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Egashira, Kazuhiko
Department of Plant Resources, Faculty of Agriculture, Kyushu University

Moslehuddin, Abu Zofar Md.
Department of Soil Science, Bangladesh Agricultural University

<https://doi.org/10.5109/10081>

出版情報：九州大学大学院農学研究院紀要. 53 (1), pp.121-126, 2008-02-28. Faculty of
Agriculture, Kyushu University

バージョン：

権利関係：

Local Market Research on Vegetables in Jessore of the High Ganges River Floodplain, Bangladesh

Kazuhiko EGASHIRA* and Abu Zofar Md. MOSLEHUDDIN¹

Laboratory of Soil Science, Division of Soil Science and Plant Production,
Department of Plant Resources, Faculty of Agriculture,
Kyushu University, Fukuoka 812–8581, Japan
(Received November 9, 2007 and accepted November 30, 2007)

Local market research was implemented in Jessore District, southwestern Bangladesh. It was done in July 2006 and March and July 2007 at the vegetable bazaar in Jessore Town and in March and July 2007 at the Marua hut of Marua Village, Chowgachha Upazila. Many kinds of vegetables were identified with some seasonal variation at the vegetable bazaar in Jessore Town. Among them, fruit vegetables including gourds, root vegetables, leaf vegetables including local varieties, kachu and spices were more variable. In comparison to the vegetable bazaar in Jessore Town, kinds of vegetables identified at the Marua hut of Marua Village were limited and less varied with the seasons. Vegetables sold in the Marua hut were probably all essential to daily life of villagers in Marua Village.

INTRODUCTION

Market is a most active site in daily life of people in monsoon Asian countries. Vegetables in a market are mostly local products in Bangladesh. While, fruits are frequently imported from other areas or countries. We have visited Jessore District, located in the southwestern part of Bangladesh, in the field survey of Kyushu University P&P Project (Kyushu University Interdisciplinary Programs in Education and Projects in Research Development) of “An empirical study on the pathway of arsenic from groundwater contamination to human health hazard” headed by Dr. Masakazu Tani, Associated Professor of the Faculty of Design, Kyushu University.

Jessore District occupies a southern half of the High Ganges River Floodplain, and the land is calcareous and mostly above normal flood-level (FAO–UNDP, 1988). Vegetables and pulses are cultivated in the field as crops in the cropping patterns under rainfed and irrigated conditions (Bangladesh Agricultural Research Council, 2005). We have observed vegetables grown in the field and in the garden around farmer’s houses. In the present study, market research on vegetables was done in July 2006 and March and July 2007 at a vegetable bazaar in Jessore Town and in March and July at a hut in Marua Village of Chowgachha Upazila. March is in the late dry season and July is in the early rainy season in Bangladesh. The purpose of the present study is to identify vegetables sold at bazaar and hut and to understand seasonal variation in the kind and price of vegetables in Jessore, Bangladesh.

MATERIALS AND METHODS

Location

Bangladesh is located in the Ganges–Brahmaputra delta under the tropical to subtropical monsoon with distinct rainy and dry seasons. Jessore District is located in the southwestern part of Bangladesh with bordering with India, and has the area of 2,567 km² and population of 2,417 thousands in 1996 with the population density of 942 persons/km². Jessore Town, a center of Jessore District, is situated at 23°17' N and 89°17' E. Jessore District is a hottest and driest area in Bangladesh; the mean annual rainfall was 1,491 mm, and the mean monthly maximum temperature ranged from 25.3 °C in December to 36.2 °C in April and the mean monthly minimum temperature ranged from 11.3 °C in January to 26.0 °C in June and August as an average of 1951 to 1980 (Navin, Jr. and Khalil, 1988).

Physiographically or agroecologically, Jessore District is located in the southern half of the High Ganges River Floodplain, and the land type is medium highland and highland and mostly above normal flood-level (FAO–UNDP, 1988); it means no more occurrence of deposition of new river sediment on the land. Soil is Calcareous Brown or Dark Grey Floodplain Soil according to the Bangladesh soil classification system (FAO–UNDP, 1988; Saheed, 1988).

Administratively, Jessore District is composed of eight upazilas of Sadar, Chowgachha, Bagherpara, Jhikargachha, Sarsha, Manirampur, Abhaynagar and Keshabpur. Jessore Town is situated in Sadar Upazila and is a center of Sadar Upazila and Jessore District. Marua Village is under Chowgachha Upazila and is located about 10 km northeast of Chowgachha Town, a center of Chowgachha Upazila, and around 25 km northwest of Jessore Town. Marua Village is composed of around 600 households. They mainly make a living in agriculture. Marua Village has been severely suffered from arsenic contamination of groundwater.

¹ Department of Soil Science, Bangladesh Agricultural University, Mymensingh–2202, Bangladesh

* Corresponding author (E-mail: kegashi@agr.kyushu-u.ac.jp)

Vegetable market

There are several vegetable markets in Jessore Town. They are open every day and called “bazaar”. At a vegetable bazaar only men are selling vegetables. They are sitting at both sides of a small street with a fixed interval over a distance of around 100 m or more. Some persons sell a few kinds of vegetables while others sell various vegetables. Most of them sell vegetables under sky while a few persons sell them in a house. We walked slowly in the vegetable bazaar while looking at vegetables. We identified a vegetable and recorded it with its price which was asked to a selling man. We covered almost all of vegetables sold at the vegetable bazaar.

In Marua Village, a vegetable market is open two days in a week and called “hut”. The Marua hut is open on Saturday and Tuesday. Fish is also sold in the hut. The Marua hut is open at the place called Marua bazaar, a center of the village, after around 4 p.m. Only men are selling vegetables. They occupied one of compartments arranged in two rows with a distance of 20~25 m and sold vegetables carried in by themselves. Each compartment was covered with tent. We waked in the space between the two rows and identified a vegetable and recorded it with its price which was asked to a selling man. Because almost similar vegetables were sold in different compartments, we covered several compartments.

RESULTS AND DISCUSSION

Table 1 shows vegetables and their prices, sold at the vegetable bazaar in Jessore Town in July 2006 and March and July 2007, and Table 2 shows those at the Marua hut in Marua Village, Chowgachha Upazila, Jessore District in March and July 2007. Several prices for a vegetable at the same survey time mean asking to different selling men. A blank without price means no selling or not being found of that vegetable. The survey was not always detailed, but general statement can be drawn on the vegetable marketing in Jessore Town and Marua Village.

Among the vegetables listed in Tables 1 and 2, okra, cabbage/cauliflower, onion, potato, tomato and garlic have been cultivated as crops in the cropping patterns performed in the High Ganges River Floodplain; okra is cultivated in the early rainy season and the others are cultivated in the dry (Rabi) season under the rainfed or irrigated condition (Bangladesh Agricultural Research Council, 2005). Many kinds of pulse, such as mungbean and blackgram in the rainy season and lentil, chickpea and grasspea in the dry season, are cultivated as crops in the cropping patterns (Bangladesh Agricultural Research Council, 2005), but they were not identified at the vegetable bazaar in Jessore Town and at the Marua hut in Marua Village.

Vegetables at the vegetable bazaar in Jessore Town

Many kinds of vegetables were sold with some seasonal variation at the vegetable bazaar in Jessore Town. They are described separately.

Gourd

Gourds are most popular vegetables in Jessore area. We saw most frequently shelf-cultivation of gourds on the way to field survey at Marua Village from Jessore Town (described as “on the way to field survey” thereafter). Various gourds were identified at the vegetable bazaar. Bitter gourd (*Momordica charantia*), pointed gourd (*Trichosanthes dioica*), bottle gourd (*Lagenaria siceraria*), pumpkin and sweet gourd, and cucumber (*Cucumis sativus*) were found in both rainy and dry seasons, but snake gourd (*Trichosanthes anguina*), ribbed gourd (*Luffa acutangula*), white gourd (*Benincasa hispida*), and kakrol (teasel gourd) (*Momordica dioica*) were identified only in the rainy season. Price was higher for the dry season than for the rainy season in bitter gourd and pointed gourd, hardly changed between the seasons in pumpkin and sweet gourd, and showed an annual variation in cucumber.

Concerning pumpkin and sweet gourd shown in Table 1, *Cucurbita maxima* which is most prevailing in the country, *Cucurbita moschata*, and squash (*Cucurbita pepo*) are now cultivated as pumpkin in Bangladesh. Among them, *Cucurbita maxima* is called pumpkin and *Cucurbita moschata* is called sweet gourd (Okubo and Rasul, personal communication).

Pulse

Cultivation of different kinds of pulse was observed on the way to field survey and in the field outside the settlement of Marua Village. However, only yard-long bean (*Vigna unguiculata*) was identified at the vegetable bazaar throughout rainy and dry seasons. Price of yard-long bean was a little higher for the dry season than for the rainy season.

Other fruit vegetables

Tomato (*Lycopersicon esculentum*), brinjal (*Solanum melongena*) and okra (*Abelmoschus esculentus*) were identified as fruit vegetables other than gourd and pulse. We saw growing brinjal and okra in the field on the way to field survey. Tomato was found only in the dry season, and brinjal and okra were in both rainy and dry seasons. Tomato was cheaper than brinjal and okra. Price of brinjal tended to be varied more with selling men rather than with seasons.

Root vegetables

Different kinds of root vegetables were recorded at the vegetable bazaar. Production of root vegetables was much higher for the dry season than for the rainy season and potato (*Solanum tuberosum*) was the most popular root vegetable, although we did not notice cultivation of any root vegetable in the area. Among the root vegetables, sweet potato (*Ipomoea batatas*), carrot (*Daucus carota*) and beet (*Beta vulgaris*) were found only in the dry season while radish (*Raphanus sativus*) and white spot arum (*Amorphophallus* sp.) were only in the rainy season. Price of potato was a little lower for the dry season than for the rainy season, and price of shallot (*Allium cepa* Aggregatum group) did not change between rainy and dry seasons. Garlic (*Allium sativum*) was in a relatively high price.

Leaf vegetables

Table 1. Vegetables and their prices (Taka/kg), sold at the vegetable bazaar in Jessore Town, Jessore District in July 2006 and March and July 2007

Vegetables		Price		
		21 July 2006	20 March 2007	19 July 2007
Gourd	Bitter gourd	16	24, 24	16, 20
	Pointed gourd	10	24, 20	8
	Snake gourd	10		12
	Ribbed gourd	8		10
	Bottle gourd (round)	16		
	Bottle gourd (long)	20	around 20 Taka/piece	
	White gourd	14~15 Taka/piece		14
	Kakrol* (Teasle gourd)	16		16
	Pumpkin and sweet gourd	8	6, 8	8
	Cucumber	20	12, 10	12
Pulse	Yard-long bean	16	24	20
Fruit vegetables	Tomato		12, 10, 8	
	Brinjal (purple)	16	24, 16, 14	
	Brinjal (green)	28	16	24
	Brinjal (pale green)		24	
	Okra	24	24	24
Root vegetables	Potato	17	10, 14, 14, 14, 15	18
	Sweet potato		12, 12	
	Radish	10		
	Carrot		12, 10, 10	
	Shallot	22	20, 20	22
	Garlic	70	32, 40	32
	White spot arum	24		
Leaf vegetables	Beet		20	
	Cauliflower		32, 24~28	
	Cabbage		8, 6	
	Summer cabbage	24		
	Water lily	2 Taka/bundle		
	Helencha* (Watercress)	about 8		
	Pui shak* (Indian spinach)	5	12	
	Data shak* (Stem amaranth)	5	10, 10	10
	Lal shak* (Red amaranth)	12	10	
	Katanote* (Spiny amaranth)		24	
Radhamoni***		20		
Kachu*	Mukhi kachu*, root (Taro)	12, 16	40	12
	Pani kachu*, stem (Lowland taro)	12, 8 Taka/piece	8 Taka/piece	12
	Ol kachu* (Elephant foot yam)			20
	Man kachu*, shoot (Giant taro)		16	
	Man kachu*, root (Giant taro)		16	
Spices	Green chili	48	28, 24	28
	Red chili		160	140
	Ginger	80	32	60
	Indian pudina		300	
	Coriander		40	
	Drumstick		40	
Fruits	Grape		100	
	Pomegranate		130	
	Apple		80	
	Papaya	8	6	10
	Banana	10		6
	Orange		9, 8 Taka/piece	
	Wood apple		8 Taka/piece	
	Sapodilla		2.5 Taka/piece	
	Lime		10 Taka/4 pieces	
	Lemon	2 Taka/4 pieces		
	Amra* (Hog plum)	8		

* means expression by Bengali.

** may be a local name.

Table 2. Vegetables and their prices (Taka/kg), sold at the Marua hut in Marua Village, Chowgachha Upazila, Jessore District in March and July 2007

Vegetables		Price						
		24 March 2007	14 July 2007					
			Compartment					
			1	2	3	4	5	6
Gourd	Bitter gourd	24			12	16		
	Pointed gourd	16		10	10		10	10
	Pumpkin and sweet gourd	14	10	8				
Fruit vegetables	Tomato	6, 10						
	Brinjal	16, 20			20		18	
	Okra			12				
Root vegetables	Potato	16, 18	20	20		20	20	
	Shallot	16	20	24	24	24	20	24
	Garlic	32		40			40	40
Leaf vegetables	Lal shak* (Red amaranth)	7						
Kachu	Mukhi kachu*, root (Taro)		12	10				
Spices	Green chili	24	40		30	30		
	Red chili							150
Fruits	Banana		10		8	10		

* means expression by Bengali.

Various kinds of leaf vegetables, including local varieties, were sold at the vegetable bazaar. We saw several fields in the red amaranth cultivation on the way to field survey. Kinds of leaf vegetables were more variable for the dry season than for the rainy season, because the land suitable for cultivation of leaf vegetables is limited in the rainy season. Price of cauliflower (*Brassica oleracea* var. *botrytis*) was high compared with prices of other leaf vegetables, and price of summer cabbage (*Brassica oleracea* var. *capitata*) was considerably higher than that of cabbage (*Brassica oleracea* var. *capitata*). Aquatic plants of water lily (*Nymphaea stellata*) and watercress (helencha in Bengali with a scientific name of *Enhydra flactuans*) were also sold in the rainy season.

Shak in Bengali means that leaves are eaten as vegetable when green (Rasul, personal communication). Different vegetables of shak were sold in both rainy and dry seasons and their prices were relatively low with less seasonal variation but some annual variation. They seem to be important leaf vegetables for local people. Pui shak is Indian spinach (*Spinacia oleracea*), data shak is stem or green amaranth (*Amaranthus viridis*), and lal shak is red amaranth (*Amaranthus tricolor*). Both stem and leaves are usually eaten for data shak, and leaves are absolutely used for lal shak (Rasul, personal communication). Katanote is spiny amaranth (*Amaranthus spinosus*) and was found only in the dry season at the bazaar, along with radhamoni. Katanote is in fact a weed and has some medical value; its leaves are eaten sometimes (Rasul, personal communication). All grains of amaranth are used for seed, and grains are not eaten in Bangladesh (Rasul, personal communication).

Kachu

Kachu is popular vegetables in the area, and we saw frequently cultivation of mukhi kachu (taro, *Colocasia esculenta*) and pani kachu (lowland taro, *Colocasia esculenta*) in the field along the road on the way to field survey. Mukhi kachu is equivalent to taro and pani kachu is cultivated under waterlogged condition. Ol kachu (elephant foot yam, *Amorphophallus campanulatus*) and man kachu (giant taro, *Alocasia* sp.) were observed in the garden around farmer's houses in Marua Village. Mukhi kachu and pani kachu were identified in both rainy and dry seasons at the vegetable bazaar. Ol kachu was found in the rainy season while man kachu was in the dry season. Root, stem and shoot of kachu are used for eating.

Kachu means aroids and any crops under aroids are suffixed with kachu in Bengali literature (Okubo and Rasul, personal communication). Classification of kachu is still confusing and kachu may be under any genus of *Colocasia* or *Xanthosoma* or *Amorphophallus* or *Alocasia* etc.

Spices

Green and red chilies (*Capsicum annuum*) and ginger (*Zingiber officinale*) were identified in both rainy and dry seasons, and Indian pudina (*Mentha* sp.), coriander (*Coriandrum sativum*) and drumstick (*Moringa oleifera*) were only in the dry season. Price of spices was relatively high, probably because of their use in a small quantity. We saw several fields of growing chili in the area having a little higher elevation on the way to field survey. Turmeric (*Curcuma longa*), not listed in Tables 1 and 2, was cultivated in the system of agroforestry inside and outside the village settlement. Drumstick was seen at the yard of farmer's houses in Marua Village in the field survey of March 2007.

Fruits

Fruits were surveyed in detail only in March 2007. Quite high prices of grape (*Vitis* sp.), pomegranate (*Punica granatum*) and apple (*Malus pumila*) mean their import from other areas or countries, and other fruits are of local production. Among the local products, papaya (*Carica papaya*) and banana (*Musa* sp.) are most popularly used in the area. We saw papaya and banana in the small garden, at the yard of farmer's houses and along the road on the way to field survey. We also saw mango (*Mangifera indica*), coconut palm (*Cocos nucifera*), jack fruit (*Artocarpus heterophyllus*), sugar palm (*Arenga pinnata*) and betel nut palm (*Areca catechu*) in addition to papaya and banana. Papaya was found in both rainy and dry seasons but banana was only in the rainy season. Prices of papaya and banana were not much varied with seasons. Other fruits at the bazaar were orange (*Citrus* sp.), wood apple (*Feronia limonia*), sapodilla (*Achras zapota*), lime (*Citrus aurantifolia*), lemon (*Citrus limon*) and hog plum (*Spondias mangifera*).

Vegetables at the Marua hut in Marua Village

Compared with the vegetable bazaar in Jessore Town, kinds of vegetables identified at the Marua hut in Marua Village were limited and less varied with seasons.

Gourd

Bitter gourd, pointed gourd, and pumpkin and sweet gourd were identified in both rainy and dry seasons. They seem to be most popular gourds to villagers among the gourds produced in Jessore area (Table 1). We heard from one farmer in Marua village that he cultivated bitter gourd, pointed gourd and kakrol in his field located 4 km far from his house. Price was higher for the dry season than for the rainy season common to the gourds and was higher for bitter gourd than for pointed gourd and pumpkin and sweet gourd irrespective of the seasons. This price system was somewhat different from that of the vegetable bazaar in Jessore Town.

Fruit vegetables

Tomato, brinjal and okra were identified as fruit vegetables other than gourd and pulse. They were identical with those at the vegetable bazaar in Jessore Town, suggesting that they are popular fruit vegetables to city residents and villagers in Jessore area or that they are only produced as fruit vegetables in addition to gourd and pulse in Jessore area. Brinjal was found in both rainy and dry seasons, whereas tomato was found in the dry season and okra was in the rainy season. Price of tomato and brinjal was in the similar level to that of the vegetable bazaar in Jessore Town but price of okra was half of that at the vegetable bazaar in Jessore Town.

Root vegetables

Potato, shallot and garlic were recorded as root vegetables in both rainy and dry seasons and covered only one-third of the root vegetables recorded at the vegetable bazaar in Jessore Town. Potato showed the similar seasonal change of price to that at the vegetable bazaar in Jessore but with a little higher price in both seasons.

Prices of shallot and garlic were clearly higher for the rainy season than for the dry season, different from the price tendency observed at the vegetable bazaar in Jessore Town.

In the survey of July 2007, three kinds of vegetables were sold as each of gourd, fruit vegetables other than gourd, and root vegetables at the Marua hut. Among 6 compartments investigated, total compartments selling root vegetables were 13 and larger than total 8 compartments of gourd and 3 compartments of fruit vegetables other than gourd. Potato, shallot and garlic are probably in a higher demand by villagers as ingredients of curry.

Leaf vegetables, kachu, spices and fruits

Only lal shak (red amaranth) as leaf vegetables was identified in the dry season. No leaf vegetable was found in the rainy season; even at the vegetable bazaar in Jessore Town limited kinds of leaf vegetables were sold in the rainy season. Several kinds of kachu were sold at the vegetable bazaar in Jessore Town, but only mukhi kachu in the rainy season was recorded at the Marua hut. However, it was recognized through food collection in the field survey of July 2007 in Marua Village that different kinds of kachu such as pani kachu, ol kachu, man kachu, black kachu, dosta kachu, kata kachu and bagan kachu have been cultivated as subsistence crops in the village.

Green and red chilies were sold with the nearly same price as that at the vegetable bazaar in Jessore Town. They are essential as spices to city residents and villagers. Only banana was identified as fruits at the Marua hut. It may be important for supporting human life in the village in the rainy season. In addition to the vegetables listed in Table 2, pui shak (Indian spinach) and sugar palm were bought by the P&P team, but we missed them with no record of their names and prices in Table 2.

ACKNOWLEDGEMENTS

We express our sincere thanks to Dr. Hiroshi Okubo, Professor, Laboratory of Horticultural Science, Department of Plant Resources, Faculty of Agriculture, Kyushu University, and Dr. Md. Golam Rasul, Associate Professor, Department of Genetics and Plant Breeding, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Bangladesh, for their presentation and correction of English and scientific names of vegetables and fruits. However, mistakes in description, if any, are responsible to the authors.

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