of pesticide safety labels and field spraying practices: a case study of cotton farmers in northern Coted'Ivoire. *Sci. Res. Essays* 2., 204-210.
- Anonymous. 1988. Country review paper: Vietnam. Informal Expert Consultation on IPM in Major Vegetable Crops in Asia. 1,1-16 November 1988. RAPA (FAD). Bangkok, 11 pp.
- Aminuddin, B.Y., Ghulam, M.H., Wan Abdullah, W.Y., Zulkefli, M. & Salama, R.B. 2005. Sustainability of current agricultural practices in the Cameron Highlands Malaysia. *Water, Air and Soil Pollution: Focus*, 5(1-2): 89-101.
- Belpoggi F, Soffritti M, Guarino M, Lambertini L, Cevolani D, Maltoni C. (2002). Results of long term experimental studies on the carcinogenicity of ethylene-bis-dithiocarbamate (Mancozeb) in rats. *Ann N Y Acad Sci*. Dec., 982:123-36.
- Chandrasekara, A.I., Wettasinghe, A., Amarasiri, S.L., 1985. Pesticide usage by vegetable farmers. Paper presented at Annual Research Conference ISTI, Gannoruwa, Sri Lanka.
- Coronado, G.D.; Thompson, B.; Strong, L.; Griffith, W.C.; Islas, I. (2004). Agricultural task and exposure to organophosphate pesticide among farm workers. *Environ. Health Persp.*, 112., 142-147.
- Damalas, C.A., Georgiou, E.B., Theodoraou, M.G. (2006). Pesticide use and safety practices among Greek tobacco farmers: A Survey. *Int. J. Environ. Health Res.* 16 339-22348.
- Devine, G., and M. Furlong. 2007. Insecticide use: Contexts and ecological consequences. *Agriculture and Human Values* 24:281-306.
- Ding, T. H., Vimala, P., and Yusof Salleh (1981). An Agro-economic Survey of Vegetable Farming in Peninsular Malaysia. MARDI, Selangor, Malaysia.

- Dinham, B., 2003. Growing vegetables in developing countries for local urban populations and export markets: problems confronting small-scale producers. *Pest Manage. Sci.* 59 (5), 575–582
- DOA (2011). Crop Statistical Data.
www.doa.gov.my/web/guest/data_perangkaan_tanaman. Retrieved by 11 March 2013.
- DOA, SABAH (2001). Management Of Pesticide Use On Vegetable Production : Role Of Department Of Agriculture Sabah. *RO -Agriculture Research Centre Tuaran ** SMO -Unit Khas Pengembangan Tuaran **. (pp. 13–14).
- Drlik, T., W. Olkowski, H. Olkowski, and S. Daar. 2001. IPM for Schools : A How-To Manual. Bio-IntegralResourceCenter.
- FAO (2005). Country Reports: Malaysia. In Proceedings of the Asia Regional Workshop on the Implementation, Monitoring and Observation of the International Code of Conduct on the Distribution and Use of Pesticide. Bangkok, Thailand. 26-28 July, 2005.
- Foster. E., Obermeyer, J. L., & Entomologists, E. (2010). *Vegetable Insects* (pp. 1–10). Retrieved from <http://extension.entm.purdue.edu/publications/E-65.pdf>.
- Gidarakou, I. (1997). Young women's attitudes towards agriculture and women's new roles in the Greek countryside: A first approach. *Journal of Rural studies* 15(2), 147-158
- Heidari, A. 2010. Pesticide Use in Iran.in Conference of Half a Century of the Pesticide Usage in Iran, Tehran, Agricultural Research, Education and Extension Organization.
- Herzfeld, D. and K. S. (2011). Chapter 1 Integrated Pest Management Notes Page. Private Pesticide Applicator Training Manual(pp. 1–34).
- Ho, T. H. (1965). The life-history and cont.rol of the diamond-back moth in Malaya. *l/lin. Agric. & Cooperatives Bull.* 108, 26 pp.
- Jamaludin, M.N Mohamad Roff dan Ng Kwang Yew. (2001). Serangga Perosak Utama Sayur-sayuran di Malaysia. Terbitan Institut Penyelidikan dan Kemajuan Pertanian Malaysia.
- Moore, K. M. (2009). Network Framing of Pest Management Knowledge and Practice *, *73(3)*, 414–439.

- Konradsen, F.; Van der Hoek, W.; Cole, D.C.; Hutchinson, G.; Daisley, H.; Singh, S., Eddleston, M. (2003). Reducing acute poisoning in developing countries- options pesticides for restricting the availability of pesticide. *Toxicology* 192: 249-261.
- Malaysia Agriculture Directory and Index 2009/2010 (2010). Published by Agriquest Sdn Bhd.
- Man, N, 2008. Youth Perception towards Agriculture and Needs on Agriculture Education. *Journal of Malaysian Youth Development*, 1(December): 99-114.
- Man, N. and Nawi, N. (2010). The practices of contract farming among fresh fruit and vegetable suppliers in Malaysia. *American Journal of Agricultural and Biological Sciences*.5(3): 321-330.
- Mazlan, N. and Mumford, J. (2005). Insecticide use in cabbage pest management in the Cameron Highlands, Malaysia. *Journal of Crop Protection* . 24: 31-39.
- Minakawa, N., Omukunda, E., Zhou, G., Githeko, A., Yan, G., 2006. Malaria vector productivity in relation to the highland environment in Kenya. *The American Journal of Tropical Medicine and Hygiene* 75, 448.
- Nel & Loubser. (2004) The Impact Of Crop Rotation On Profitability And Production Risk In The Eastern And North Western Free State. *Agrekon*.Vol 43, No 1.
- Ngowi, a V. F., Mbise, T. J., Ijani, a S. M., London, L., & Ajayi, O. C. (2007). Pesticides use by smallholder farmers in vegetable production in Northern Tanzania. *Crop protection (Guildford, Surrey)*, 26(11), 1617–1624. doi:10.1016/j.cropro.2007.01.008
- Ngowi, A.V.F., Partanen, T., 2002. Treatment of pesticide poisoning: a problem for health care workers in Tanzania. *Afr. Newslett. Occup. Health Saf.* 12, 71.
- Ngowi, A.V.F., Maeda, D.N., Partanen, T.J., 2001. Assessment of the ability of health care providers to treat and prevent adverse health effects of pesticides in agricultural areas of Tanzania. *Int. J. Occup. Med. Environ. Health* 4, 347.
- Olkowski, W. 1991. *Common-Sense Pest Control: Least-Toxic Solutions for Your Home, Garden, Pets and Community*. Taunton.
- Ooi, P.A.C.,1992. Role of parasitoids in managing diamond-back moth in Cameron Highlands, Malaysia. In: Talekar, N.S. (Ed.), *Management of DBM and other Cruciferous Pests. Diamondback moth and Other Crucifer Pests: Proceedings of the Second International Workshop, Tainan, Taiwan, AVRDC*. Shanhua, Taiwan, pp. 255–262.

- Ooi, P.A.C., 1986. Diamondback moth in Malaysia. In: Talekar, N.S., Griggs, T.D. (Eds.), Diamondback Moth Management. Asian Vegetable Research Institute, Taiwan, pp. 25–34. Proceedings of the First International Workshop, 11–15 Mar 1985, Tainan, Taiwan.
- Oruonye and Okrikata. (2010). Sustainable use of plant protection products in Nigeria and challenges. *Journal of Plant Breeding and Crop Science* Vol. 2(9), pp.267–272.
- Pimentel, D., Acquay, H., Biltonen, M., Rice, P., Silva, M., Nelson, J., Lipner, V., Giordano, S., Horowitz, A., D'Amore, M., 1992. Environmental and human costs of pesticide use. *Bioscience* 42, 750–760.
- Quebral, F. C., and M. I. Caramancion. 1972. Survey of pesticides application in home selected vegetable farms in the municipality of Atok and Bugias, Benguet Province. In Proceedings, 3rd National Pest Control Council of the Philippines Conference, Buguio City, 9 pp.
- Röling, N. G., and J. N. Pretty. 1997. Extension's Role in Sustainable Agricultural Development. Pages 181-191 in B. E. Swanson, R. P. Bentz, and A. J. Sofranko, editors. *Improving Agricultural Extension*. FAO, Rome.
- Rondon, S. I., Clough, G. H., & Corp, M. K. (2008). How to identify , scout , and control insect pests in vegetable crops, (July).
- Shadnia, S., H. Esmaily, G. Sasanian, A. Pajoumand, H. Hassanian-Moghaddam, and M. Abdollahi. 2007. Pattern of acute poisoning in Tehran-Iran in 2003. *Human and Experimental Toxicology* 26:753-756.
- Sibanda, T., Dobson, H.M., Cooper, J.F., Manyangarirwa, W., Chiimba, W., 2000. Pest management challenges for smallholder vegetable farmers in Zimbabwe. *Crop Prot.* 19 (8–10), 807–815.
- Soltaninejad, K., M. Faryadi, and F. Sardari. 2007. Acute pesticide poisoning related deaths in Tehran during the period 2003-2004. *Journal of Forensic and Legal Medicine* 14:352-354.
- Sosan, M.B. & Akingbohunge, A.E. (2009). Occupational insecticide exposure and perception of safety measures among cacao farmers in southwestern Nigeria. *Arch. Environ. Occup. Health* 64., 185-193.
- Speight, M. R., and H. F. Evans. 2004. *Integrated Pest Management Principles*. Elsevier Ltd.

- Stephanie, W., Andrew, B., Jules, P., (2008). Trends in pesticide use and drivers for safer pest management in four African countries. *Science Direct. Crop Protection* 1327-1334
- Sudarwohadi, S. 1975. Hubungan antara waktu tanam kubis dengan dinamika populasi *Pitt/ella maculipellli*; Cmt. dan *Crocidolomia billo/atis* Zell. Rapal. teknis LPH. Pasar Minggu, Indonesia. (In Indonesian, mimeograph), 11 pp.
- Tadesse, A. and Asferachew, A. (2008). An Assessment of The Pesticide Use, Practice And Hazards in The Ethiopian Rift Valley. Africa.
- Tait, J. and B.Napompeth (eds.). 1987. Management of pest and pesticides: Farmers perception and practices. *Westview studies in insect biology*. Westview press, Boulder and London. 244 p.
- Tay, E. B., Bong, C. L., Sim, C. H. and Tseu, C. (1984). Pesticides Usage in Sabah. In: *Kursus Kawalan dan Penggunaan Racun Makhluk Perosak*; 9 - 11 Okt. 1984; Organised by Jab. Pertanian Semenanjung Malaysia and Sabah.
- Tey, Y. S., Mad Nasir S., Zainalabidin M., Amin Mahir A. and Alias R. 2008a. A complete demand system of food in Malaysia. *ICFAI University Journal of Agricultural Economics* 5 (3): 17-29.
- Thornton, P., Jones, P., Farrow, A., Alagarswamy, G., & Andresen, J. (2008). Crop Yield Response to Climate Change in East Africa : Comparing Highlands and Lowlands, 23–26.
- Tisdell, C.A., Auld, B., Menz, K.M., 1984. On assessing the biological control of weeds. *Protection Ecology* 6, 169– 179.
- World Resources Institute, 1998. *World Resources, 1998/1999*. Oxford University Press, UK
- Yunus, A. and Balasubramaniam, A. (1975). Lepidoptera: Psychidae ‘bagworms’. In: *Major Crop Pests in Peninsular Malaysia*. pp38-39.
- Zalom, F.G. and Fry, W.E., (eds). 1992. *Food, Crop Pests, and the Environment: The Need and Potential for Biologically Intensive Integrated Pest Management*. American Phytopathological Society Press, St. Paul, MN, USA.
- Zalom, F. G. (2001). Pesticide Use Practices in Integrated Pest Management. *Integrated Pest Management* (pp. 275–283). University of California, Davis.
- Zhou, J.H & Jin, S.S. (2008). Safety of vegetable and the use of pesticide by farmers in China: Evidence from Zhejiang province. *ScienceDirect* 1043-1048.