

A Spatial Analysis on Flowers, Fruits, and Vegetables Gardening in Patheingyi City and its Environs

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Abstract

In the study of agricultural sector in Patheingyi and its surrounding areas, it was found that paddy cultivation and garden agriculture were in the majority. Rice is mainly cultivated in the paddy fields. There are two categories of garden agriculture: (1) perennial trees plantation and (2) seasonal crops cultivation respectively. In perennial trees plantation, cashew and rubber are commonly cultivated. Flowers and vegetables are grown as seasonal plants. Cultivation of seasonal flowers and vegetables could be found as a small private family farming in the study area. Moreover, after harvesting monsoon paddy, the farm owners usually restart planting another paddy crop and some of them grow other combined crops such as seasonal flowers and vegetables afterward. 16 locations of gardening were found in the city and 23 locations were found in the surrounding areas of the city. It was observed that 6 out of 39 sites are for flower farming, and vegetable farming was found in 27 locations. The cultivation of both vegetables and flowers was found in the rest of the 6 places. The cultivators can make money from these farms for their livelihoods.

Keywords: Patheingyi, Farming, Flowers, Fruits, Vegetables

I. INTRODUCTION

Flowers, vegetables, and fruits are important items for human beings. The relief, soil, and climatic conditions of Ayeyarwady Region are suitable for cultivation. Although the region is not a major surplus area of flowers, fruits, and vegetables, certain kinds of them with less quantities are presently grown for local consumption. Administratively, Patheingyi, the capital city of Ayeyarwady Region, is composed of 15 wards. Patheingyi is located at 193.12 kilometers (120 miles) in the west of Yangon. Patheingyi River passes through the city from the northwest to the south, and the greater part of the city lies on the eastern bank. According to 2014 Census of Myanmar, the total population of the city is 208,771 and the total area is 66.02 square kilometers.

The main purpose of this study is to emphasize the activities of growing flowers, fruits and vegetables in and around Patheingyi. With this purpose, three research questions are structured as a framework of the study.

1. What kinds of flowers, fruits, and vegetables are cultivated in the study area?
2. Where are the farms located?
3. What is the extent of income that is generated from these farms?

The data used in this study is only primary data. Locations of the cultivated areas of flowers, fruits, and vegetables are collected with the aid of GPS receiver and then, plot these data on base map of Patheingyi to analyze a spatial distribution pattern of these cultivated areas. Field observations and interview method are used to collect facts and information of

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cultivators. Unstructured interview method is used to get the data concerned with the cost and return, and the farm income.

II. FINDINGS AND DISCUSSION

Flowers and vegetables can be seen being cultivated in some areas of the city. The places of fruit and vegetable gardening and farming were observed by setting points of location with the help of GPS for the spatial data collecting. According to the spatial data collecting, there were (16) points in the city and (23) points were found in outskirts, adjoining areas in which gardening and farming were common. The locations of these points are shown in the under-mentioned Table 1. The spatial locations of flower and vegetable growing areas in and around the city are presented in Figure 1.

Table 1 Locations of farms in and around the Pathein City

Number on map	Farm Area	Location		Farm size (Acre)	Year of established	Cultivated plants
		Latitude	Longitude			
1	Point 1	16 47 16.16	94 49 06.02	1	2017	A
2	Point 2	16 46 37.22	94 44 44.47	0.5	1961	C
3	Point 3	16 45 47.17	94 43 48 75	0.5	2008	A
4	Point 4	16 45 47.39	94 43 47.70	1	2008	A/C
5	Point 5	16 45 43.64	94 43 45.78	0.5	2010	A
6	Point 6	16 45 43.68	94 43 44.87	1	1988	A
7	Point 7	16 45 41.62	94 43 21.53	1	2013	A/C
8	Point 8	16 45 46.08	94 43 37.25	0.25	2015	A
9	Point 9	16 45 45.62	94 43 36.24	0.25	2016	A
10	Point 10	16 45 54.78	94 43 49.55	0.25	2013	C
11	Point 11	16 45 44.57	94 45 29.05	0.25	1998	C
12	Point 12	16 45 43.64	94 45 29.29	0.7	2008	C
13	Point 13	16 45 42.11	94 45 32.09	0.25	2013	C
14	Point 14	16 45 29.26	94 45 27.21	0.25	2013	C
15	Point 15	16 45 55.13	94 45 19.21	0.15	1988	C
16	Point 16	16 45 94.38	94 45 18.15	0.15	2003	C
17	Point 17	16 45 47.27	94 45 16.67	0.2	1998	C
18	Point 18	16 45 59.60	94 45 58.23	1	2005	C
19	Point 19	16 47 08.76	94 46 02.77	1	2008	C
20	Point 20	16 46 58.85	94 46 11.96	3	2008	C
21	Point 21	16 46 11.34	94 42 09.98	1	1961	A/C
22	Point 22	16 46 10.87	94 52 12.83	1	1993	A/C
23	Point 23	16 46 13.81	94 42 09.39	1.5	1998	C

24	Point 24	16 46 13.60	94 42 09.58	0.25	2013	C
25	Point 25	16 46 15.71	94 42 09.66	1	1993	C
26	Point 26	16 46 13.04	94 42 00.53	1	1993	A/C
27	Point 27	16 46 13.00	94 42 00.44	1.12	1962	C
28	Point 28	16 46 14.01	94 42 03.85	0.5	1988	C
29	Point 29	16 46 08.03	94 42 01.74	1.2	1988	C
30	Point 30	16 46 11.36	94 42 00.31	4	1963	A/C
31	Point 31	16 46 02.79	94 42 10.71	1	1968	C
32	Point 32	16 46 02.97	94 42 08.70	0.5	1968	C
33	Point 33	16 46 07.64	94 42 17.72	1	1988	C
34	Point 34	16 49 05.41	94 44 48.56	1.3	2013	C
35	Point 35	16 49 11.17	94 45 27.90	0.5	2015	C
36	Point 36	16 49 08.82	94 45 25.68	0.5	2008	C
37	Point 37	16 49 00.12	94 45 20 .65	0.5	2008	C
38	Point 38	16 48 51.54	94 45 16.64	0.15	2008	C
39	Point 39	16 48 51.54	94 45 16.66	0.15	2008	C

A - Various kinds of flowers: roses, kyai taryar, dawna, gandamar, and Shwe Sein, etc.

C - Various kinds of vegetables: cabbage, cilantro, chervil, spring onion, chive, green leaf, cucumber, ladyfinger, watercress, and lettuce etc.

Source: Field Survey with GPS and interview result

Among them, the business of gardening could be seen in 16 areas of the city's boundary and 11 areas were found in the areas outside the administrative limit of the city. They are in Lin Win Gyi Village Tract: Kwet-Pyinyi Village and Yaythoegone Village. The rest are in Pauk Kon, Myochaung, and Pyin Ka Kone Village Tracts. There are some wards of Pathein: Ward No. 1, Ward No. 5, Ward No. 8, Ward No. 10, Ward No. 11, and Ward No.14 in which farming and gardening are found.

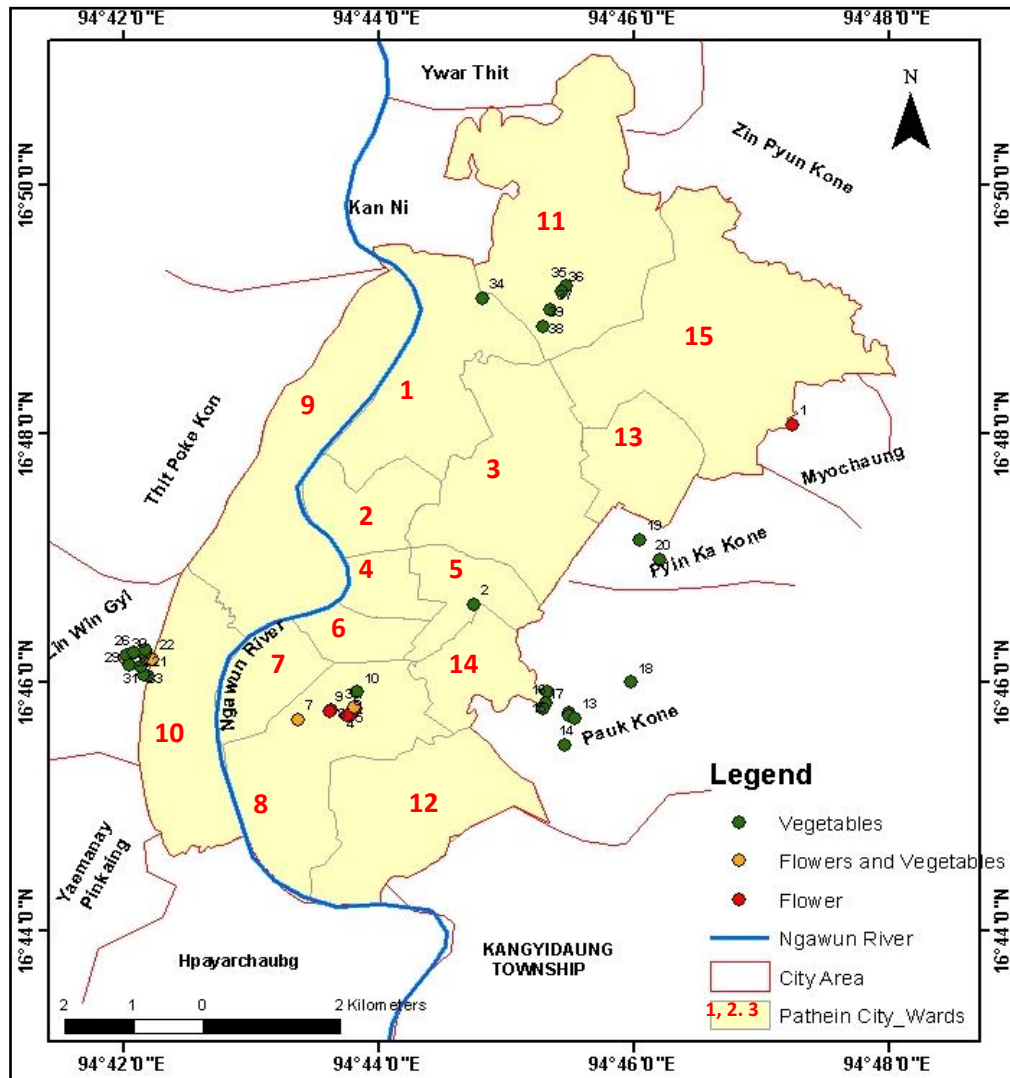


Figure 1: Distribution of farming areas in and around the Patheingyi City

Source: Table 1

The remaining wards do not have farming business at all (Figure 1). The cultivators living in Ward No. 8 and Ward No. 11 sell flowers and vegetables from their farms in the major markets of the city. The farming area of Point 2 is located in Ward No. 5 (Figure 1). According to table 1, this area is 0.5 acre wide and it has established since 1962 and various types of vegetables are presently grown. According to the interview with a farm owner, the estimated income from the farm is Kyats 700,000 and the profit is Kyats 100,000 per annum. The farming area of Point 34 is located in Ward No. 1, the northern part of the city. The area is 1.3 acre wide and various kinds of vegetables (cabbage, cilantro, chervil, spring onion, chives, green leaf, and lettuce) are cultivated.

The farming areas shown by Point 35, 36, 37, 38, and 39 are located in Ward No. 11, the northern part of the city (Figure 1). All these farms are vegetable growing farms. In the areas of Point 38 and 39, farming is mostly for home consumption. The farmers living in the villages, surrounding areas of Patheingyi usually have to go and sell the produce in the major markets of the city. The villages where farming is found as a major business are Payagyigone, Pauk-Kone, Pyingadoegone, Yaysoegone, Kwetpyingyi, Lingwingyee and Warboedaw.

As shown in figure, there are 6 farming areas in which various kinds of flowers are cultivated. There are 6 flowers and vegetables farms. There are 27 farming areas in which

various kinds of vegetables are cultivated. The following photographs show some farm sites of the study area.



Plate 1: Flower and vegetable gardening areas in Pathein and its surrounding areas

(Photos © by Myint Myint Aye, 2018)

Most farms are situated outside the city which is close to the city's boundary. The farming areas vary in size mostly from 0.5 to 1 acre. Their established years also vary from one to another. The oldest farm is 55 years old. However, some farms last only 1 year in existence. Figure (2) shows the age of each farm in the study area. According to their ages, the older farms have existed in the Ward No. 10 and Lin Win Gyi Village, western bank of Ngawun River.

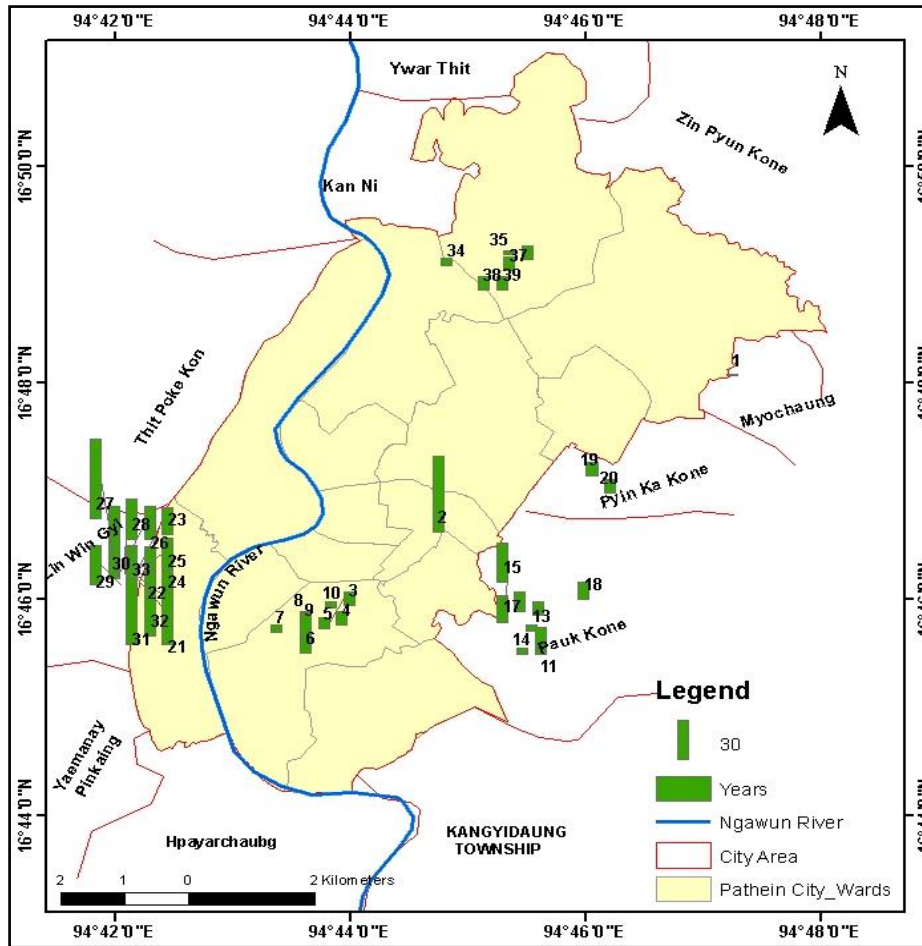


Figure 2: The farm ages in the study area
 Source: interview survey, June 2018

Point 30 shows the largest farming area (4 acre) and it is also the second oldest farm after Point 2 and Point 21 according to the record in the table 1. This farm has existed since 1963. It is located in Lin Win Gyi Village Tract. Both flowers and vegetables are cultivated in this farm. According to the interview with a farm owner, he earns from Kyats 1,400,000 to Kyats 1,500,000 per year from this farm. Point 20 indicates the second largest area (3 acre) in which only various kinds of vegetables are cultivated. The age of the farm is 10 years old. According to the interviews with the farm owners, the farming generates the profit of Kyats 20 lakhs per year. Figure (3) shows the area extent of each farm in the study.

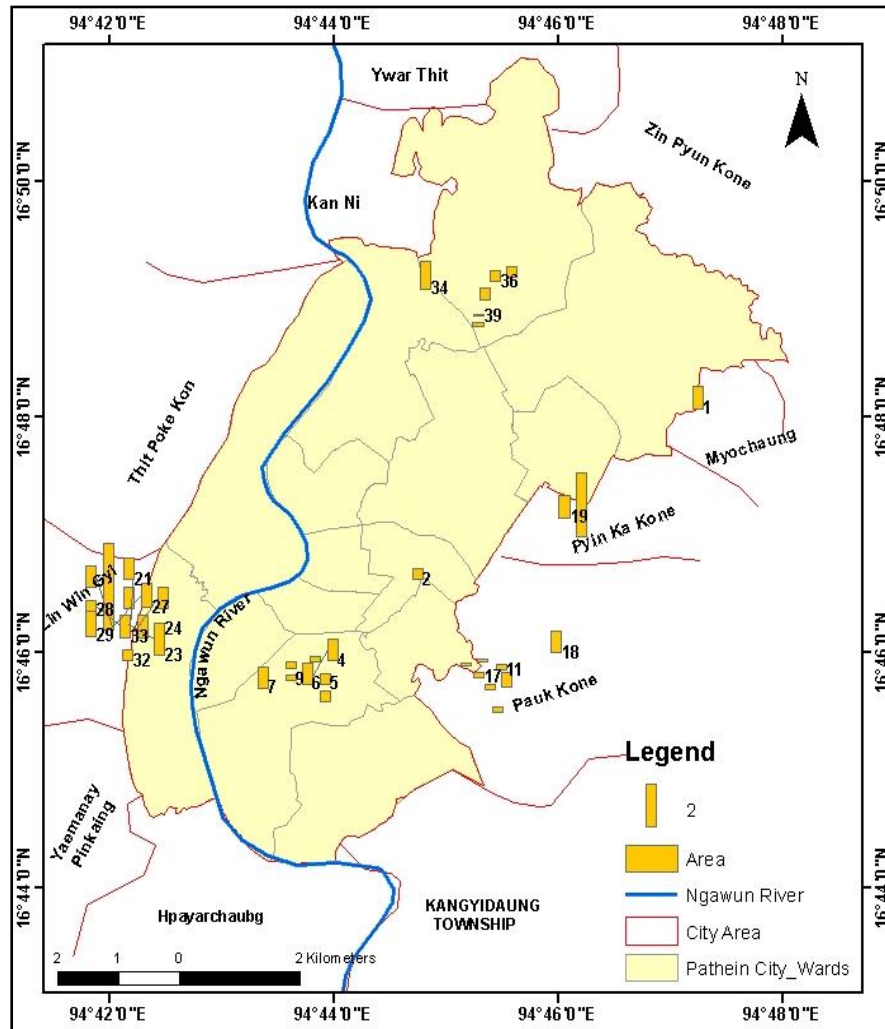


Figure 3 The area extent of farms in the study
Source: interview survey, June 2018

Flower Gardening in Pathein

In the study of flower gardening in Pathein City, there were 39 Points found to have gardening and farming of various kinds of flowers and vegetables. Among them, only 6 Points indicate the areas of cultivating flowers specifically and these farms are located in the city's area. Point 3, 5, 6, 8, and 9 are in Ward No. 8 and Point 1 is in Ward No. 15. The farm sizes are moderate to small, compared with other farms in and around the city. Both various species of flowers and vegetables cultivating farms are totally 6 in number. Only Point 7 and 4 are located in Ward No. 8. The others are located in Lin Win Gyi Village Tract where is very close to Ward No. 10 (Figure 3). Therefore, totally 12 Points of flower farms are found in and around the city.

The majority of flowers found in the Pathein area are various species of Gandamar (small and large in size). Moreover, roses, lilies, Star flowers and Thitsar are also grown in raining season. There are many orchid farms in the city. There are many Gandamar species cultivated in the city. These species are Gandamar Kyway Phyu, Gandamar-Lucky in multi colours, Thit Kwa, Koe-rea, Chet Sein, Gandamar in yellow and white, Shwe Sein, Khine Pann, Jasmine, Hsaung Hnin Phyu, Kilo etc. As per the wholesalers of flowers and flower farm owners in the city, Gandamar-Kyway Phyu is the most popular of all. It is more popular and also a bit more expensive, compared with other Gandamar species in the market. The flower

cultivators of the city cannot supply the flower demands of all residents. Therefore, that kind of flower has to be ordered and transported from Taunggyi and Pyin Oo Lwin regions and the flower farm owners in Pathein have to take extra care to get same quality as the flowers imported from these regions.

Usually, Gandamar Kyway Phyu has to be taken more care, compared with other species. There are various methods such as spraying special chemicals to get whiter blossoms, trimming off the buds and auxiliary buds in order not to get extra blossoms, pouring more water, and spraying suitable insecticides and pesticides with extra care. Other species of Gandamar flowers need only proper care.

The owners of flower farms and gardens in Pathein usually sell their produce in the markets: Aung Ayeyar (Station) market, Myoma market, Aung Thiri market, Ayeyarwun market, Myothit market, Ayeyar Min market, floating market, Sanpya market, Kannar market. There are also some direct purchases from the farms and gardens on wholesales basis. Moreover, there are also transporting and selling the produce to Chaung Thar, Ngwe Saung, Shaw Pyar and other coastal areas through waterways.

Seasonal flowers are grown all year round in the region. According to 6 owners of flower farms in Pathein, they all grow flowers the whole year round i.e. in summer and raining season. In the remaining areas, 3 of them have flower farms in summer only. In the Lin Win Gyi Village Tract; - Kwet-Pyingyi Village and Yaythoegone Village, flowers are cultivated only in summer season and only 2 of them grow *Thitsarpan* in raining season. Most of the flower farm owners in Pathein usually order their seedlings and plants by phone from the nursery farms in Taunggyi and Pyin Oo Lwin, get them transported by car in order to grow them in Pathein. They place their orders through on-line groups such as “*Pan Pyo Thu*” and get communicated also. Lilies are found to be in the state of being tested to be grown in Pathein area. *Thitsarpan* has been planted in 3 specific places of the city.

The business of selling flowers like cultivating of flowers can make good income and yield benefits. According to the flower farm owners, if Kyats 500,000 (i.e. 5 lakhs) has been invested in flower cultivation, one can earn from Kyats 20 to 30 lakhs as income until the flower growing season is finished. Sometimes they get back 25 lakhs as benefits after the end of each flower growing season.

Chemical fertilizers are seldom used and mostly the farmers have to use cow dung, quail dung, natural fertilizer products derived from grinding sesame seeds and miscellaneous beans. Moreover, private and individual preparation of organic natural fertilizers for own plantations and gardens can be found in Pathein. According to the flower farm owners, they have some limitations as followed. They usually have to order flower-seedlings from other cities by phone but the merchandise they receive differ from what they have ordered. The seedlings have been matured more than enough in the former nursery farms and when they reached the farms in Pathein for replanting and the plants do not grow well and develop normally. Therefore, the plants will become smaller in size and have lesser buds and blossoms. Spraying water through pipes is a suitable way of watering the flower seedlings and plants. Sometimes while the flower plants are blossoming, they have to be watered by using tube-well water. And water shortage is sometimes a problem in some places. According to interviews with experienced gardeners during the study period, water from surface wells is more suitable than water from tube wells for flowers. However, the surface-well water is not available in some flower gardens. Flowers have been transported to the city from other regions. When the time of flowers blossoming in the city usually coincides with the time of flowers coming to the city from other towns, selling flower in the flower markets is sometimes difficult.

Flower plantation and gardening business is usually family owned business. There are some farms which have workers also. There are usually 3 workers on wages found in farms. There are only 4 flower farms where workers are hired but in the rest farms, the owners run their own business without any workers. Therefore many workers are not necessary in the business of flower farms and it is a kind of business that can be run by only family members and it can create good income.

Fruit Cultivation in Pathein and its Environs

One can find only perennial trees when observing the growing of fruits in Pathein City in Ayeyarwady region. The types of fruits usually grown in the areas were cashew, mango, jack fruit, custard apple, Kywe-gaw (*Citrus maxima*), papaya, and banana etc. The owners of the fruit farms are not growing them for selling in markets but only for family consumption and usually sell them out in the market when they have extra goods. Therefore the fruits grown in Pathein are not sufficient and not in high quality for supplying fruit markets. The types of fruits being sold in the markets have to be ordered and transported from outside areas such as Yangon, Pyin Oo Lwin and Shan State. Rubber has been a raw material for industries and cashew nuts are collected and usually sent to cashew nut factories. Papaya, banana and *Kywe-gaw* fruits are sent to the markets in the city. Papaya is grown on a large scale in a big farm in Kwet Pyin Gyi Village. Custard apple and mango are grown in garden farms on a small scale.

Vegetable cultivation in Pathein and its Environs

There are 33 vegetable farms in and around Pathein. Among them, both vegetables and flowers are cultivated in 6 farms. Farm location Points 34, 35, 36, 37, 38, and 39 are found in Ward No. 11 and Point 2 and Point 10 are located in Ward No. 8 and Ward No.5. The other farms are located in Lin Win Gyi, Pauk Kone and Pyin Ka Kone Village Tract. There are the farms in which vegetables are grown in one season and flowers are cultivated in another season. Sometimes both of them are cultivated at the same time. Figure 1 shows the spatial distribution of vegetable farms.

When observing the growing of vegetables in the city, some types of vegetables sold in the major markets are found to be grown in the city. The types of vegetables sowed in the areas are;- (1) gourd, (2) cucumber, (3) *Kyauk-Phayon* (*Benincasa hispida*), (4) *Shwe-Phayon* (pumpkin), (5) *water spinach* (*Ipomoea aquatica*), (6) *Chin-bong* (*Hibiscus sabdariffa*), (7) *pedaung-she* (*Vigna catjang*), (8) *kyet-hinga* (bitter gourd/ *Momordica charantia*) (9) *kayan-she* (*Solanum melongena*) (10) *kayan-gyut* (*Solanum melongena*) (11) *Yone-badi* (12) *Ar-war thee* (jigsaw chilli) (13) *Mone-la-oo* (raddish) (14) *Mone-la paw* (*Brassica oleracea*) (15) *Nannan bin* (coriander) (16) *Mon-Nyin* (*Brassica campestris*) (17) *Salat-ywet* (lattice) (18) *Keit-lan* (*Collard greens*) (19) *Myin Kwar* (*Centella asiatica*) (20) *Sabar-lin* (*Cymbopogon citratus*) (21) *Hti-gayone* (*Neptunia javanica*) (22) *Tayokey Nannan* (*Petroselinum crispum*) (23) *Hin-nunwe* (*Amaranthus mangostanus*) (24) *Kinbon-chin* (*Acacia pruinescens*) (25) *Pin-Sein* (*Ocimum americanum*) (26) *Pein-oo* (*Colocasia affinis*) (27) *Bonlon thee* (*Trichosanthes cucumerina*) (28) *Khawel thee* (*Luffa acutangula*) (29) *Pusi nan* (*Mentha spicata*) (30) *Kwee-saing* (*Asian chives*) (*Buchu*) (31) *Kyet-thon meit* (*Leeks*), etc.

The farmers of vegetable farming in Pathein are usually owners of the farm lands or the gardens and grow flowers and vegetables themselves in their farm yards. Most of them sell their produce in the markets of the city. They bring their produce to sell in the markets such as Aung Ayeyar station market, Myoma market, Aung Thiri market, Ayeyar Wun market, Myothit market, floating market, Kannar market and Shwe Bontha market. Moreover the vegetable wholesalers purchase the produce from the farms nearby directly and resell them at the markets in the town. The farmers from the villages “Yay Soe Gone & Kwet Pyin Gyi” sell

the produce in the markets of *Pathein* and transport them to other regions through waterway. Moreover the wholesale merchants from Chaung Thar and Ngwe Saung also purchase the vegetables directly from the farm owners.

The vegetable farm owners in Pathein are usually the people who have been engaged in growing and cultivation of seasonal plants and vegetables since their ancestors' time. According to their experiences, cultivating only one stable crop does not yield much and they usually have to switch over to other kinds of vegetables. For example, 5 years ago, cultivation of reddish (*monla*) yielded a lot but since 1 year ago, growing that crop was having too much wastage and discrepancies and they had to switch over to growing flowers as a replacement. They had to grow two or more crops like flowers and (*Pein*), *Colocasia affinis* or (*Pein & pedaung-she Vigna catjang*) in the same land as a multi-cropping method. In most of the vegetable farms, only surface-well water is used but in some of the farms, water from nearby creeks and tube wells is used. According to interviews, people use cow dung, chicken dung, natural fertilizer products derived from grinding miscellaneous beans and peas, quail dung for fertilizers in the vegetable farms. Moreover, some people use *Palei & Armo* fertilizers and other kinds of spray for insecticides and pesticides in their farms.

Most owners of vegetable farms usually buy the seeds in Pathein. Seeds are available at Kyats 2,000 to Kyats 4,000 per packet. Growing vegetables is also a kind of profitable business with small capital. Starting from the time of harvesting, the farmers can earn daily income from farming and gardening. Some farms can be harvested every day and some crops have to be harvested every week. Therefore, one can have daily income for that. The daily income can range from Kyat 5,000 to 10,000 and up to Kyat 30,000 according to the farm owners. After one season is finished, a farm owner is estimated to be able to earn Kyat 10 lakhs to 20 lakhs.

Vegetable farm owners have to face obstacles such as falling of insects and pests in the farms and unexpected too much rainfall in the wrong season. There are many other incidents that crops have less developed and they are slow to grow due to the use of tube-well water. This is because of poor water quality. Therefore they need to test the water quality of these tube wells which are in use.

III. CONCLUSION

Cultivation of seasonal flowers and vegetables were found as private family farms in and around Pathein City. There were no big farms which grow fruits in and around the city. Small scale private farms were found and their locations were found clustering in northern and southern part of the city. In the spatial locations of flower and vegetable growing areas in and around the city, 16 areas were found to have gardening in the city areas and 11 areas were found in the Ling Win Gyi Village Tract, Kwet-Pyngyi Village and Yaythoegone Village. The rests are in Pauk Kon, Myochaung, and Pyin Ka Kone Village Tract. 6 out of 39 areas are only flower farms and another 6 areas are flower and vegetable growing farms. There are 27 vegetables growing sites where most vegetables they grown are sent to the markets of Pathein and some vegetables are sold in nearby regions. The farm owners do not need to make much capital investment for their cultivation but they get sufficient amount of profit. Due to the existence of these farms in and around the city, fresh flowers and vegetables are available anytime. Although various kinds of flowers and vegetables are imported from other regions, the basic seasonal kinds of them are available from these farms. On the other hand, the city dwellers can buy more fresh flowers and vegetables at a low price. If suitable kinds of fruits could be grown in the farms with the help of proper soil and climatic condition, the city dwellers would be served some kinds of fruits in fresh and cheaper cost.

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