Constraints to Organic Vegetable Production in Chiang Mai, Thailand

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ABSTRACT

There are several vegetable production systems in Chiang Mai, including conventional, safe-use, pesticide-free, and organic. Recently the number of farmers who cultivate organic vegetables is increasing. The farming systems concerned with health and environmental quality are popularly called alternative farming systems. Nevertheless, this approach cannot be achieved for all farmers. Some of them switch back to chemical production because of pest and disease problems. The objectives of the research are to explore the current constraints to organic vegetable production and marketing, and to investigate the future opportunities for organic vegetable production in Chiang Mai, Thailand. The data was collected through farmer interviews with the questionnaire from farmers in the target areas. The data was analyzed by using descriptive analysis. The results showed that constraints to organic vegetable production consist of 1) bio-physical constraints, such as low soil fertility, water shortage, and pests, 2) economic constraints which include the high material cost, high labor cost, high transportation cost, and market access, 3) knowledge constraints which are lack of understanding and management skills about pest and disease management, crop-environment, added value from farm processing and postharvest management, and 4) social constraints, such as lack of experience or skill in group negotiation for marketing.

Key words: Organic vegetable production, Organic system constraints, Chiang Mai

INTRODUCTION

Conventional farming has helped Thailand not only to produce enough food for domestic consumption but also generate surpluses for exports. However, the increasing population and income will lead to further increases in demand for food and also for raw materials for industry. The modern system of farming, it is increasingly felt, is becoming unsustainable as evidenced by declining crop productivity, damage to environment, chemical contamination and danger the health of farmers and consumers. The necessity of having an alternative agriculture method which can function in a friendly eco-system while sustaining and increasing the crop productivity is realized now. Organic farming systems like a key to sustainable agriculture have captured the interest of many countries throughout the world in response to the need to sustain the health of soils, ecosystems and people. In Thailand, the rapid socio-economic development has been accompanied by a modernization and industrialization of the agro-food production. The Thai government has promoted an industrial, export-oriented agriculture, characterized by a heavy reliance on synthetic chemicals to promote production and to protect crops against weeds, pests and diseases and thus leading to improved productivity (UNDP, 2007). There are various groups of smallholder farmers transforming their practices from chemical farming to organic farming. However, some groups succeed in converting to organic farming but some remain in chemically based farming systems. Therefore, it is important to explore the production and marketing constraints in organic vegetable production systems.

This study aimed to explore production and marketing constraints in organic vegetable farming in Chiang Mai, Thailand and to investigate the opportunity for organic vegetable production.

MATERIALS AND METHODS

The data was collected mainly through farmer interviews with the use of questionnaire on farming practices farmers in the target area. The observation was used for data collection. And the data was analyzed by using descriptive analysis for distinguish the constraints to organic vegetable production. The survey was conducted during the months of April to June 2011.

During this research 15 sample farmers were interviewed in four districts: 2 in Mueang, 7 in Mae Taeng, 3 in San Pa Tong and 3 in Saraphi district respectively. The farmers sold their products at the farmer market in Multiple Cropping Center (MCC) research station, Jing-jai (JJ) market and Im-boon farmer market.

RESULTS AND DISCUSSION

Transforming towards organic farming

Monoculture is the agricultural practice of producing or growing one single crop over a wide area. Its implementation has allowed for large harvests from minimal labor. Labor is replaced by machinery in large corporate farm. So the system requires mechanical harvest. A monoculture field is a very simple system. Soil preparation, irrigation and chemical inputs can all be focused on the needs and preferences of a single crop species. Pests and disease can be treated without considering the effects of the treatment on any other crops and farmers' health. Growing concerns on health and seeing vulnerability of monoculture system, farmers begin to change their conventional farming systems and practice to poly culture and organic farming. For instance farmers in Mueang and Saraphi districts have transformed their practice from rice based farming to organic vegetable farming; and farmers in Mae Taeng and San Pa Tong districts have transformed from longan based farming to organic vegetable farming (Table 1).

Table 1. Organic transformation in selected districts of Chiang Mai province.

Farmer groups	Former production systems	Number of years engaging in organic vegetable systems
Mueang district	Rice based farming	5 years
Mae Taeng district	Longan based farming	7 years
Saraphi district	Rice based for farming	10 years
San Pa Tong district	Longan based farming	5 years

Farming Systems Vegetable productions include both pesticide free vegetables and organic vegetables. The pesticide free systems refer to the attempts to reduce the dependency on the use of synthetic chemical inputs by not using any synthetic chemical pesticides, although chemical fertilizer is applied, while organic farming uses only organic inputs. Farmers applied traditional practices such as crop rotation systems and annual cropping systems. In the organic systems, farmers cultivated different types of vegetables in rotation. There were many kinds of vegetables mainly leafy vegetables, especially the salad type, chinese vegetables and premium crops such as baby-corn and asparagus (Table 2). Types of vegetables planted depends on season, market demand and group agreement. Price setting of vegetables and amount of vegetables to be grown were determined by the group's decision.

Table 2. Organic vegetable-based farming systems in selected districts of Chiang Mai province.

Farmer groups		Mueang district	Mae Taeng district	Saraphi district	San Pa Tong district
Characteristics		crop rotation	crop rotation	crop rotation	crop rotation
Month	Jan-April	Morning glory, Tomato, Eggplant, Cauliflower	Morning glory, Tomato, Okra, Eggplant, Cauliflower	Morning glory, Tomato, Eggplant, Cauliflower	Morning glory, Tomato, Eggplant, Cauliflower
	May-July	Kale, Baby-corn, Chili, Bitter cucumber, Chinese, bitter-gourd	Kale, Chili, Bitter cucumber, Chinese, bitter-gourd	Kale, Chili, Bitter cucumber, Chinese, bitter-gourd	Kale, Chili, Bitter cucumber, Chinese, bitter-gourd
	Aug-Dec	White cabbage, Chinese lettuce, Kale, Morning glory, Chili, Lettuce, Asparagus, Spinach	White cabbage, Chinese lettuce, Kale, Morning glory, Chili, Lettuce, Spinach	White cabbage, Chinese lettuce, Kale, Morning glory, Chili, Lettuce, Spinach	White cabbage, Chinese lettuce, Kale, Morning glory, Chili, Lettuce, Spinach

Farmers' management practices in organic farming

Soil preparation Farmers plough the soil and keep the soil dried for 7 days before growing vegetables as preconditioning for improving soil environment and enhancing vegetable growth, such as weed control, crop residue management, soil aeration, conservation of manures and other fertilizers, hardpan reduction, and soil sanitation to destroy pest and disease habitat.

Seed management Most of farmers buy the seed from outside (the wholesale or retail markets). Some farmers get the seed from government support (extension officers, researchers) especially for the areas that the extension officers or researchers visited. Saraphi and Mae Taeng district used the local seed varieties that kept from last season. The seeds were sun-dried, and kept in a cool, dry place for the next season planting. Farmer management of vegetable seeds for self-reliance was commonly practiced in pumpkin, bitter-gourd.

Water management The important water resources for vegetable cultivation in the studied areas were from irrigation and tube wells. The general practice is that farmers apply twice a day.

Soil nutrient management Organic farmers incorporate green manure crops into the soil for the purposes of soil improvement, especially in Sanpatong district. The famers grow leguminous cover crop (*Arachis pintoi*), to provide nitrogen, and apply composts to make soil more productive.

Pest management Organic farming relies heavily on populations of natural enemies i.e. predators, parasites and pathogens, to help manage pest problems. Examples of beneficial insects include *Geocoris* spp. Farmers in Mueang, San Pa Tong and Saraphi district use yellow traps and bio-pesticide extract solution for pest control. Farmers in Mae Taeng district also apply these methods and spray water to get rid of insects. Moreover, the farmers would not grow the same vegetable crop in the same place as it was planted before. Instead, farmers use crop rotation as pest and disease management practices. The system has helped prevent build-up of soil diseases.

Weed control Farmers control weeds by hand weeding. However, in the beginning of transformation process, farmers use herbicides in the heavily weed infested fields, where hand weeding was not effective but the group monitoring systems stimulated farmers to reduce and stop using herbicide and apply hand weeding for organic management. Some case (Saraphi district) promoted weed suppression, rather than weed elimination. The farmers in San Pa Tong district used organic materials and plastic films as mulching method to prevent weed emergence.

Table 3. Farmers' management practices in organic farming in four districts of Chiang Mai province.

Farmer groups	Mueang district	Mae Taeng district	Saraphi district	San Pa Tong district
Soil preparation	Plough and Tillage by hand	Plow and Tillage by small tractor	Plough and Tillage by hand	Plow and Tillage by small tractor
Seed management	Buy from wholesale and retail	Buy from wholesale and retail	Buy from wholesale and retail	Buy from wholesale and retail
Water management	Sprinkler	Furrow	Sprinkler	Furrow
Soil nutrient management	Green manure crop, animal manure, compost	Green manure crop, Chicken manure, compost	Green manure crop, animal manure, compost	Green manure crop, chicken manure, compost
Pest management	Yellow trap, Bio-pesticide extract solution	Bio-pesticide extract solution, Spray water	Yellow trap, Bio-pesticide extract solution, Predator	Yellow trap, Bio-pesticide extract solution
Weed control	Hand weeding	Hand weeding	Hand weeding	Hand weeding, mulching

Socio-economic aspects

Cost According to farmers who are producing pesticide free vegetable are still applying chemical fertilizers such as 46-0-0, 15-15-15, so the cost is high. In the case of organic farming, the early stages of production costs are relatively high. Because farmers must buy the materials for production such as nets, seed, bio-extract and take a long time to take care vegetable plots until they have enough experience to cultivate organic vegetables. Then they can reduce their cost by using inputs from farm resources and replacing all the chemical substances (Table 4).

Table 4. Cost on vegetable production systems.

Farmer groups		Mueang district	%	Mae Taeng district	%	Saraphi district	%	San Pa Tong district	%
Material cost (baht/rai/year)	Seed	3,600	21.95	4,800	21.62	4,800	20.73	3,600	29.03
	Organic fertilizer	2,400	14.63	3,000	13.51	2,000	8.64	2,500	20.16
	Chemical fertilizer	4,250	25.91	8,500	38.29	10,200	44.06	-	
	Pest control	2,400	14.63	2,000	9.01	2,500	10.80	1,800	14.52
	Soil preparation	1,500	9.15	1,800	8.11	2,000	8.64	1,800	14.52
Labor cost (baht/rai/year)	Planting	-*	-	-*	-	-*	-	-*	-
	Fertilizer management	-*	-	-*	-	-*	-	-*	-
	Pest control	-*	-	-*	-	-*	-	-*	-
	Weed control	1,800	10.98	1,200	5.41	900	3.89	1,500	12.09
	Harvesting	450	2.74	900	4.05	750	3.24	1,200	9.68
Total		16,400		22,200		23,150		12,400	

*Household labor

Market arrangement There is many retail markets for organic vegetable products. Some markets belong to Chiang Mai University, some belong to local government agencies, some are owned by private business. All the markets play important roles in the marketing system in assembling and distributing organic vegetable products. Such as local market, community market (Jing-Jai market

(JJ), The Prince Royal's College School market, etc.), farmer market especially Multiple Cropping Center (MCC) market that is an institution sponsored discourse coalition advocating pesticide-free production processes. The MCC has allowed farmers to sell their pesticide-free farm produce, using alternative production processes, to consumers from stalls located at the experimental farm. As MCC's research mandate grew, so did it need to help its farmers (Wyatt, 2010). The group sticker as the brand of the group. The price of products depends on customers demand, market demand and groups' agreement. With the exception of community markets, certified vegetables are wrapped in packages labeled with official logos; package provides an additional layer of customer assurance (Allen et al., 1998; Massey, 2005). The survey found that the head of each groups buys vegetable products from the members, then sells the products in a community market a significant distance from the farm. Due to this they must pay high prices for transportation and gas.

Farmers Group They concerns for their personal health, consumers seek out certified products to protect themselves from toxin and chemical residues. So safe use, pesticide free and organic regulations are accepted by customers. Therefore, organic vegetable marketing is a very good business. In general, the farmers are in a good position to market their products with strong power to make price negotiation with traders because of their collective cooperation and action. Moreover, there is market information system, with the result that farmers in the groups will not produce the same crops at the same time or know how much they should produce their products. This is the benefit of group participation. Moreover, the main elements of the group strategy are to provide knowledge, technical assistance, information and technical training, strengthen the service sub-sectors related to input supply and marketing information, establish post-harvest handling facilities and marketing infrastructure, enhance credit systems with the financial sector, set up the price agreement and group stability, reduce marketing and selling costs: through groups, marketing farmers can share storage, processing, transport and selling costs. Lower costs per farmer mean higher profits.

One of the challenges in developing organic agriculture is increasing farmers' knowledge of organic farming methods for producing high quality organic products. As a result of an agricultural extension process, farmers may adopt a new technology. The farmers may obtain enough knowledge of the technology through communication and adoption processes. Therefore, agricultural extension is an essential and major part of transfer of technology (Swanson and Claar, 1984). Expansion of the organic vegetable production in Chiang Mai depends on a variety of agronomic, social and marketing factors. The engagement of new generation of farmers and entrepreneurs in organic production will be critical for sustainability of the system. New organic farmers are mostly interested in small, intensively managed farms with production matching the size of local market or community market. How to manage pest and disease in organic farming will be an important technological issue. Demand for local, organic vegetables is expected to continue to grow. A variety of direct marketing methods offer the best options for organic farmers to meet this demand. Overall, expansion of organic vegetable production is more likely to be gradual than rapid and may not result in a large increase in organic area. Further study is need to investigate the strategy for increasing the organic sector at all stages in the supply chain including production, processing and marketing levels.

CONCLUSION

Economic constraints are the high initial cost due to the only using land requirement. Farmers should start with healthy soil by only using land for 3-5 years and natural inputs applied such as amendments like lime, mineral calcium or compost. High labor cost, high transport cost conducting to the need of volume produce especially to market and supermarket, and market with modern trade because the produces will get premium price then marketing cost may be necessarily. Bio-physical constraints are low soil fertility or reduction in its productivity, irregular rainfall and pest incidence. Knowledge constraints are lack of understanding of problem on farm such as nutrient management, crop and nutrient relation or other environment: proper nutrition is essential for satisfactory crop growth and production. The profit potential for farmers depends on producing enough crops per rai to keep production costs below the selling price. Post-harvest and processing management and

waste management or residue management value added. For result in example how to make bio-extract from waste or vegetables by-products and also consumers' perception. Limited interaction with extension agents. Finally, social acceptability constraints are lack of grouping to negotiate on marketing show in Figure 1.

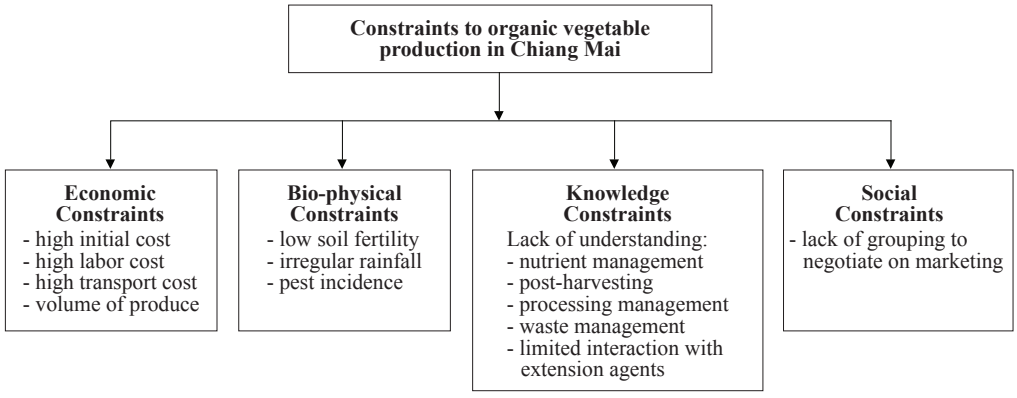

Figure 1. Constraints to organic vegetable production systems in Chiang Mai.

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