

## **VEGETABLE CULTIVATION AND PERCEPTION OF VEGETABLE GROWERS IN TWANTAY TOWNSHIP**

Cho Cho Khaing<sup>1</sup>, Nyi Nyi Aung<sup>2</sup>, Aye Aye Win<sup>3</sup>, Naing Naing Aye<sup>4</sup>

### **Abstract**

Twantay Township is located at the urban fringe area of Yangon City. Good accessibility and nearness to Yangon City is a locational advantage for vegetable cultivation in Twantay Township. Existing large agriculture land also supports vegetable cultivation and vegetables such as roselle, water cress, carrot, gourd, etc are extensively grown in the area. Seasonal changes in vegetable cultivation are found due to market demand, climatic favourability, etc. due to short growing period. Although chemical fertilizer use increase vegetable production, it has negative consequences on human health and environmental pollution. Local people also use natural and artificial fertilizers that give less negative impacts on human health and environment. The objectives of the paper are to explicit present vegetable cultivation of Twantay Township, to explore supporting factors on vegetable supply of the study area and to find out vegetable growers' perception on input uses and market demand. Primary data on vegetable cultivation, vegetable supply and vegetable growers' perception were mainly applied and situational analysis was also applied in presenting the paper.

**Keywords:** vegetable cultivation, accessibility, market demand, investment, net benefit, growers' perception

### **Introduction**

Vegetables have played an important role in local and national food security as well as the national economy (Prodhan et al. 2017). To meet the basic food need of the ever-increasing human population and to get higher seasonal income, vegetables are widely grown. (Bisbis et al. 2018) also wrote vegetables provide maximum output and more income per unit area of land to small-scale farmers, particularly when compared to cereals. World vegetable production has increased for the purpose of meeting the need of the increasing population and there was over a four-fold increase in world vegetable production from 1970 until 2009 (FAO, 2011).

Nutritional guidelines recommend the consumption of at least two servings of fruits and three servings of vegetables per day (World Health Report, 2002) because fruits and vegetables are good for health. In developing countries, people's daily consumption includes vegetables regardless to health knowledge due to low income countries and cheaper cost. People in developing countries eat one or more vegetables as the main dish or side dish for the purpose of saving the consumption cost.

Vegetables can be grown in home garden and in large areas on agriculture land. Although Twantay Township is located in Yangon fringe area possessing large agriculture land, local people grow vegetables year round because paddy cultivation gives low and irregular income. Dung et al, 1997, stated that environmental problems relating to farming and farming practices have become distinct in recent years due to the misuse of chemical fertilizers and pesticides. To get more profit in vegetable cultivation, amount of fertilizer use is more than recommended level. The unsystematic fertilizer use is not sustainable in the long- run and its effects on environment as well as human being.

---

<sup>1</sup> Department of Geography, Nationalities Youth Resources Development Degree College, (Yangon)

<sup>2</sup> Department of Geography, Nationalities Youth Resources Development Degree College, (Yangon)

<sup>3</sup> Department of Geography, Nationalities Youth Resources Development Degree College, (Yangon)

<sup>4</sup> Department of Geography, Nationalities Youth Resources Development Degree College, (Yangon)

To present vegetable cultivation and related accessibility, market demand, impacts of input uses, local growers' perception, etc, Twantay Township was selected as the study area and presented from the geographical point of view.

### Study area

Twantay Township is located in the western part of the Yangon Region and it has an area of 724.94 square kilometers (279.90 square miles).



**Figure 1:** Location of Yangon Region

Source: MIMU



**Figure 2:** Village Tracts of Twantay Township

Source: MIMU

The urban area comprising 8 wards is only 3.99 square kilometers (1.54 square miles) and the rural area covering 65 village tracts including 235 villages occupies the remaining 720.95 square kilometers (278.36 square miles). Extensive agriculture land of the area support vegetable cultivation and vegetables are mainly sent to Yangon City, major market area, through road transportation and waterway.

### Objectives

The objectives of the paper are:

- To explicit present vegetable cultivation of Twantay Township,
- To explore supporting factors on vegetable supply of the study area and
- To find out vegetable growers' perception input uses and market demand

### Data and Methodology

To present the paper, primary data such as types of vegetables, price, perception of the growers, pesticide use, types of fertilizer, etc. were collected through semi structured interviews and key informant interviews where the village tracts is accessible as well as phone interviews where the village tracts is inaccessible due to Covid-19 and security. Key informant interviews conducted to understand the vegetable cultivation and production for the purpose of presenting challenges facing vegetable production. Primary data were collected from 15 sample villages and 75 interviewees were selected by using purposive sampling method. Secondary data were also applied to present changes in the area of vegetables. Qualitative and quantitative method was

applied in presenting paper and GIS tools in drawing maps on vegetable cultivation and transportation.

### Results and Findings

Twantay Township is located in Yangon fringe area and it possesses large agricultural land that is 47709.65 hectares (65.81% of the township's area). In the study area, *le land* in 2020-21 was 35569.07 hectares and paddy is grown on *le land* in the rainy season and vegetables were grown after harvesting monsoon paddy. *Kaing-kyun Land* area was 474.70 hectares in which gourd, cucumber, pumpkins, tomato and chilli, and *garden land* 11000 hectares covering Roselle, okra, asparagus beans (string bean), snake gourd, winged bean (goa bean), bitter melon, lettuce, coriander, amaranth, and other vegetables. Nearness to Yangon City, major market, is the locational advantage and good accessibility is a supporting factor for vegetable Cultivation owing to highly perishable products.

### Growth of Vegetable Cultivated Area

In the area, two types of vegetables: leaf vegetables and fruit vegetables are mainly grown because of high market demand. Fruit vegetables are mainly grown on *garden land* and leaf vegetables are grown on *le land* after harvesting paddy because they need short growing period.

**Table 1: Vegetable Cultivated Area of Twantay Township**

	Fruit Vegetables	Leaf Vegetables	Total area ( ha)
2010-11	1165.09	930.37	2095.46
2011-12	1167.52	938.87	2106.39
2012-13	1212.84	936.04	2148.88
2013-14	1260.19	953.04	2213.23
2014-15	1331.01	1006.05	2337.06
2015-16	1358.53	1067.97	2426.5
2016-17	1437.85	1095.49	2533.33
2017-18	1511.5	960.32	2471.82
2018-19	1577.06	961.94	2539
2019-20	1613.08	996.74	2609.82
2020-21	1640.19	1017.38	2657.57

**Source:** Department of Agricultural Land Management Statistics

Area of fruit vegetables cultivating gourd, cucumber, pumpkins, okra and chilli, is larger than leaf vegetables such as roselle, lettuce, spinach, etc. To cultivate fruit vegetables such as long beans, gourd, etc., growers usually built bamboo trellis for the purpose of climbing that cover large area. Therefore, the fruit vegetable cultivated area is larger in Twantay Township.

Vegetable cultivated area generally increased from 2095.46 hectares in 2010 to 2657.57 hectares in 2020. It is due to higher demand of Yangon City, high economic return and better accessibility from the study area to Yangon City.

## Fruit Vegetables

Fruit vegetables includes chilli, cucumber, eggplant, long bean, bitter gourd, okra, etc. Among fruit vegetables, area occupied by chilli increased distinctly in the study period. Chilli are less perishable items and it can be stored the whole year round and chilli can be sent to other towns and cities. Moreover, after 2000 Covid-19 pandemic period, chilli from the central dry zone has not been carried to southern Myanmar including Yangon and the price became higher. Therefore, local growers extensively cultivate chilli on *le land*, *kaing-kyun land* as well as *garden land*.



Plate 1: Long bean cultivation

Source: Field Survey



Plate 2: Bitter Gourd cultivation

Source: Field Survey



Plate 3: Gourd cultivation

Source: Field Survey

## Leaf Vegetables

Generally, the total leaf vegetables cultivated area increased in the study area although there is fluctuation in the cultivated area of some types of vegetables. Among these vegetables, water cress cultivated area is highly fluctuated and it distinctly increased in 2016-17. Water cress cultivated area is fluctuated and it is related to area of fish pond and price of water cress. Water cress is grown in *le land* as well as fish ponds and water cress cultivated area decreased when the number of fish pond decreased. In the study period, in 2015, price of roselle increased to 200ks per bundle and local growers wanted to grow roselle due to high economic return. Therefore, local growers grow roselle extensively. In that year, price decreased and pest occurrence causes loss and high investment due to high pesticide price. After that, roselle cultivated area decreased in the study area.



Plate 4: Roselle cultivation

Source: Field Survey



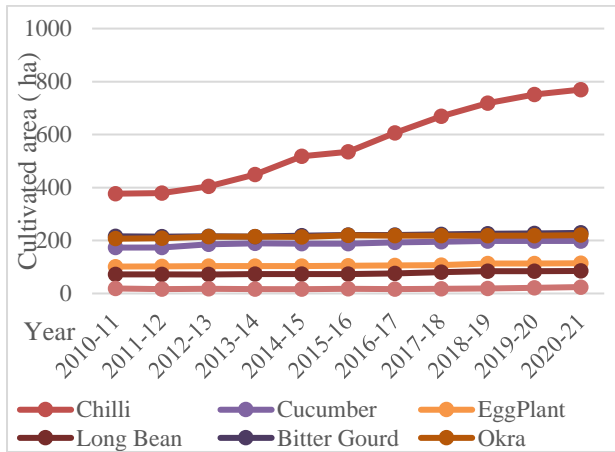
Plate 5: Lettuce cultivation

Source: Field Survey

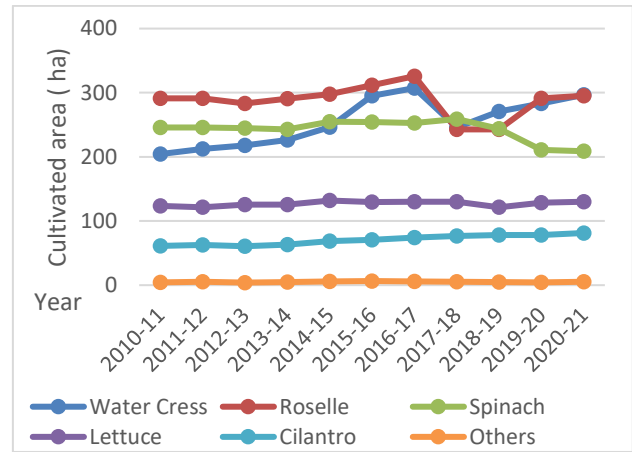


Plate 6: Spinach cultivation

Source: Field Survey



**Figure 3:** Fruit Vegetable cultivation  
Source: Field Survey



**Figure 4:** Leaf Vegetable cultivation  
Source: Field Survey

**Vegetable cultivated areas**

Although vegetables are widely grown in Twantay Township, vegetable cultivated areas are mainly concentrated in the western part of the township. Of 65 village tracts, vegetables are cultivated in 43 village tracts having 2421 hectares. The village tracts possessing cultivated area of more than 100 hectares are Sarphyusu, Kywedayut, Letpangwa, Hteintapin and Khattiya that are found in the western part. In the central area, the village tracts cultivating vegetables with an area of less than 20 hectares are Phayargyi, Mayantapin, Pauktaw, Kyunbet, Yangonparda, Kyaikthale, Tamargyi, Ahyoetaung, Kalihtaw, Talokehtaw and Thawuntaw. Twenty-two village tracts do not have vegetable cultivated area.



**Figure 5:** Vegetable Cultivated Area of Twantay Township

Source: Based on data of Department of Agricultural Land Management Statistics

**Supporting factors for vegetable cultivation**

**Locational advantage**

Nearness to Yangon City is a locational advantage for vegetable cultivation of Twantay Township. The population of Yangon has been increasing at an accelerating rate and population

growth is very distinct. To meet the basic food need consumption, vegetables are carried from nearby areas as well as Hmawbi, Taikkyi, Pyay, etc. Therefore, nearness to Yangon City is one of the major supporting factors for vegetable cultivation.

### Suitable Topography

The relief of the township is low and flat with general elevation between 3.05 meters (10 feet) and 15.24 meters (50 feet) above sea-level and low lying flat lands are favourable for vegetable cultivation. The main rivers are the Panhlaing River, Yangon River, Thakhutpin creek or Patheingyi river, Khattiya Yakyaw Creek, Toe River or China Baykar River and Biku Creek which support water for vegetable cultivation and vegetable transportation.

### Soils

Although Charrier et al. (2015) stated that vegetables need good soil and environment for better production and Comas et al. (2010) said that production depends on soil and environment, vegetables are extensively grown in the study area by upgrading the existing soils that are mixed with natural and artificial fertilizer that causes high production and low environmental pollution.

### Large Number of Rural Population

Twantay Township possesses high number of rural people (nearly 60 percent of the township population) who are familiar with agriculture and engaged in agriculture. They cultivate vegetables because of short growing period of vegetables, high market demand as well as high seasonal income. Among fruits vegetables, eggplant, gourd, okra and bitter melon gives high economic returns and water cress, roselle, spinach, lettuce, etc. in leaf vegetables.

### Accessibility

Accessibility is also a supporting factor for vegetable cultivation because of perishability. Vegetables produced from the study area are carried by road transportation and some by waterway.



**Figure 6:** Vegetable Transporting Routes from Twantay Township to Yangon City  
Source: Based on interviews and Map of MIMU

From village tracts of Twantay to Thirimingalar Market of Yangon City takes only 2 driving hours by car and it also takes about 2 hours by waterway from Twantay to Thirimingalar Market through Kyeemyindine Township. Good accessibility is one of the supporting factors for vegetable cultivation.

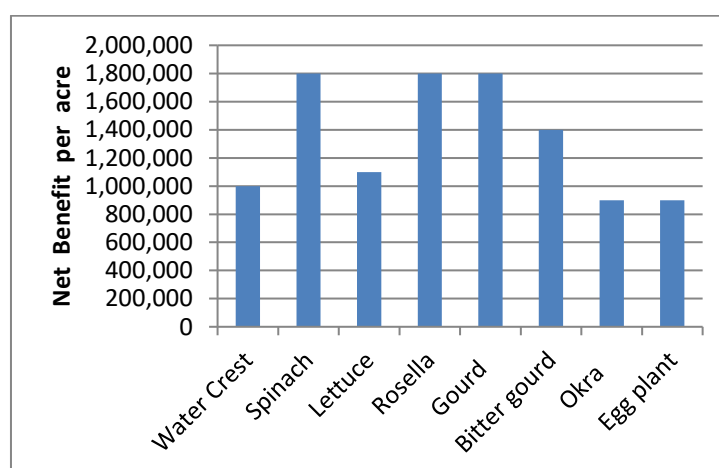
**Net economic return**

Economic benefit derived from vegetable cultivation is one of the supporting factors, because of low job opportunity in the rural area of Twantay Township. To present benefit derived from vegetable cultivation, 8 major types of vegetables were selected. In leaf vegetables cultivation, labour cost is high and cost on pesticide and trellis made by bamboo is high in fruit vegetable cultivation. Among leaf vegetables, water cress and roselle give high economic return for local grower, although net economic return depends on price. Although price of Spinach is high in the market, growers get net low economic return due to high investment costs including seed cost and labour cost. Among fruit vegetables, gourd cultivation produces high net return for the grower. Although investment is high growers sell not only gourd leaves but also gourd.

**Table 2: Cost and Net Return of Vegetable Cultivation**

Types of vegetable	Cost	Net Return	Cost benefit Ratio
Water cress	200,000	1,000,000	1: 5
Spinach	500,000	1,800,000	1: 4
Lettuce	400,000	1,100,000	1: 3
Roselle	300,000	1,800,000	1: 6
Gourd	800,000	1,800,000	1: 3
Bitter gourd	800,000	1,400,000	1: 2
Okra	400,000	900,000	1: 2
Eggplant	400,000	900,000	1: 2

Source: Interviews' answers



**Figure 7: Net Benefit per acre in Vegetable Cultivation**

Source: Table 2

### Perception of the growers

The Green Revolution in 1965 focused on developing new technologies for irrigation, chemical fertilizers, herbicides and high yielding varieties. Dhital (2015) found that pesticides were used for increasing agricultural productivity without hampering the public health. Excessive use of chemicals endangered quality of soil, air and water with a high risk to environmental safety (Mehdizadeh et al., 2017).

### Input uses

In the study area, vegetable growers use not only chemical inputs but also natural fertilizer made themselves.



Plate 7: Chemical Fertilizer Uses in Vegetable Cultivation

Source: Field Survey

In vegetable cultivation, chemical fertilizers such as Armo, Kawmus produced by Myanma Awba Group is used. But local people said natural fertilizers that are made by mixing cow dung, paddy stalk, etc is better for vegetable cultivation. Although it takes time, it causes low environmental impacts and less effect on human health.

According to interviews, most vegetable growers want to use natural fertilizer more and some growers who do not have large invest and time and labour for making natural fertilizer apply chemical fertilizers. The natural fertilizer made locally is called EM fertilizers (Effective Microorganism) and it is better for vegetable cultivation due to organic fertilizers that can maintain moisture in it.



Plate 8: Natural Fertilizer Making for Vegetable Cultivation in Twantay Township

Source: Field Survey

### Crop Choice

Growers chose vegetable that can give high economic returns and they sometimes encountered price fluctuation and changing market demand that affect economic return of



vegetable cultivation. Sometimes, local growers encounter loss of investment due to price fluctuation and changing market demand.

### **Pesticide uses**

Although they are aware of the negative consequences of chemical pesticides, they do not follow the instruction and guideline for the growers. Local people do not wear masks, hand gloves and long boots for the purpose of covering their bodies.

### **Health knowledge on vegetable cultivation**

According to interviews, local people said that vegetable cultivation is more interesting and extensive cultivation is done due to daily consumption, cheaper price, etc. Some people who know health knowledge on nutrient included in vegetables search to buy 10 types of vegetables for the purpose of consuming as medicine.

According to interviews, although local growers are interested in vegetable cultivation, they only get information from pesticide shops, nearby friends and other vegetable growers. Therefore, they do not know exactly negative consequences of pesticides. They think that pesticide affects only pests and not to human. They used to pluck the vegetables 4 or 5 days later after spraying pesticides and it is harmful for human health.

### **Change in market system**

Last 5 years ago, local growers sent their vegetables to Yangon City by rental cars. After that, due to the Covid-19 pandemic, local growers sell their vegetables to brokers who come and collect vegetables. Brokers control price and marketing system by purchasing the whole farm for the purpose of getting higher benefits for them.

## **Conclusion**

Twantay Township is one of the township of Yangon Region that produces large amount of vegetables. Various types of vegetables are grown based on market demand and price. As vegetable cultivation is a major income source for the area, local growers cultivated several types of vegetables the whole year. They use both chemical fertilizers that give negative impacts on human health and environment and natural fertilizers. But they do not understand negative impacts of pesticides on human health.

Therefore, it is necessary to disseminate health education on vegetable cultivation and to present environmental pollution through mass media such as pamphlet, staff of agriculture department by doing workshops, training, etc. On the other hand, to get higher benefit for local growers, it is necessary to help growers through giving necessary aids such as loan for investment, pesticide, fertilizer, etc. for the purpose of getting high investment and creating firm grower organization that control market system and market price for the intention of supporting high economic return for local growers.

Furthermore, it is needed to do further researches on seasonal changes in income, negative impacts of vegetable cultivation, changing environmental situation, etc. for the purpose of being vegetable cultivation that support local people economy and that reduce negative impacts of vegetable in Twantay Township.

## Acknowledgments

We wish to express my sincere gratitude to U Htain Lin for providing me an opportunity to write this review article. We also wish to express my gratitude to Daw Tin Myo Win. Thanks, are also extended to our friends as well as the vegetable growers and authorities concerned of Twantay Township for their help during the period of my work.

## References

- Bisbis, M.B., Gruda, N., Blanke, M. (2018), Potential impacts of climate change on vegetable production and product quality—A review. *Journal of Cleaner Production*, p:1602-1620.
- Charrier, G., Ngao, J., Saudreau, M. (2015), Effects of environmental factors and management practices on microclimate, winter physiology, and frost resistance in trees, *Frontiers in Plant Science*, p-259
- Comas, L.H., Bauerle, T.L., Eissenstat, D.M. (2010), Biological and environmental factors controlling root dynamics and function: effects of root ageing and soil moisture, *Australian Journal of Grape and Wine Research*, p-131-137.
- Dhital, S (2015), A Review on status of pesticides use in Nepal. *Research Journal of Agriculture and Forestry Sciences*, p-26-29
- Dung, N. H., Thien, T. C., Hong, N. V., Loc, N. T., Thau, T. D., Nguyen, H. T. L., Phong, N. T., Son, T. T., (1997), Impact of Agro-Chemical Use on Productivity and Health in Vietnam. *International Development Research Centre, Ottawa, Canada*.
- FAO (2011), Food and Agriculture Organization of the United Nations (<http://faostat.fao.org/site/339/default.aspx>)
- Mehdizadeh, M., Alebrahim, M.T and Roushani, M. (2017), Determination of two Sulfonylurea herbicides residues in soil environment, *Bulletin of Environmental Contamination and Toxicology*, p-93-99.
- Prodhan, A.S., Sarker, M.N.I., Sultana, A. (2017) Knowledge, adoption and attitude on banana cultivation technology of the growers of Bangladesh, *International Journal of Horticultural Science and Ornamental Plants*, p- 3:47-52
- World Health Report (2002), Reducing risks, promoting healthy life, Geneva: World Health Organization.