Eurasian Journal of Anthropology Euras J Anthropol 5(1):14-31, 2014

A comparative study of farming systems in two regions of West Bengal, India

Arun Makal*, Arnab Das
Department of Anthropology, University of Calcutta, West Bengal, India

Received March 6, 2014
Accepted July 14, 2014

Abstract

The present article has discussed the diversification of cultivation in two regions of Indian state of West Bengal, particularly the district Purba-Medinipur and the district South 24 paraganas. This study focuses on farming systems in Mahatpur village of the Panskura region and Sasan village of the Baruipur region. The contemporary farmers of these two villages still cultivate their traditional rice beside cultivation of one important profitable crop. It is seen that flower production is fully operative in the village Mahatpur and guava production is very well-known in the village Sasan. This study also examines and compares the field types, mixed-crops, farming methods, and labor forms of the purposively selected flower farmers and guava farmers by using the methods of participant observation, case histories, individual and group interviews. It also analyzes farmer's own appraisal and plans to describe local knowledge, practices and problems among the selected farmers. This study concludes that differences in farming systems of two villages have historically developed in ways that reflect the activities and choices of local cultivators, influenced by local climatic conditions.

Keywords: *Farming systems, crops, farmers, West Bengal*

Introduction

To encounter the several objectives of poverty decline, food safety, competitiveness and sustainability, several scholars (Den Biggelaar, 1991; Dixon, Gulliver and Gibbon 2001; Mahapatra, 1994; Mahapatra, 1992) have recommended the farming systems approach to research and development. The work of Rhoades (1984), Netting (1993) Collinson (2000), Murphy (1990), and Cleveland (1994) shows that farms are 'systems,' because different activities are closely related to each other by the common use of land, labor, capital, knowledge and by joint use of the farmer's management capacity. So, farming system as a concept belongs to a larger system and it can be subdivided into subsystems (Lawas 1997; Netting 1974; 1993; Shaner, Philipp and Schmehl 1982; Norman et al., 1997; Dewalt 1994). The most relevant subsystem in agricultural systems is cropping systems (Jha 2003; Singh 2001; Singh, Sharma, Batra and Sharma 2003).

*Corresponding author: Department of Anthropology, University of Calcutta, West Bengal, India
(**email:** arunmakal@gmail.com)

ISSN: 2166-7411

Several other scholars (Behera and Mahapatra 1999; Singh et al., 2006, Scoones and Thomson 1994, Chambers 1983; Chambers 1991; Chambers 1992) consider that farming systems research is a powerful tool for natural and human resource management in the country of India and also in state of West Bengal (Chakraborty, Sen, Mandal, Gupta and Mukherjee 1976). It is a multidisciplinary whole-farm approach and very operative in explaining the problems of small and marginal farmers. Therefore, farming systems approach is very significant to understand the current situation of the contemporary farming communities in the state of West Bengal where the economic structure is predominantly rural, agricultural, and constituted by small size of land holding (Mahapatra 1994; Balguru and Manikandan 2001). On the other hand, the analysis of farms is quite important to the subject of agricultural development. Lastly, choosing policies for agricultural development requires the use of information about the existing farming situation (Hildebrand and Russell 1996).

Material and methods

Accordingly the present article tries to analyze, relate and compare the farming systems and various subsystems in two regions of West Bengal, particularly the village Mahatpur of the Panskura region in the district Purba-Medinipur and the village Sasan of the Baruipur region in the district South 24 paraganas. This study also examines and compares the field types, mixed-crops, farming methods, and labor forms of the purposively selected flower farmers and guava farmers by using the methods of participant observation, case histories, individual and group interviews. It also analyzes farmer's own appraisal and plans to describe local knowledge, practices and problems among the selected farmers. Farmers were identified by name, age, sex, residential address, family composition, community identity, educational status, occupation and their knowledge. Other preferred traits were household position, total family members engaged in farming of different age category, annual income, beliefs, problems and organizational participation. The data on farmers' knowledge about the crops, yield, cropping pattern, land, labor and capital were also collected.

Studied regions, people and economy

The present study purposively selects the village Mahatpur in the panchayat Panskura-I of the block Panskura-I of the district Purba Medinipur to understand the systems of flower farmers. Because, paddy-flower system is the most adopted cropping system in the Panskura-I block of the district Purba Medinipur and this district is number one in flower production in the state of West Bengal. There is a high potential to strengthen the export position in case of cut flowers. This region has also promoted traditional flowers like jasmine, marigold, hibiscus, tube roses, where there is a high local demand. The farmers of the village Mahatpur practice flower farming simultaneously with paddy cultivation. On the other hand, this current study has also traced the village Sasan of the panchayat Sikharbali-I of the block Baruipur in the South 24 Paraganas district to know the systems of guava farmers because the paddy-guava system is one of the widely practiced cropping system in the block Baruipur. It is also observed that guava is an important cash crop in paddy growing areas of the panchayat Sikharbali-I in the block Baruipur.

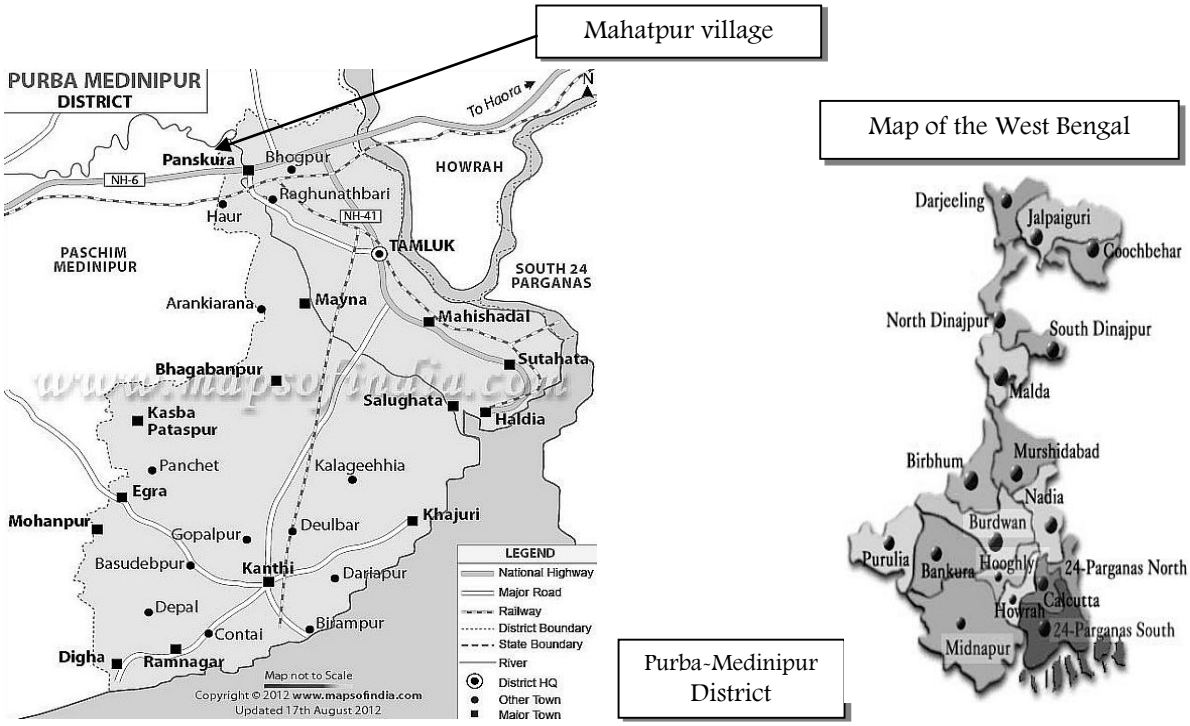

Figure 1: Location of the village Mahatpur.

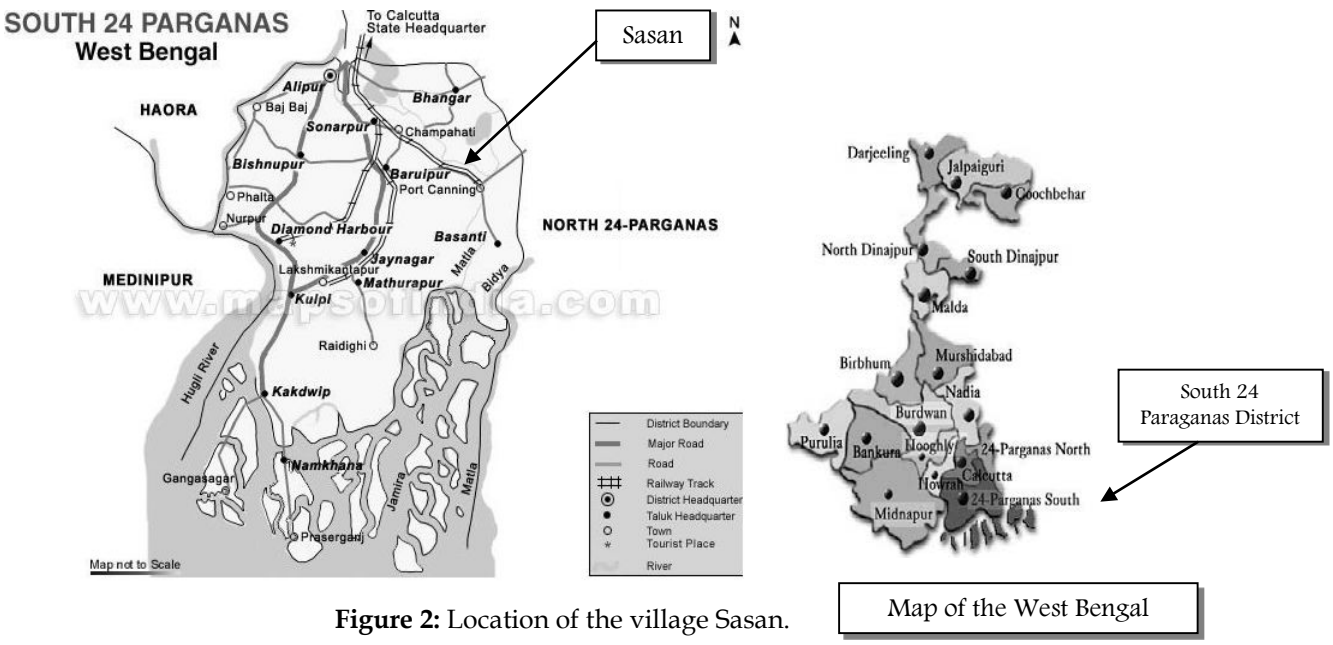

Figure 2: Location of the village Sasan.

Mahatpur village

Mahatpur village is situated on the bank of the Kangsabati River and the total area of this village is 238.62 hectare. The J.L number of the village is 66. According to the record of local panchayat-samity, till 1997 it has 425 households and a population of 2143 respectively. In the village there are 1068 males and 1075 females and the %ages are 49.83 and 50.16 respectively. Among the total population 1303 are working persons

(60.80%) and 840 are non-working persons (39.19%). The Figure 3 shows the working and non-working population based on sex in the village Mahatpur. By this Figure 3 we can see that in the village Mahatpur, out of 1303 working population 816 are males (62.62%) and 487 are females (37.37%). On the other hand, out of 840 non-working population 252 are males (30.00%) and 588 are females (70.00%). Furthermore, the figure 4 shows the distribution of male and female population in the village Mahatpur on the basis of earning. By this figure 4 we can see that out of 1068 male population, 816 are workers (76.40%) and 252 are non-workers (23.52%). Besides, out of 1075 female population, 487 are workers (45.30%) and 588 are non-workers (54.69%).

The study explores four types of on-farm income sources and two types of off-farm income sources in the village Mahatpur. The on-farm income sources of village Mahatpur include owner cultivators, share croppers, day labor and agricultural labor. On the other hand, the off-farm income sources of village Mahatpur include grocery and fishing. The Figure 5 shows the different categories of on-farm income sources and off-farm income sources of the village Mahatpur. By this Figure 5 we can see that in the village Mahatpur, out of 1303 working population, 388 persons are owner cultivators (29.77%), 135 persons are share croppers (10.36%), 260 persons are day labor (19.95%) and 390 persons are agricultural labors (29.93%). Conversely, among the total working population (1303), only 30 persons are engaged with economy of grocery (2.30%) and 100 persons are involved with the fishing activities (7.67%).

The distribution of castes in Mahatpur village according to household numbers has also been studied. It is seen that the Mahatpur village is populated by different Hindu caste groups like Brahmin, Kayastha, Mahishya, Kolu, Goala, and Jele. The Figure 6 shows the distribution of several Hindu caste groups in the village Mahatpur according to household numbers. By this Figure 6 we can see that in the village Mahatpur, out of 425 households, 46 families belong to caste Brahmin (10.82%), 93 families belong to caste Kayastha (21.88%), 106 families belong to caste Mahishya (24.94%), 92 families belong to caste Kolu (21.64%), 46 families belong to caste Goala (10.82%), and lastly 42 families belong to caste Jele (9.88%). Thus, the Mahisya people have large number of households in the village Mahatpur (see Figure 6).

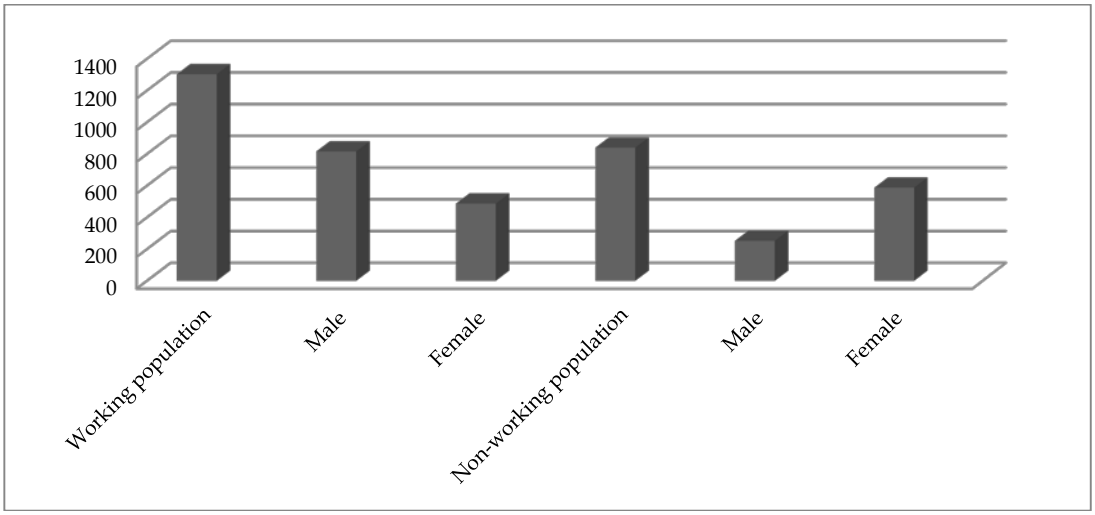

Figure 3: Working and non-working population based on sex in Mahatpur

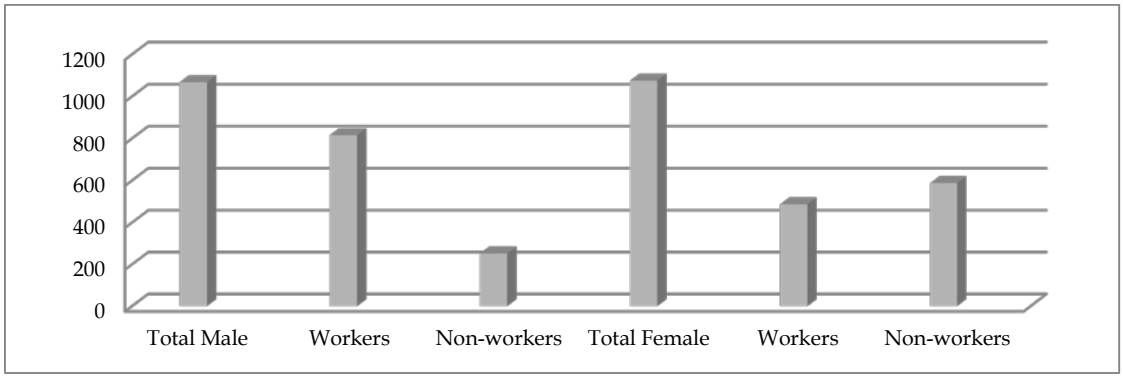

Figure 4: Male and female population based on earning in Mahatpur.

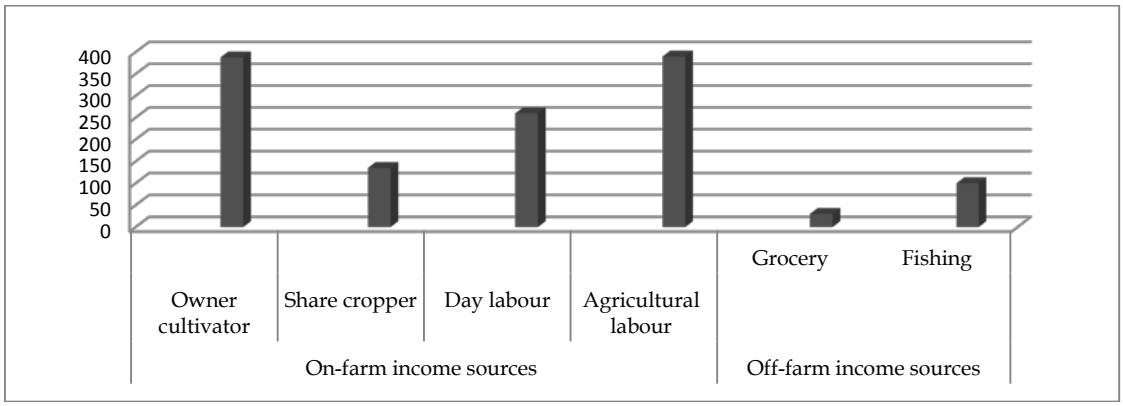

Figure 5: On-farm and off-farm income sources in Mahatpur

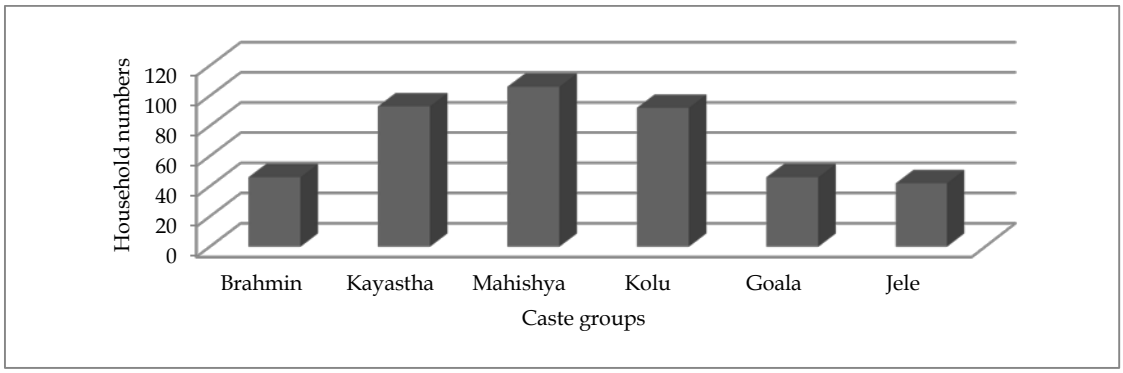

Figure 6: Distribution of caste groups in Mahatpur.

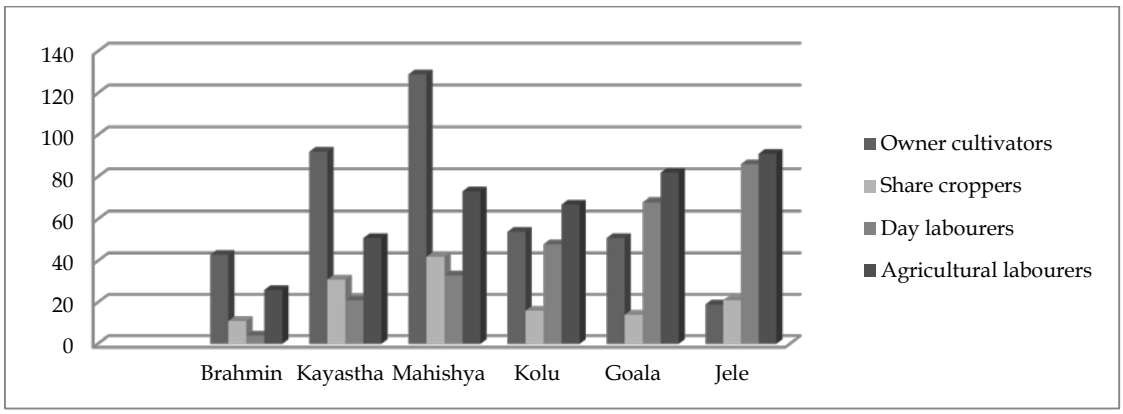

Figure 7: Castes groups in Mahatpur according to on-farm income sources.

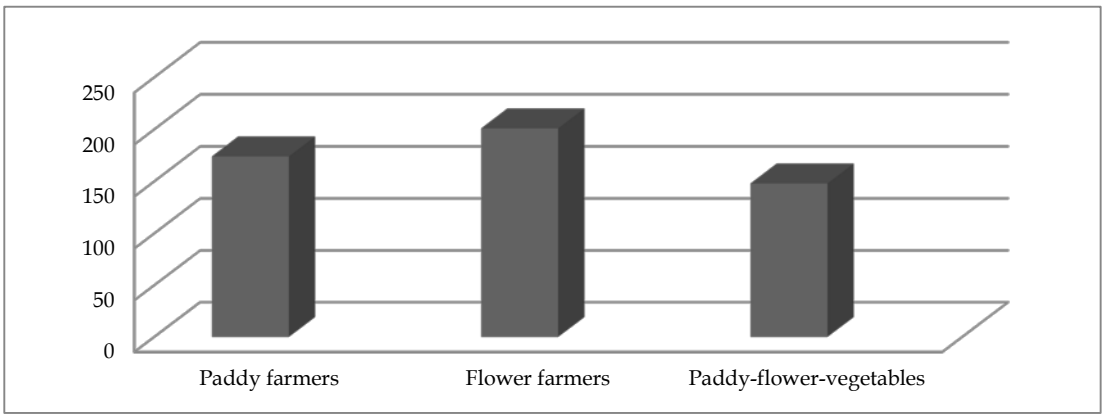

Figure 8: Distribution of farmers in Mahatpur according to crop farming.

This study also observes the distribution of caste groups of the village Mahatpur on the basis of agriculture related working categories. The Figure 7 shows the distribution of several castes groups in the village Mahatpur according to on-farm income sources. By this Figure 7 we can see that in the village Mahatpur, out of 388 owner cultivators, 43 cultivators belong to caste Brahmin (11.08%), 92 cultivators belong to caste Kayastha (23.71%), 129 cultivators belong to caste Mahishya (33.24%), 54 cultivators belong to caste Kolu (13.91%), 51 cultivators belong to caste Goala (13.14%) and only 19 cultivators belong to caste Jele (4.89%). On the other hand, out of 135 share croppers, 11 farmers belong to caste Brahmin (8.14%), 31 farmers belong to caste Kayastha (22.96%), 42 farmers belong to caste Mahishya (31.11%), 16 farmers belong to caste Kolu (11.85%), 14 farmers belong to caste Goala (10.37%), and 21 farmers belong to caste Jele (15.55%). Moreover, among the total 260 day laborers, 4 labors belong to caste Brahmin (1.53%), 21 labors belong to caste Kayastha (8.07%), 33 labors belong to caste Mahishya (12.69%), 48 labors belong to caste Kolu (18.46%), 68 labors belong to caste Goala (26.15%), 86 labors belong to caste Jele (33.07%). Lastly, among the total 390 agricultural labors, 26 labors are from caste Brahmin (66.66%), 51 labors are from caste Kayastha (13.07%), 73 labors are from caste Mahishya (18.71%), 67 labors are from caste Kolu (17.17%), 82 labors are from caste Goala (21.02%), and 91 labors are from caste Jele (23.33%).

The study reveals that flower farming is the chief means of earning for all caste groups in the village Mahatpur. The produced flowers are supplied to Kolkata, Howrah and many other cities in India like Mumbai, Delhi and Chennai. The Figure 8 shows the distribution of farmers in the village Mahatpur according to different crop farming. By the Figure 8 we can see that in the village Mahatpur, out of 523 farmers (388 owner cultivators and 135 share croppers), 174 farmers are only engaged with paddy farming (33.26%), 201 farmers' life is totally bounded by flower farming (38.43%). Again, among the total villagers who are engaged with farming practices, 148 of them (28.29%) cultivate paddy simultaneously with flowers and different green vegetables like cabbage, cauliflower, tomato, turnip, raddish, mustard, and chilli.

Sasan village

The village Sasan is situated at a distance of about one kilometer from the Sasan road railway station. The village Sasan is surrounded by the villages named Paschim-Ramnagar on the east, Tripura-nagar on the west, Paschim-Madhavpur on the north and Sikharbali on the south. The village Sasan comprises three different localities like Uttor-Sasan, Dakkhin-Sasan and Pacchim-Sasan. The post office of the village Sasan is

Ramgoyalpur. The total number of families or households of the village Sasan is 961. The total population of the community is 5289. There are 2697 males and 2592 females and the %ages are 50.99 and 49.01 respectively.

Among the total population, 2431 are working persons (45.96%) and 2858 are non-working persons (54.03%). The Figure 9 shows the working and non-working population based on sex in the village Sasan. By this Figure 9 we can see that in the village Sasan, out of 2431 working population 1589 are males (65.36%) and 842 are females (34.63%). On the other hand, out of 2858 non-working population 1108 are males (38.76%) and 1750 are females (61.23%). Furthermore, the Figure 10 shows the distribution of male and female population in the village Sasan on the basis of earning. By this Figure 10 we can see that out of 2697 male population, 1754 are workers (65.03%) and 943 are non-workers (34.96%). Besides, out of 2592 female population, 677 are workers (26.11%) and 1915 are non-workers (73.88%).

This research has also observed that there are four types of on-farm income sources and eight types of off-farm income sources in the village Sasan. The on-farm income sources of village Sasan include owner cultivators, share croppers, day labor and agricultural labor. On the other hand, the off-farm income sources of village Sasan include service, fruit selling, vegetable selling, zari embroidery work, dhup-making, honey making, honey processing, fruit processing and rope making. The Figure 11 shows the different categories of on-farm income sources of the village Sasan. By this Figure 11 we can see that in the village Sasan, out of 2431 working population, 243 persons are owner cultivators (9.99%), 286 persons are share croppers (11.76%), 166 persons are day laborers (6.82%) and 520 persons are agricultural labors (21.39%). Conversely, the Figure 12 shows the different categories of off-farm income sources of the village Sasan. By this Figure 12 we can see that in the village Sasan, out of 2431 working population, 249 persons are service holder (10.24%), 197 persons are engaged with the economy of fruit selling (8.10%), 147 persons are engaged with zari embroidery work (6.04%), 62 persons are involved with the work of dhup-making, 70 persons are engaged with the work of honey making and processing, 154 persons are engaged with the work of fruit processing (6.33), and only 92 persons are engaged with rope making (3.78%).

The distribution of caste groups and communities in Sasan village according to household numbers has also been studied. It is seen that the Sasan village is populated by different Hindu caste groups like Brahmin, Kayastha, Mahishya, Goala, Pode and other communities like Muslim. The Figure 13 shows the distribution of several caste groups and communities in the village Sasan according to household numbers. By this Figure 13 we can see that in the village Sasan, out of 961 households, 98 families belong to caste Brahmin (10.19%), 207 families belong to caste Kayastha (21.54%), 258 families belong to caste Mahishya (26.84%), 134 families belong to caste Goala (13.94%), 219 families belong to caste Pode (22.78%), and lastly 45 families belong to Muslim communities (4.68%). Thus, the Mahisya people have large number of households in the village Sasan (see Figure 13). The distribution of caste groups of village Sasan on the basis of agriculture related working categories has been also explored in the present study. The Figure 14 shows the distribution of several castes groups and communities in the village Sasan according to on-farm income sources. By this Figure 14 we can see that in the village Sasan, out of 243 owner cultivators, 28 cultivators belong to caste Brahmin (11.52%), 43 cultivators belong to caste Kayastha (17.69%), 79 cultivators belong to caste Mahishya (32.51%), 24 cultivators belong to caste Goala (9.87%), 46 cultivators belong to caste Pode (18.93%) and only 23 cultivators belong to Muslim communities (9.46%). On the other hand, out of 286 share croppers, 16 farmers belong to caste Brahmin (5.59%), 42 farmers belong to caste Kayastha (14.68%), 65 farmers

belong to caste Mahishya (22.72%), 34 farmers belong to caste Goala (11.88%), 86 farmers belong to caste Pode (30.06%) and only 43 farmers belong to Muslim communities (15.03%).

Furthermore, it is observed that among the total 166 day laborers, 12 labors belong to caste Brahmin (7.22%), 24 labors belong to caste Kayastha (14.45%), 35 labors belong to caste Mahishya (21.08%), 22 labors belong to caste Goala (13.25%), 54 labors belong to caste Pode (32.53%), 19 labors belong to Muslim communities (11.44%). Lastly, among the total 520 agricultural labors, 46 labors are from caste Brahmin (8.84%), 81 labors are from caste Kayastha (15.57%), 108 labors are from caste Mahishya (20.76%), 88 labors are from caste Goala (16.92%), 135 labors are from caste Pode (25.96%), and 62 labors belong to Muslim communities (11.92%).

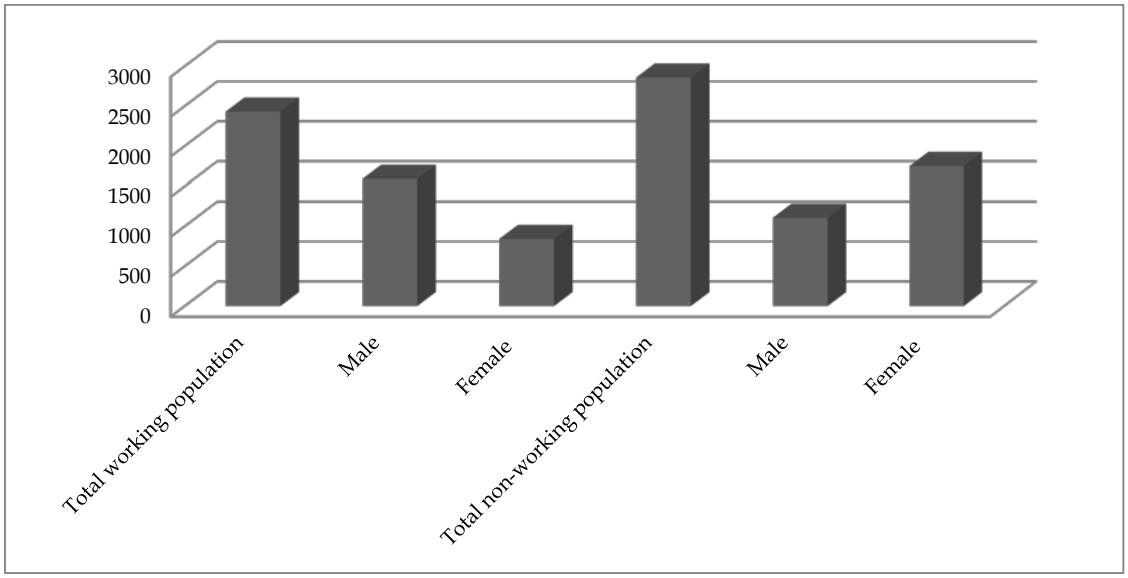

Figure 9: Working and non-working population based on sex in Sasan.

Figure 10: Male and female population based on earning in Sasan.

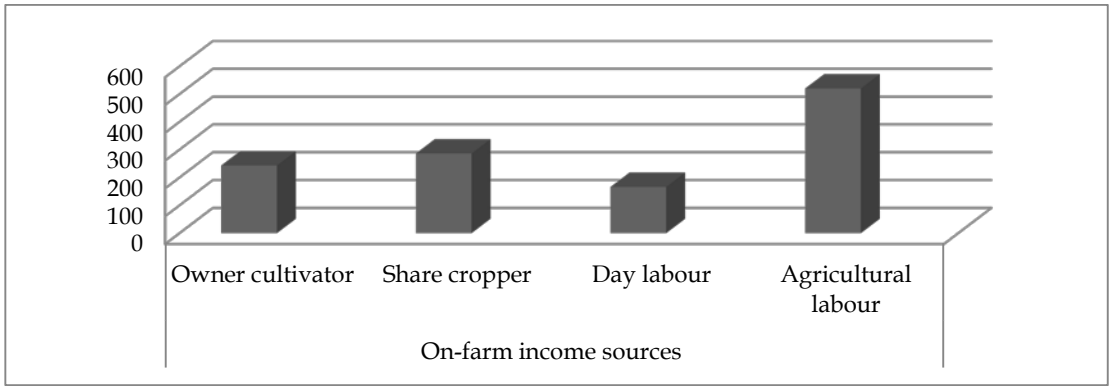

Figure 11: On-farm income sources in Sasan.

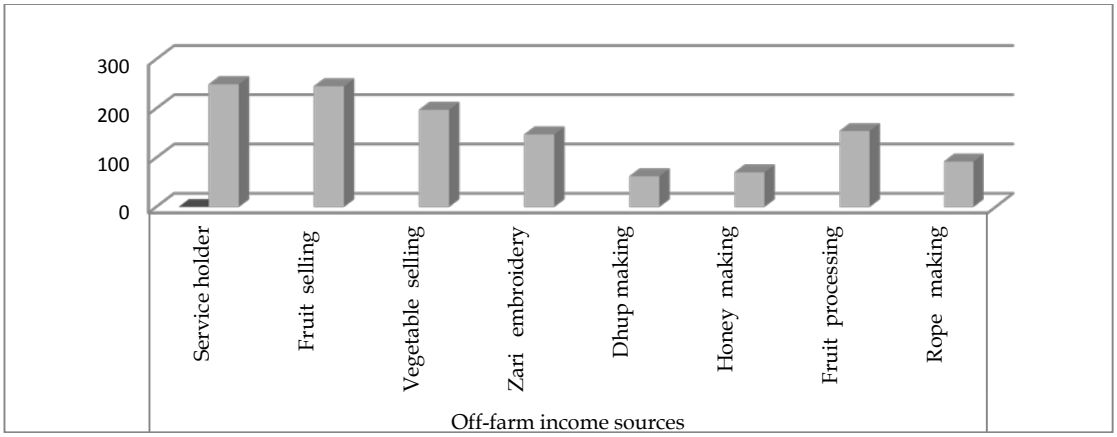

Figure 12: Off-farm income sources in Sasan

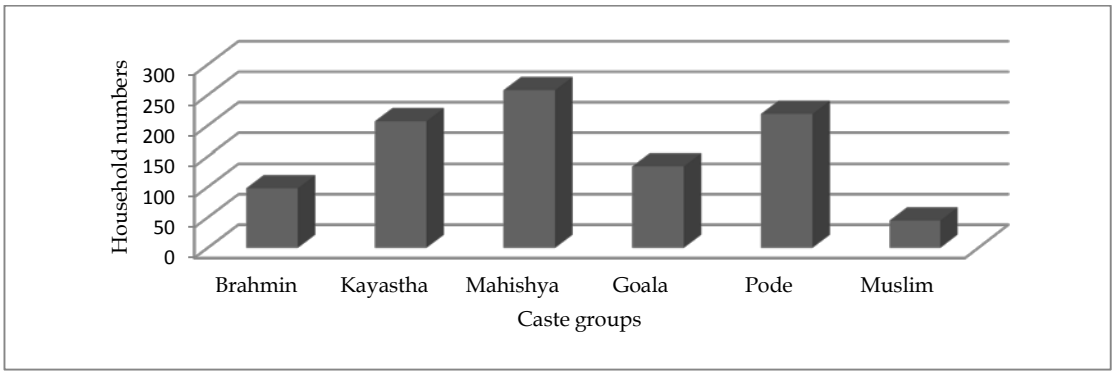

Figure 13: Distribution of caste groups in Sasan.

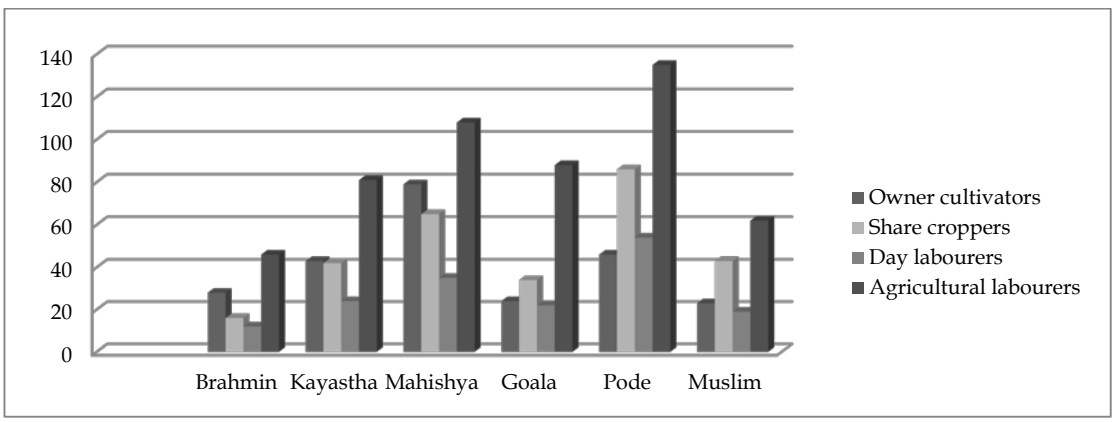

Figure 14: Castes groups in Sasan according to on-farm income sources.

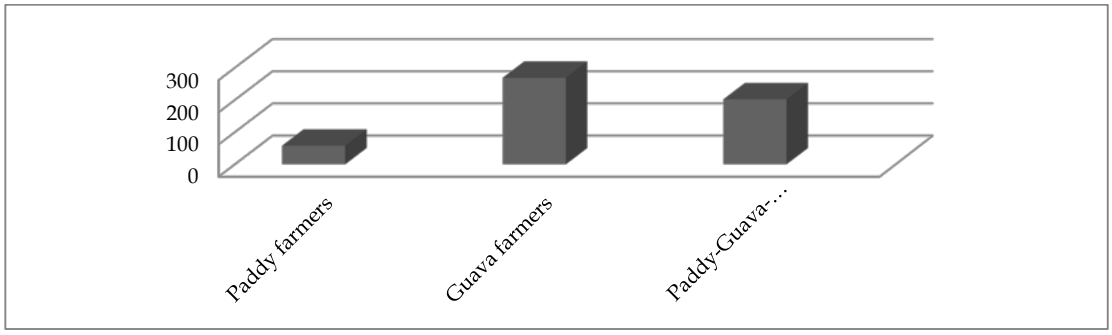

Figure 15: Distribution of farmers in Sasan according to crop farming.

This study also explores that guava farming is the principal means of earning of every family in the village Sasan. They work in their fields daily to cultivate and harvest various fruits, crops and vegetables. The Figure 15 shows the distribution of farmers in the village Sasan according to different crop farming. By the Figure 15 we can see that in the village Sasan, out of 529 farmers (243 owner cultivators and 286 share croppers), 58 farmers farm only paddy (10.96%), 269 farmers' life is totally surrounded by guava farming (50.85%), and 202 farmers (38.18%) cultivate paddy simultaneously with guava and different green vegetables like potato, chili and mustard. It is also revealed that the farmers of village Sasan cultivate various different other types of fruits besides guava (peyera) like lichi (lichu), star-apple (jamrul), and jamboline (jam). Farmers of the village Sasan report that guava is a very profitable fruit to them. It is available throughout the year except during the summer season. Being very hardy, it gives an assured crop even with very little care. Its cost of production is also low because its requirements for fertilizer, irrigation and plant protection are not much.

Farming systems in Mahatpur and Sasan villages

The present study has examined and compared the farming systems of village Mahatpur and the village Sasan in terms of land use patterns, farm type, farm structure, farm size, field location, crop types, cropping systems and labor patterns because farms are systems. In addition to that, in farming systems different activities are interrelated and interdependent with each other by common use of land, labor, capital, farmers' knowledge, experience and their management capacity. This interrelationship of several components makes the basic model of farming systems where farm households are integrating and basic units. Along with, farmers are center in farming systems for taking decisions and performing different activities or actions for agricultural establishments. Moreover, various external inputs (seed, fertilizers, and pesticides), internal inputs (land, soil, and water), farm production, farm outputs, market and various others off farm works are interrelated and interdependent with each other to fulfill the farming systems.

Household patterns and land settings

This study has observed that all studied farm households present several patterns. In the village Mahatpur, 14.82% houses are brick made, 40.70% families has moderately built houses with tiles roof and paddy straw thatched roof, 14.58% farm families build their mud houses besides the river and cultivable lands and lastly 29.88% families has farm houses beside the cultivable lands. On the other hand, the household pattern of the village Sasan of the Baruipur region is different from the village Mahatpur of the Panskura region. In the village Sasan mainly three different types of household

patterns are observed where out of the total households, 54.94% families has brick made houses, 14.98% families has moderately constructed houses with tiles roof and bamboo made wall. In this village 30.07% families made their houses beside their cultivated plots. Again, in case of land settings two important types of land plots are observed in the village Mahatpur of the Panskura region such as high land plots *unchu-jomi* and low land plots or *nichu-jomi*. Among the flower farmers of the village Mahatpur highland plots are their main plots where they make their houses. These houses on the highland plots form the farming village. The low land plots or *nichu-jomi* is located somewhat far from the village. Farmers of the village Mahatpur cultivate rice on these low land field settings. In comparison with the filed settings of the village Mahatpur, mainly highland plots are observed in the village Sasan of the Baruipur region where farmers cultivate guava plants and other fruit plants.

Land holding and land use

The small holding sector is the dominating one in both the studied villages. In the village Mahatpur flower farmers attempt to farm their entire existing land. The same attitude is found among the guava farmers of the village Sasan. The study observes that farmers are distributed according to land size and the minimum and maximum operational landholding sizes vary from one village to another village. It is seen that the average minimum and maximum operational landholding sizes among the flower farmers of the village Mahatpur varies from 5 katha (0.035 hectare) to 5 bigha (0.665 hectare).[1] This study has collected the detail information on the distribution of farms according to operational land holding size among the studied farmers of the village Mahatpur. From the study it is revealed that among the total number of farmers, 12.61% farmers has 0.5 to 1.0 hectare operational landholdings, 50.47% farmers has 1.0 to 2.0 hectare operational landholdings, 14.91% farmers has 2.0 to 3.0 hectare operational landholdings, 19.88% farmers has 3.0 to 5.0 hectare operational land-holdings, and only 2.10% farmers has 5.0 and above 5.0 hectare operational landholdings. On the other hand, comparatively the significance of the small holdings is also observed among the farmers of the Sasan village where the minimum and maximum average operational landholding sizes vary from only 2 katha (0.014 hectare) to 2 bigha (0.266 hectare). The collected data of the village Sasan also explores that among the total number of farmers, 13.79% farmers has below 0.5 operational landholdings, 44.42% farmers has 0.5 to 1.0 hectare operational land-holdings, 27.59% farmers has 1.0 to 2.0 hectare operational landholdings, 9.82% farmers has 2.0 to 3.0 hectare operational landholdings, 3.21% farmers has 3.0 to 5.0 hectare operational landholdings, and only 1.13% farmers has 5.0 and above 5.0 hectare operational landholdings.

In the village Mahatpur almost all the farmers use low land for paddy cultivation and high land for flower farming. Again different green vegetables like cabbage, cauliflower, tomato, turnip, raddish, mustard, chilli are also raised by the farmers in the high land for domestic consumption. Highlands are called by the local flower farmers as *kala-jamin* and the low lands are called as *jol-jamin*. High lands are very important among the flower farmers because flower farming is totally dependent on highland. It is known from farmers that all lands are not suitable for flower farming and they select mainly small plots of highly fertile soils for farming. But in reality, lands with highly fertile soils are rare. The flower farmers of the village Mahatpur use the same land for cultivation of seasonal flowers for one year and yearly flowers for next year. It makes the land fertile and is vital to protect flower from various pests and fungus. Comparatively, the present study has explored that each and every land and

also a small area are farmed by the guava farmers of the village Sasan. There is a difference in land use patterns, which is intensified by the fact that almost all the guava famers use even their small plots of land beside houses for farming due to the fragmentation of agricultural lands and interspersion of homesteads. In the village Sasan farmers classify their land on the basis of generation such as inherited land locally known as *purono-jomi* and modern fields or new land locally known as *notun-jomi*. The *purono-jomi* is cultivated by the family for many generations. Actually these lands were traditionally cultivated by paddy. But now these lands are transferred into *notun-jomi* (new-land) or *peyera-bagan* (garden of guava).

Labor forms

Labor is an important component of farming systems. Flower farming of the village Mahatpur is organized by family farm. Here most of the labor comes from the family. The family labor of the village Mahatpur is locally known as *ghorer-mojur*. In this village, both genders are engaged with the flower cultivation. Wives of the flower farmers are engaged with watching and collecting flowers. The labor forms of the village Sasan is to some extent different from the village Mahatpur. In the village Sasan a large number of family labors, locally known as *nijeder-jon* are required to watch and conserve the guava plants. Here, both men and women work as laborers in guava farming. Farmer's wives and children are engaged with watching and collection of the guava. Different works are done by the labors like cleaning the plant and *daltana* process.[2] A daily basis work charge of a labor varies from eighty to ninety rupees in the Mahapur village. But this charge is increased i.e. one hundred fifty to two hundred in case of Sasan village.

Crops and farming schedule

The main crops in Mahatpur village are flower and paddy, with a small amount of green vegetables like cabbage, cauliflower, tomato, turnip, raddish, mustard, chilli. The studied flower farmers of the village Mahatpur classify their produced flowers into two types on the basis of weather or climate such as seasonal flowers or *somoyer-ful* and yearly flowers or *borshio-ful*. The seasonal flowers are cultivated mainly in the winter time which includes different local varieties like *chiney-ganda, lal-ganda, basanti-ganda, cherigold, astar, corn-flower, chandra-mallika, enty, baaby* and *sentaria*. On the other hand, the *borshio-ful* are cultivated by the farmers throughout all seasons of the year which also include various local varieties like *jangla-ganda, jhupsi, golden-rod, korea* and *gulbahar*. On the other hand, the present study also explores that farmers of the village Sasan also classify their produced guava into two types on the basis of climate like seasonal guava and off-seasonal guava. The guava flowers come in the plant during the month of *falgun* (February-March) to *baisakh* (April- May) in case of seasonal guava. It is known by the local farmers as *guti-asa*. These fruits are being suitable for sell in the rainy season i.e. in the month of *ashar* (June- July) and *shraban* (July- August). The fruit matures ninety to one hundred fifty days after flowering. Sasan farmers also explain that guavas are harvested throughout the year (except during May and June). However, peak harvesting periods are August for rainy season crop, November-December for winter season crop and March-April for spring season crop.

It is also observed that farmers of the village Sasan also classify their produced guava into different types on the basis of quality, color, size, shape, taste, and the name of cultivated region, seed-variety, seed-propagation, rate of production, plant-quality, weight of the crops and farmers' preference. It is known from the farmers of the Sasan

Table 1: Agricultural calendar in Mahatpur village

Village name	Crop	Local varieties	Duration of cultivation	
			Planting	Harvesting
Mahatpur	Flower	chandra-mallika	Baisakh (April-May)	Agrahion (November-December)
		gladiolus, chiney-ganda, lal-ganda, basanti-ganda, cornflower	Aswin (September-October)	Magh (January- February)
		cherigold, astar, corn-flower	Aswin (September-October)	Magh (January- February)
		enty	Agrahion (November-December)	Magh (January- February)
		baaby	Shraban (July-August)	Agrahion (November- December)
		sentaria	Agrahion (November- December)	Magh (January-February)
		rajani-gandha	Ashar (June-July)	Aswin (October- November).
		jangla-ganda, korea, gulbahar	All over the years	All over the years
		golden-rod	Agrahion (November- December)	Baisakh (April- May)
		jhupsi	Agrahion (November- December)	Magh (January- February)
	Paddy	aamon or paddy of rainy season (Lal-sarna, Deputisal)	Jaistha (May-June)	Agrahion (November-December)
	Green vegetables	cabbage, cauliflower, tomato, turnip, raddish, mustard, chilli	Agrahion (November-December)	Magh (January- February)

Table 2: Agricultural calendar in Sasan village

Village name	Crop	Local varieties	Duration of cultivation	
			Planting	Harvesting
Sasan	Guava	khaja	Chaitra (March-April) to Baisakh (April- May)	Ashar (June-July) to Shravan (July-August)
		allahabad	Chaitra (March-April) to Baisakh (April- May)	Ashar (June-July) to Shravan (July-August)
	Paddy	aaus or paddy of autumn	Baisakh (April–May)	Aswin (September-October)
		aamon or paddy of rainy season	Jaistha (May-June)	Agrahion (November-December)
		boro or paddy of spring time (I.R-36)	Magh (January-February)	Baisakh (April-may)

village that they cultivate mainly three types of guava such as *allahabad*, *L-forty* and *khaja*. Allahabad is the most famous variety and it has acquired large variations due to seed propagation. These are large in size, round in shape, skin smooth and yellowish white. The seeds are numerous, bold and hard. The weight of the *allahabad* guava varies from one hundred gram to two hundred gram. L-forty guava means Lucknow-40 which is also known as *sardar*. These variety is large, roundish ovate in shape, skin primrose yellow and pulp white, very sweet and tasty. The trees are vigorous. The weight of the *L-forty* guava varies from two hundred gram to two hundred fifty gram. The khaja guava is also known as *bengal-safeda*. *Khaja* is the most preferred cultivar because of high yield, superior in quality, attractive shape and size of fruit. The weight of the khaja guava varies from four hundred gram to five hundred gram. The

production of *allahabad* guava is higher than the khaja and L-forty guavas. The guava growers of the Sasan village also prefer to cultivate various other types of guava like *allahabad, safeda, khaja, kafri,* and *teli*. The knowledge of cropping and farming calendars are minutely constructed in the present study (see Table 1 and Table 2). The cropping and farming calendars of Mahatpur and Sasan villages also differ. According to the farming calendar two types of cropping sequences like two-crop- systems and three-crop-systems in rotation are noticed. In the village Mahatpur of the Panskura region three-crop systems are observed. Here farmers are engaged with the flower cultivation beside their traditional paddy mixed with green vegetables. Conversely, two-crop-systems are observed in the village Sasan of the Baruipur region. Here farmers mainly depend on their guava farming for profit. They cultivate paddy or rice to fulfill their own domestic consumption.

Farmers' knowledge, classifications and management

The current investigation reveals that farmers of the studied villages acquire agricultural knowledge and technologies from a variety of sources. The studied farmers learn knowledge regarding farming from previous generation or the elder members of their family. But their ideas differ from one age group to another. For example, middle aged (30 to 50 years) flower farmers in the village Mahatpur Panskura region are more knowledgeable than the other two age groups. They have more expertise on farming than the younger (20 to 30 years) and older farmers (50 to 60 years). Conversely, the older farmers have experience but they are not inclined to accept new knowledge. Similar situation prevails observed among the farmers who cultivate paddy and guava in the village Sasan. It is seen that the studied farmers in both of the cases classify themselves on the basis of experience of farming and knowledge of farming. For example, among the flower farmers, *baro-chasi* or experienced farmers have learnt first the methods of flower farming and started collecting seedlings of different types of flower from their previous generation known as senior-farmers or *purono-chasi* and the farmers who collected seedlings of flowers freshly and acquired knowledge recently are known junior-farmers or *notun-chasi*.

Many activities are noticed in the present study to understand farmers' management capacity. These farming activities may be similar or dissimilar depending upon crop and region. In the same way, soil preparation, fertilizers use, and pest and disease management of flower farmers is different from the guava famers. Mahatpur farmers are very much conscious about the soils on their farms and their flower farming. They state that flower farming depends on nature of soil. Soil of the high land is specially prepared for flower farming. The farmers of the village Mahatpur locally term the flower field as *bari*. They state that sandy-loam soil or *bele-doansh-mati* is well for flower farming and sandy-loam soil is well for root of the plants. According to them sticky-soil or *entel-mati* is not good for flower farming because the drive spade or *kodal* on the sticky soil is very difficult. Mahatpur farmers also comment that flower cultivation fully depends on weather. Cloudy weather, low pressures are not good signal for flower cultivation. These weather harms production of flower. Actually, cold weather is good for flower farming. Cold environment keeps the flowers fresh and it increases the brightness of flowers. In addition to, more rain and dry weather are not well for flower productions. The additional rain destroys plants and creates loss. Drought or dry climate harms plants and branches of the plants are not grown due to this. In this way, summer destroys flower and downs the flower market.

On the other hand, the guava famers of the village Sasan state that heavy clay to very light sandy soils is important for guava farming. Good drainage is important in

guava farming. The guava cultivation also depends on the weather. Dry climate is favorable for guava production. It can survive only a few degrees of frost. Young trees have been damaged or killed in cold spells. Older trees, killed to the ground, have sent up new shoots which fruited 2 years later. In other words, the medium summer and sunrise is important for guava cultivation. Light rain is better for good production of guava. But, too much rain and cloud are harmful for guava cultivation. Farmers also announce that the rains during harvesting period deteriorate the quality of fruits. Guava trees are usually planted to best advantage during late spring or early summer just ahead of the rainy season. Farmers select the Bengali month Chaitra (March- April) and Baisakh (April-May) of the Bengali year in favor of sowing the new guava plant. The local farmers of the village Sasan say that planting of about thirty guava plants are appropriate within the 10 kata plot.

Investment, profit and production

Cases make known that availability of capital is important for flower farming. Mahatpur farmers declare that flower farming needs high investments. For example, the expenditure of farming of *chandramallika* flower is also high. About 2000 to 3000 rupees are needed for cultivation of one kata land of *chandramallika* flower. Sometimes it needs more money than estimate. One lakh rupees are necessary for farming of one bigha land. The study has also observed different forms of investment systems among the studied farmers. It is seen that the studied flower farmers of the village Mahatpur use their own profit to pay the wages of labor and to buy seed, fertilizers and pesticides. So, they re-invest in the farm by using their own profit. This process is known as feedback within the farming systems. Again it is revealed from the study that sometimes rain and disordered weather destroys all cultivated flower plants. In this situation a small number of farmers get loan from the bank but not all. On the other hand, it is also seen that the guava farmers of the village Sasan depend on the loans of the informal sources. Because in guava cultivation capital investments are also required to purchase modern pesticides, fertilizers and high yielding seed varieties. They clarify that they do not get any assist from the government in support of guava cultivation like loan etc.

The Mahatpur farmers also state that profit depends on markets and weather. To get profit the farmers of the village Mahatpur do not want to cultivate new varieties of flowers. They prefer their 40 to 30 years old varieties of flower which have more require or demand in the flower market. So, they cultivate those flowers which have more demand or more order in the flower market. They said that they have no any wish to make flower garden for showing. According to them, the *chandramallika* and *enty* flowers are more profitable and demandable flower in the market throughout the year. On the other hand, farmers of the village Sasan explain that guavas are harvested throughout the year (except during May and June). However, peak harvesting periods are August for rainy season crop, November-December for winter season crop and March-April for spring season crop. The plants begin bearing at an early age of 2-3 years but they attain full bearing capacity at the age of 8-10 years. The yield of a plant depends on its age, cropping pattern and the cultural practices. A ten year old guava plant yields about one hundred kilogram of fruits every year.

Market networks and prices

The present study has carefully explored the details of several crop markets, their networks and intermediaries. The Mahatpur farmers state that flower market totally depends on the production of flower. The flower farmers of the village Mahatpur

supply their produced flower in different local markets like Deulia flower market (near Kolaghat) and Kolaghat flower market. They supply their maximum flower to the Mallikghat flower market of Kolkata. Conversely, the Sasan farmers put in plain words that ripening of guava starts on the tree and continue even after harvest. It is accelerated in rainy season due to high temperature and slows down in winter season due to low temperature. Because of their perishable nature, guava as disposed-off immediately after harvesting in the local market and a very small quantity is sent to distant markets. The studied guava farmers of the Sasan village sell their produced guava in the local market known as Kachari bazaar near the Baruipur station.

The study reveals that prices of the crops depend on the market and production of the crops. For example, the price of marigold flower is higher in the Deulia market, situated near the Panskura railway station. Mahatpur farmers state their many experiences regarding price of flowers. They said that they go daily to the Mallikghat flower market of Kolkata to sell their produced flower by train from Pankura railway station. According to them there are two to three flower markets like Deulia flower market and Kolaghat flower market in the district Purba-Medinipur. But they do not go there. Because they do not get good price of flower form these markets. Again, these markets are closed within 10 to 11 a.m. For this reason they prefer Howrah-Mallikghat flower market of Kolkata. In this market they get good price of flower and also it is open for whole day. Comparatively, the guava farmers of the village Sasan elucidate that the current rate of one kilogram guava varies from 30 to 35 rupees. According to local guava farmers, the value of guava totally depends on the production of guava. Twenty guavas are collectively known as *ek-kuri*. The price of *ek-kuri* guava is based on the quality and size of guava. The maximum price of 20 guavas may be 100 rupees and minimum price may be 30 rupees in the market.

Conclusion

The present study concludes by emphasizing the significance of socio-cultural aspects in local farming systems between the districts of Purba-Medinipur and South-24-Paragans. The presented data and examples demonstrate the diversification of farming systems of two villages. It also reflects socio-cultural adaptations and historical interactions. So, differences in farming systems of two villages in different regions of West Bengal have historically developed in ways that reflect the activities and choices of local cultivators, influenced by local climatic conditions. For example, since 30 years flower has emerged as a high value crop in Panskura region. It is number one in flower production in the state and is important for paddy-flower cropping systems.

This study also examines different characteristics of farming systems by comparing two villages (Mahatpur of the Panskura region and Sasan of the Baruipur region) with different local environmental conditions, land and soil fertility. So, cropping systems are influenced by local geographical conditions and also soil conditions. For this reason, paddy-guava is major cropping patterns in the Baruipur region and paddy-flower is more profitable and sustainable among the farmers of the Panskura region. Thus, in this study farming choices has been explored as a consequence of social conditions in both the districts, as well as local adaptations to the natural environment. The studied farmers of both the villages form the diversity of crops through choice associated with resources and communication. Their values and needs have been reflected by selection of profitable crops. They have maintained and adapted their selective crops with specific agro-ecological environments. It is explored from the study that farmers of both the villages consider different factors when making decisions about adopting crops in their farming systems such as (*a*) crops with a dual

purpose, i.e. mainly for consumption and profit (*b*) crops requiring low labor and (*c*) crops promoted by the market. As a result, farmers prefer to cultivate staple food crops, followed by accompanying food crops and lastly pure profitable crops. On an average, the studied farmers want to produce three different crops per year such as staple i.e. paddy, accompanying i.e. various green vegetables (i.e. cabbage, cauliflower, tomato, turnip, radish, mustard, chili) and pure profitable crops i.e. flower and guava.

Moreover, the present investigation also focuses that majority of farmers of both the studied villages are unable to provide more than very basic needs for their families, because the prices of basic commodities are on the steep rise. A few village farmers have telephones, computers, modern equipment and new agricultural implements like tractors. Most of the farmers hire tractor from the rich farmers. There is another disturbing issue. That is wages are so poor. So, presently the farmers send their children in brick kilns, rice mills and embroidery factories as a labor. Therefore, the present research of similarities and differences of farming systems in different regions of West Bengal are not grounded solely on agricultural intentions but also on cultural and social orientations. So, this study concludes that farmers need supports for improvements of farming systems. On the other hand, the developmental efforts in farming systems are required with effective participation of varied sections of farmers, specialists, collaborators, bureaucrats and policymakers.

Notes

1. In the state of West Bengal 1 bigha is equal to 0.133 hectare and 1 katha is equal to 0,007 hectare.
2. The branches of guava plants are tied with the help of rope by a pillar for better production. This pillar is placed under the guava plant. Farmers say that, they use this process to get fruition in concert. This kind of tying is very important among the guava farmers for increasing the production of guava. This process is locally known by the farmers as *daltana*.

Acknowledgement

Authors are grateful to University Grant Commission, New Delhi, India for providing financial assistance.

Bibliography

Balguru T, Manikandan P. (2001) Implementation of farming systems research in India-case study. Rajendranagar, Hyderabad: National Academy of agricultural research Management.

Behera UK, Mahapatra IC. (1999) Income and employment generation of small and marginal farmers through integrated farming systems. Indian J Agron 44(3):431-439.

Byerlee D, Harrington L, Winkelman D. (1982) Farming systems research: issues in research strategy and design. Am J Agr Econ 64:879-904.

Chakraborty LN, Sen SN, Mandal SK, Gupta SK, Mukherjee D. (1976) Possibility of utilizing rice fallows in West Bengal. Field Crop. Abstracts 29, 2382-2385.

Chambers R. (1983) Rural development: putting the first last. London: Longman.

Chambers R. (1991) Complexity, diversity and competence. Toward sustainable livelihood from farming systems in the 21st century. Journal of the Asian Farming Systems Association 1: 79-89.

Chambers R. (1992) Rural appraisal: rapid, relaxed and participatory. IDS discussion paper 311. Brighton: IDS.

Collinson MP. (2000) Introduction: a history of farming systems research. In: Collinson MP, editor.

History of Farming Systems Research. Wallingford: CAB International and FAO.
Cleveland DA. (1994) Can science and advocacy coexist. The ethics of sustainable develop-ment. Anthropology Newsletter 35(3): 9-10.
Dewalt BR. (1994) Using indigenous knowledge to improve agriculture and natural resource management. Human Organization 53,123-138.
Den Biggelaar C. (1991) Farming systems development: synthesizing indigenous and scientific knowledge systems. Agriculture and Human Values, 8 (1/2):25-36.
Dixon J, Gulliver A, Gibbon D. (2001) Farming systems and poverty: improving farmers' livelihoods in a changing world. Rome and Washington, DC: FAO and World Bank.
Hildebrand PE, Russell JT. (1996) Adaptability analysis: a method for the design, analysis and interpretation of on farm research. Ames, Iowa: Iowa State University Press.
Jha D. (2003) An overview of farming systems research in India. Annals of Agricultural Research 24(4):695-706.
Lawas MCM. (1997) The resource user's knowledge, the neglected input in land resource management: The case of the Kankanaey farmers in Benguet, Philippines. PhD Disserta-tion, Utrecht University, Utrecht, The Netherlands. ITC Publication No.52, p 311.
Mahapatra IC. (1992) Farming systems research challenges and opportunities. Eastern Indian farming system research and extension, Newsletter 6(4):3-10.
Mahapatra IC. (1994) Farming system research a key to sustainable agriculture. Fertilizer News, 39(11):13-25.
Murphy J. (1990) Farmers systems and technological change in agriculture. In: Chaiken MS, Fleuret AK, editors. Social change and applied anthropology: essays in honor of David W Brokensha. Boulder, Colorado: Westview Press.
Netting RMcC. (1974) Agrarian ecology. Annual Review of Anthropology 3:21-56.
Netting RMcC. (1993) Smallholders, householders: farm families and the ecology of intensive, sustainable agriculture. Stanford, CA: Stanford University Press.
Norman D, Simmons E, Hays H. (1982) Farming systems in the Nigerian Savanna: research and strategies for development. Boulder, Colorado: Westview Press.
Rhoades RE. (1984) Breaking new ground: agricultural anthropology. Lima: International Potato Center.
Scoones I, Thompson J. (1994) Knowledge, power and agriculture-towards a theoretical understanding. In: Scoones I, Thompson J, editors. Beyond farmer first: rural people's knowledge, agricultural research and extension practice. Intermediate Technology Publications, London, p 16-32.
Shaner WW, Philipp PF, Schmehl WR. (1982) Farming systems research and development: guide for developing countries. Colorado, USA: West View Press.
Singh AK, Sharma SK, Batra PK, Sharma NK. (2003) Instruction manual for on farm research (cropping systems). Modipuram, Meerut: Project Directorate for Cropping Systems Research.