A SURVEY ON PRESENT PRODUCTION PRACTICES OF POINTED GOURD IN JESSORE SADAR

A THESIS

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MOHAMMAD SOLAMAN HOSSAIN BHUIYAN
EXAMINATION ROLL NO. 04 AG. Hort. JJ 12 M
REGISTRATION NO. 24165 (1997-98)
SEMESTER: JANUARY-JUNE, 2006

MASTER OF SCIENCE (M S)

IN

HORTICULTURE

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BANGLADESH AGRICULTURAL UNIVERSITY
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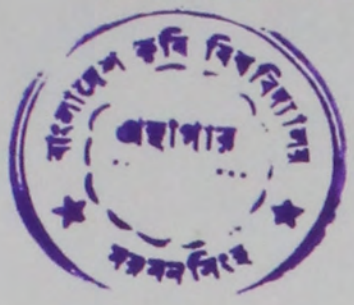

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Approved as to style and contents by

(Dr. Md. Azizur Rahman)	**(Professor Dr. Md. Abdus Siddique)**
Supervisor	Co-Supervisor

(Professor Dr. Md. Ferdous Mondal)
Chairman
Examination Committee
and

Head, Department of Horticulture
Bangladesh Agricultural University
Mymensingh

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The Author

ABSTRACT

A survey was conducted to investigate the present production practices of pointed gourd in Jessore Sadar Upazila of Jessore District. Data were collected from 100 randomly selected pointed gourd growers out of 620 from 8 villages of the Churamankati Union under Jessore Sadar Upazila during 15th August to 25th November 2005. Farming practices including land preparation, propagation, fertilization, weeding, mulching, pollination, staking and other managements were found to be different from village to village. Only few large farmers used power tiller for tillage while other farmers used country plough. As pointed gourd is a dioecious crop, so pollination is the most important factor for successful production. About 97% farmers used hand pollination which produced 25% higher yield than other methods. Most farmers (78%) used tip cutting as planting material which yielded higher (16.96 t/ha) than other planting materials. The educated farmers were more concerned about pointed gourd cultivation. Bamboo trellis used by 98% farmers. Large farmers applied fertilizers and irrigation more judiciously than the small farmers. The variation in yield of pointed gourd ranged from 16.01 t/ha in Lebutala to 16.88 t/ha in Churamankati village. The average yield of pointed gourd in Jessore sadar was 16.25 t/ha and income was Tk 133300.00 per hectare with a benefit-cost ratio (BCR) of 3.04. The findings indicated that the present practices for the production of pointed gourd in the Jessore area are not in accordance with the available modern technologies and the growers used traditional methods for the production of the crop.

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CHAPTER 1

INTRODUCTION

Pointed gourd (*Trichosanthes dioica.* Roxb) is one of the most important and widely used summer cucurbitaceous vegetables in Bangladesh. Most of the authors agree that India or Indo- Malayan region is the original home of pointed gourd (Bose and Som, 1986). Pointed gourd is cultivated in Bangladesh, Assam, West Bangal, Bihar, Orissa and Uttar Pradesh of India. In Bangladesh it is widely cultivated in the districts of Jessore, Rajshahi, Bogra, Pabna and Kustia, Rangpur and Dinajpur (Rashid, 1993).

Pointed gourd becomes available from April to October when most of the common vegetables are unavailable in the market. It is a nutritious vegetable and contains 5.4 g protein, 0.5 g mineral, 153 µg carotene and 29 mg vitamin-C per 100 g fresh weight (Gopalan *et al.* 1982). It has also some medicinal value like use as digestive, diuretic, laxative and it invigorates the heart and brain and is useful in the disorder of the blood circulatory system (Rice *et al.* 1992 Yawalkar, 1985).

Pointed gourd is a dioecious vegetable. In Bangladesh, there were 7342 hectares of land under pointed gourd cultivation in the recent past and the production was 39780 m ton (BBS, 2002). Cultivation of this vegetable is not extensive due to lack of proper knowledge about critical behaviors of flowering, pollination and fertilization.

Farmers of different region adapt different practices for pointed gourd cultivation. Use of black polyethylene mulch has been reported to keep the plots totally weed-free throughout the crop season resulting highest fruit yield and gross

income per hectare, (Dwivedi *et al.* 1999). Organic cover at 16 t/ha increased crop yield by 163-323% compared to the no mulch treatments. Mulch application also increased individual gourd weight significantly (Ghorai and Bera, 1998). Yadev *et al.* (1989) used trellis and obtained higher yield at the closer spacing with the bower system. Prasad and Singh, (1987) recorded best plant growth and the highest yield of 146.15 q/ha) on 1.0 m bamboo support compared to the control (trails over the ground) yield of 57.46 q/ha. Artificial (hand) pollination has also been reported to result in successful fruit set (about 100%) (Sachan *et al.*, 1990).

There are also reports on the uses of different plant growth regulators like cycocel, alar and kinetin for vegetative growth (Singh *et al.*, 2004) and gibberrellin (GA_3), IAA, ethrel etc for induction of flowering and sex expression in seed propagated plants of pointed gourd in Mohanpur (Sarkar *et al.* 1989) and some growth regulators like kinetin, chlormaquat, GA_3, NAA, sodium benzoate and KMS for increasing storage capacity (Chakraborty *et al.*, 1991). Application of silver nitrate at 800 or 1000 mg/L resulted in for induction of hermaphrodite flowers (Hoque *et al.*, 2002).

The information regarding production practices of the farmers in our country and profitability of pointed gourd cultivation is limited. Hence a survey work was undertaken with the following objectives:

(i) to know the recent production practices of pointed gourd cultivation in Jessore Sadar Upazila of Bangladesh.

(ii) to know the profitability of pointed gourd cultivation at farmer's level.

CHAPTER 2

REVIEW OF LITERATURE

CHAPTER 2

REVIEW OF LITERATURE

Review of the literature relevant with the objective of this study are presented in this chapter. This study is mainly concerned with the present practices in pointed gourd production followed in Jessore Sadar Upazila. It was attempted to search the literature of study related to the present production practices of pointed gourd cultivation. However, literature relating to concept of use of practices in pointed gourd production and past studies relationship of the selected characteristics of the pointed gourd growers with their use of practices of pointed gourd cultivation are conveniently presented based on the major objectives of the study.

Singh *et al.* (2004) conducted an experiment to determine the effect of plant growth regulators on vegetative growth in Faizabad, Uttar Prodesh, India during 1999-2000. They stated that the treatment comprised: 500; 1000 and 2000 ppm cycocel [chlormequat]; 500, 1000 and 2000 ppm Alar [daminozide]; 10, 20 and 30 ppm kinetin; and 0.5, 1.0 and 2.0 ppm Anand vishal. The highest mean vine length (5.40 m) and inter node length (9.15 m) was obtained with 30 ppm kinetin. The highest mean net assimilation rate at 240-270 days after planting (0.047 mg dm^{-2} day^{-1}) and at 300-330 days after planting (0.024 mg dm^{-2} day^{-1}) were obtained with 1000 ppm cycocel and 1000 ppm Alar, respectively.

Khan and Verma (2004) reported that biological control agent (BCA); (*Paecilomyces lilacinus*) was mined with soil with *T. dioica* at 0.25, 0.50, 1.00, 1.25, 1.50, 1.75 and 2.0 g per pot. *M. incognita* with the increase in the rate of BCA from 0.25 g to 2.0 Incognita was

inoculated to soil at 2000 by 2 days after the application of the biological control agent. The growth the of *T. dioica* increased g per pot. The highest increases in shoot (118.4%) and root lengths (75.8%) and shoot and root weight (86.5 and 95.59% respectively) were obtained with the highest BCA rates. Nematode multiplication was also reduced in all the treatments and the highest reduction in gall development (88.4%), number of eggs/mass (65.4%), and final population (80.3%) were obtained with BCA at 2.0 g per pot.

Singandhupe *et al.* (2003) conducted an experiment to know the effect of drip irrigation, fertilizer levels and mulching on yield parameters of pointed gourd at Bhubancheshwar, Orissa, India during 2000-2001. They observed that drip irrigation (100, 80 and 68% pan evaporation (PE) at 2 days intervals), fertilizer (100, 75 and 50%) of the recommended rate (80:74:32 kg N:P:K/ha) and rice straw mulching (7.5 or 15 t/ha). Irrigation at 100% PE resulted in 18.1% higher fruit yield than 60% PE; irrigation at 80% PE, increased the fruit yield marginally (2.6%) over 60% PE. 7-10 days interval was better than other intervals. Irrigation water use efficiency was unaffected by the differential amount of water applied and was 53.6, 49.3 and 51.9 kg fruits/cm at 100, 80 and 60% PE treatments, respectively. They highest fertilizer rate recorded the highest fruit yield, but the lowest fertilizer use efficiency (9.3 kg fruit/kg fertilizer). Fertilizer use efficiency was highest (13.83 kg fruit/kg fertilizer) at the lowest fertilizer rates. Mulching at 15 t/ha resulted in 7.7% more fruit yield than mulching at 7.5 t/ha. Fruit diameter was highest at 60% PE and lowest at 100% PE. The length trend was reverse. The other yield contributing parameters were not affected significantly by the different irrigation water, fertilizer and mulching treatments. Generally, very wide fluctuation of soil moisture

content occurred in 0 to 20 cm soil depth in 100% PE, 100% fertilizer dose and 7.5 t/ha treatment wide moisture was extended in 20-40 cm depth were irrigation was applied at 60% PE. Fourth, fifth and sixth leaves from the top of the plant had maximum leaf area. The ratio of dry matter: leaf area of bottom leaves had higher values the upper leaves. The net photosynthesis rate and stomata conductance showed a decreasing rate lowers the bottom leaf. However, the internal CO_2 concentration showed a reverse trend.

Anwar *et al.* (2003) investigated production practices, input use cost and return in potato (*Solanum tuberosum*), pointed gourd in intercropping and potato teasle gourd sequential cropping in Rangpur District, Bangladesh. Data were obtained from 40 farmers engaged in potato, pointed gourd intercropping and another 40 farmers engaged in potato, teasle gourd sequential cropping. The study revealed that both cropping systems were profitable and economically viable. In terms of profitability. Potato teasle gourd sequential cropping was found to be more attractive.

Hoque *et al.* (2002) conducted an experiment to modify sex of pointed gourd in Gazipur, Bangladesh during 1996-97. They stated that the effect of silver nitrate at 50, 100, 200, 300, 600, 800 and 1000 mg/litre on the induction of hermaphrodite flowers and fruit setting in *Trichosanthes dioica*. Silver nitrate was sprayed on shoots during the flowering period. The toxicity of silver nitrated to leaf and shoot tips increased with the increase in its concentration. Among the treatments, only 800 and 1000 mg silver nitrate/litre produced hermaphrodite flowers (2 and 8 flowers, respectively), which required 10-13 days after application to develop compared with normal flowers, hermaphrodite flowers were characterized by the presence of shorter but larger calyx tube, longer and heavier ovary;

ifucated stigma with that fused and developed into a single compact tructure; and three rudentary anthers that did not produce pollen. Both emale and induced hermaphrodite flowers produced parthenocarpic fruits, he highest number of which (12) was obtained with 100 mg. Silver nitrate/litre 200mg/litre gave the longest (8.06 ± 0.62 cm) and heaviest (18.41 ± 1.23g) Parthenocarpic fruit while 100 g/litre produced longest ones (21.40 ± 0.04 cm in diameter). Parthenocarpic fruits attained the edible size within 10-20 days.

Chakraborty *et al.* (2002) reported that pointed gourd cv. Kazli fruits were dipped in 0.5, 1.0, 1.5, 2.0 or 2.5% semperfresh for 10 minutes and stored at room temperature (29-37^{0}C) and 64-75% relative humudity to determine the effects of semperfresh on the post harvest shelf life of pointed gourd. Fruits treated with semperfresh recorded lower physiological weight loss compared to the control 2 days after storage. Dipping of fruits at 1% semperfresh resulted in the lowest physiological weight loss 2 (24.16%) and 4 (42.55%) days after storage. Similarly, semperfresh at 1% gave the lowest parentage of fruits shrinkage 2 days after storage (17.50). Dipping of fruits at 0.5% semperfresh resulted in the lowest shrinkage percentage 4 days after storage (23.50). Yellowing was not observed in fruits 2 days after storage regardless of treatment. After 4 days, 4.5 and 4% yellowing were observed in fruits 0.5 and 1.0% semperfresh, respectively, although the yellowing percentage was not significant relative to the other treatments.

Pandit *et al.* (2001) carried out an experiment to study the time of planting in pointed gourd at Mohanpur, Nadia, West Bengal in India during

1990/91 and 1991/92. They stated that root cuttings of pointed gourd cv. *Damodar* were planted at 15 days intervals from 15 September to 30 November. Planting on 30 October recorded the highest values for all parameters studied i.e. vines per plant (8.09) vine length (401.51cm), nodes per plant (57.18), fruits per plant (50.6), fruit length (8.56 cm), fruit diameter (4.07 cm), fruit weight (40.57cm) and early yield (8.86 q/ha).

Dash and Tripathy (2001) conducted an experiment to study the different plant density models on growth and flowering of pointed gourd at Orissa, India during October, 1993 to April, 1994. They found planting female plants of pointed gourd cv. Banki local at four densities; 5, 10, 15 and 20 for every male plant at three spacing: 90, 120 and 150 cm around a single male plant at the center in circular manner. The increase in distance of female plant from the male plant increased the vine length, number of branches and leaves per plant, number of female flowers and yield. However, planting 15 female plants 150 cm away from the male plants at the centre recorded the maximum yield.

Chakraborti (2000) conducted an experiment to study the effect of management practices on the root knot nematode *Meloidogyne incognita* in inted gourd. cv. Damodar, Kajli in India. He stated that the integrated approaches i.e. cultural control (deep ploughing followed by soil solarization for 15 days and stubble burning) with or without maximum synthetic chemical (2.0 or 3.0 kg a.i. Carbofuran/ha) and with the inclusion of neem (*Azadirachta indica*) components like leaf, cake and azadirachtin, were highly effective in checking the nematode population build up and

infection. The ecology friendly integrated treatments recorded very low final nematode population and good yield.

Ghorai and Bera (1999) carried out an experiment to know about straw mulch and different levels of irrigation effect on yield and yield components of pointed gourd at Bhubaneshwar, India in 1999. They reported that irrigation at IW/CPE = 1.8 in combination with straw mulch @ 15 t/ha produced 5871 kg tender fruits/ha. This combination saved 42.5 cm irrigation water over irrigation the crop at IW/CPE = 2.4. Rice straw mulch increased fruit yield and number of fruits/ha by 88 and 81%, respectively, over un-mulched cultivation irrigation with 111 cm water was optimum for crop growth and yield.

Dwivedi *et al.* (1999) conducted an experiment on weed control in pointed gourd at Department of Vegetable Science, N.D. University of Agriculture and Technology. Kumarganj, Faizabad, Uttar Pradesh in India during 1996-97. They stated that twelve treatments comprised of four herbicidal combinations (Paraquate combined with Metolachlor and Pendimethalin), two integrated methods (i.e. Paraquate or Glyphosate + hand weeding), three types of mulches (rice straw, sugar cane trash and black polyethylene), staking and weed free and unweeded control. Weed control treatments showed significant effects on *Cynodon dactylon, Cyprus rotundus, Eclipta alba, Phyllanthus niruri* and others in relation to total weed population and dry matter production. Black polyethylene mulch kept the plots totally weed free throughout the crop season and produced the highest fruit yield and gross income per hectare. The highest profit per

hectare (Rs, 39677) was obtained with paddy straw mulch, followed by sugarcane trash mulch (Rs, 20773) and paraquate at (0.5 kg/ha) + two hand weeding (Rs, 19248).

Dash *et al.* (1999a) carried out an experiment to know the effect of different plant density models on fruit setting and yield of pointed gourd at Bhubaneshwar, India during 1999. They reported that female *Trichosanthes dioica.* (cv. Bhubaneshwar local) plants were planted at 5, 10, 15 and 20 plants per plot (P_1, P_2, P_3 and P_4, respectively) in a circular manner at 90, 120 and 150 cm distance (D_1, D_2 and D_3, respectively) from a single male plant at the center of the circle. Fruit setting and fruit retention percentages were higher in plants at lower densities and greater distances. Over crowding due to increasing density resulted in poor quality fruits, but higher yields were obtained in higher planting densities. The highest and lowest yield (54.78 and 19.38 q/ha) resulted from $D_3 + P_3$ and $D_2 + P_1$ treatment, respectively.

Dash *et al.* (1999b) conducted a field experiment to study the relationship between different plant density models on growth and flowering of pointed gourd at Bhubaneshwar, India during 1999. They stated that three spacing (90, 120 and 150 cm) and 4 female ratios densities 5, 10, 15 and 20) of a local variety of pointed gourd (Bhubaneshwar local) was taken for the study. A spacing of 150 cm proved to be the most effective. As regards female plant density, 15 plants around one male were found to be best. Increasing the female plant population beyond 15 around one male resulted in significant reduction in the yield per hectare in this

crop.

Hoque *et al.* (1998) conducted an experiment to study the in-vitro culture of pointed gourd during the period from April to August, 1996. The stated cotyledons rescued from physiologically mature seeds (PMS) and immature seed (IMS) or pointed gourd were used as explants. Plant regeneration from the cotyledons ranged from 62% to 92% in different combination of media. It was highest in MS + 1mg/litre Bangladesh and lowest in hormone-free M.S. medium. The establishment rate of regenerated plantlets ranged from 61 to 94% in vermiculite and 70 to 90% in soil medium. Plantlets obtained from MS + 1mg/litre NAA performed in both media.

Ghorai and Bera (1998) conducted and experiment to know the effect of organic mulching for weed control in pointed gourd at India during 1993-94. They stated that straw mulch was applied to *Trichosanthes dioica* at 0, 8, 12, 16 and 20 t/ha in field experiments. The major weed species observed included *Cyprus rotundus*, *Echinochloa colonum*, *Digitaria* spp. *Cynodon dactylon*, *Ageratum* spp, *Chenopodium album* and *Melilotus alba*. The weed biomass in no mulch plots ranged from 256-3028 kg/ha, which was reduced by 17-69% by mulching at 8 and 16 t/ha. Mulching maintained a prolonged low weed status for 8-9 months. Sedges were the dominant weeds in no-mulch plots, but broad leaved weeds dominated with mulching. Mulch at 16 t/ha increased crop yields by 163-323%, compared to the no-mulch treatment, producing yields of 5363 and 2472 kg/ha in 1993 and 1994, respectively. Mulch application also

increased individual gourd weight significantly.

Pandit *et al.* (1997) carried out an experiment to know the effect of plant densities on growth and yield of pointed gourd at Mohanpur, Nadia, west Bangal, India, during 1989-91. They stated that root cuttings of pointed gourd cv. Damodar were planted in the first week of November each year 0.30, 0.45, 0.60, 0.75 or 0.90m a part in rows. Total number of fruits per plants and fruit length increased as plant spacing increased. Total and early fruit yields were highest (101.71 and 169.82 q/ha, respectively) when plants were spaced 0.60 m a part in rows.

Maity *et al.* (1995) conducted an experiment to determine the maturity standards of pointed gourd in Mohanpur, Nadia, West Bengal, India during 1995. They stated that pointed gourd fruits were harvested 5, 7, 9, 11, 13, 15 or 17 days after flowering. Yields increased as harvesting was delayed, fruits also grew larger and heavier thought to the final harvest. Seeds were consumable from 7 to 15 days after flowering.

Tripathy *et al.* (1994) reported that female plants were more vigorous than male plants but there was no difference in tuber fresh weight between sexes in Bhubaneshwar during 1990. Among various NPK application rates, 60:60:60 kg/ha have the highest tuber FW (58.58 g) and best tuber size.

Sontakke and Satpathy (1993) reported that five synthetic pyrenthroids along with 2 organophosphates evaluated against *Apomecyna saltator* on *T. dioica* during 1987- 88 at fruiting stages of the main and

ratoon crops in Orissa, India. Deltamethrin was most effective giving the largest fruit yield. Cypermethrin, Fenvalerate and Quinalphos were equally effective but Malathion failed to control the pest and resulted in the smallest yield among the treatments.

Agronomic and morphological characters were studied in pointed gourd by Krishnoprasad and Singh (1991). They found a positive correlation between yield and late flowering.

Sachan *et al.* (1990) also reported that four insect species were found to pollinate pointed gourd. According to them, low population of the insect during summer and rainy seasons results in low yield, and artificial pollination resulted in a two-fold increase in fruit set. Hand pollination resulted in successful fruit set (about 100%) should be done within 12 hours after anthesis.

Yadav *et al.* (1989) conducted an experiment to know the influence of spacing and methods of training on growth and yield of pointed gourd at Faizabad, India during 1989. They reported that plants of the cultivars FP1, FP-3 and FP-4, spaced at 1.5 × 1.5 m or 3.0 × 1.5 m were trained on the flat or on the bower system, Data were tabulated on the number of shoots/plants, vine length, number of fruits/plants and fruit yield. The highest yields (136.3 q/ha) were obtained at the closer spacing with the bower system. FP-4 gave the highest yields followed by FP-1 and FP-3.

Singh *et al.* (1989) studied the floral biology of pointed gourd in Faizabad, India. They stated male flowers took 16-19 days while female flowers took 10-14 days from initiation to anthesis (when the anthers and stigmas first become visible). Anthesis began at 19.00 to 19.30 in female and at 19.30 to 20.00 in male flowers. Pollen grains were 39-78 µm in diameter and 97.77 and 81.30% of them were visible, according to acetocarmin staining and artificial germination tests, respectively. Stigmas remained visible for 14 and 24 hour in open and bagged flowers, respectively, under natural conditions fruit set occurred in 40-70% of flowers.

Shanmugavelue (1989) reported in pointed gourd that it took 136-158 days for first flowering after planting. He also reported that fruits were 10-16 cm long with very faint strips and pale green in colour.

Sarkar *et al.* (1989) carried out an experiment to know the growth regulators effect on induction of flowering and sex expression in seed propagated plants of pointed gourd in Mohanpur, west Bengal, India during 1989. They stated that the effect of the Gibberellins GA_3 (50, 100 and 200 ppm) IAA (25, 50 and 200 ppm) ethrel (ethephon) on the induction of flowering in seed propagated plants was studied. The longest vines and inter nodes were obtained using 200 ppm GA_3, whereas 100 ppm IAA produced the highest number of branches/plant. In the first year, treatment singly with 50 ppm GA_3 and 25 ppm IAA produced flowering in 40% and 31.7% of plants, respectively, while in the second year 58.3% and 55% of plants flowered, respectively. Number of occurred in the control in the first year while 13.6% flowered in the second year. Sex ratio (female:

male) increased from 1:1 to 1:0:33 after treatment with both 50 and 100 ppm ethrel.

Rahman (1988) noted that in pointed gourd it took 2-3 weeks for sprouting and 3 months for flowering/fruiting after planting of vine or roots.

Prasad and Singh (1987) studied the effect of training in pointed gourd for growth and yield at Ranchi, India during 1987. They observed that the plants were left to trail over the ground (control) or were trained over dried bamboo bushes, or over 1.5 m high bamboo supports. The best plant growth and the highest yield (146.15 q/ha) were obtained on 1.0 m supports. The control yield was 57.46 q/ha.

Das *et al.* (1987) carried out an experiment to know nitrogen and phosphorus effect on growth and yield of pointed gourd in Nadia, West Bengal, India during 1987. They respond that 2 seasons trial plant of the cultivar SL-2 received N at 0, 30, 60 or 90 kg/ha, P_2O_5 at 0, 20, 40 or 60 kg/ha and K_2O at 40 kg/ha planted on 23 Oct. The crop was harvested 150 days later. Plant growth and yield increased with rising N:P rates, with the maximum average early yield (45.9 q/ha) and total yield (138.8 q/ha) being obtained at 90:60 kg/ha.

Yawalkar (1985) reported that in pointed gourd flowering stand from 70-80 days after planting and harvesting of fruits commenced within 80-90 days of planting.

Singh *et al.* (1985) evaluated 20 accessions of pointed gourd and

found that the cultivar "Dandali" Produced the highest yield (5.53 kg) per plant. The lowest yield/plant was recoded in the cultivar Lalpur (2.7 kg). The number of seeds per fruit in pointed gourd was 6.06 in "Karella" and 9.39 in "Muzaffarpuri". According to them 100 seed weight and size ranged from 7.48 to 12.5 g and 1.17-1.50 cm, respectively.

Rashid (1976) reported that the fruit of pointed gourd was elliptical or oblong in shape, 2.0-3.5 inch in length. The surface of fruit is smooth green or gray in colour and stripped.

Pathak and Singh (1950) reported that female flowers of pointed gourd opened within 8-12 days and male within 13-16 days from this bud appearance.

CHAPTER 3
MATERIALS AND METHODS

CHAPTER 3

MATERIALS AND METHODS

The details methodology of the study covering selection of the study area, location of the area, source of data instruments used, collection and handling of data is furnished below:

3.1 Selection of the study area

In order to make an assessment of the present production practices for pointed gourd cultivation, the study was conducted in some related areas of Jessore Sadar Upazila under Jessore district. Jessore Sadar Upazila is very important place for pointed gourd cultivation because per hectare production is maximum compared to other Upazilas of Bangladesh. (BBS, 2003).

3.2 Location of the study

Considering the pointed gourd growing area, the study was conducted at eight villages under Jessore Sadar Upazila. The site was situated near the Jessore town. The area is situated besides the Regional Agricultural Research Station (RARS) of BARI in Jessore Region. The map of Jessore district showing Jessore sadar Upazila and the study areas have been shown in Fig 1&Fig 2.

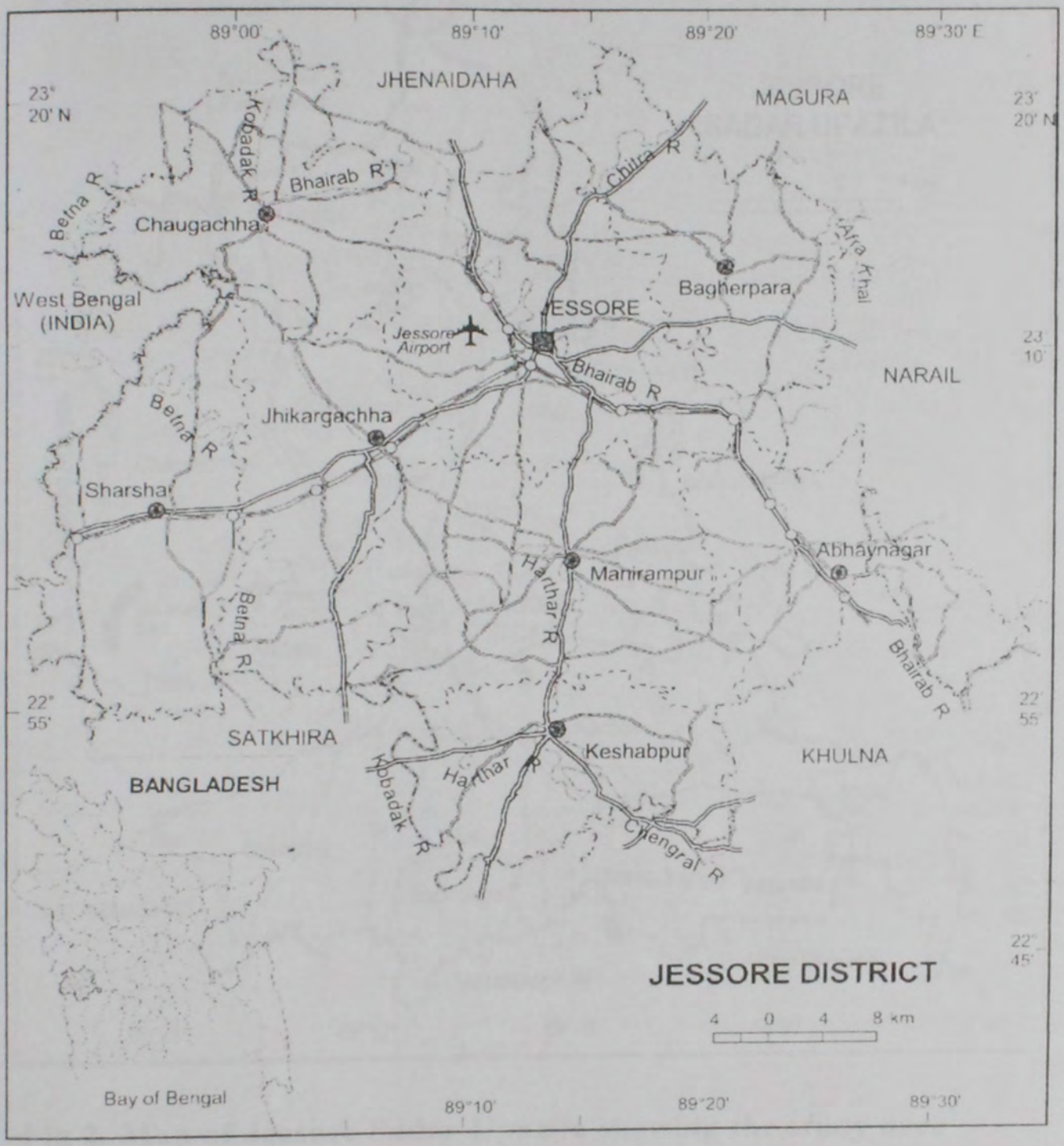

Fig. 1. Map of Jessore District showing Jessore Sadar Upazila

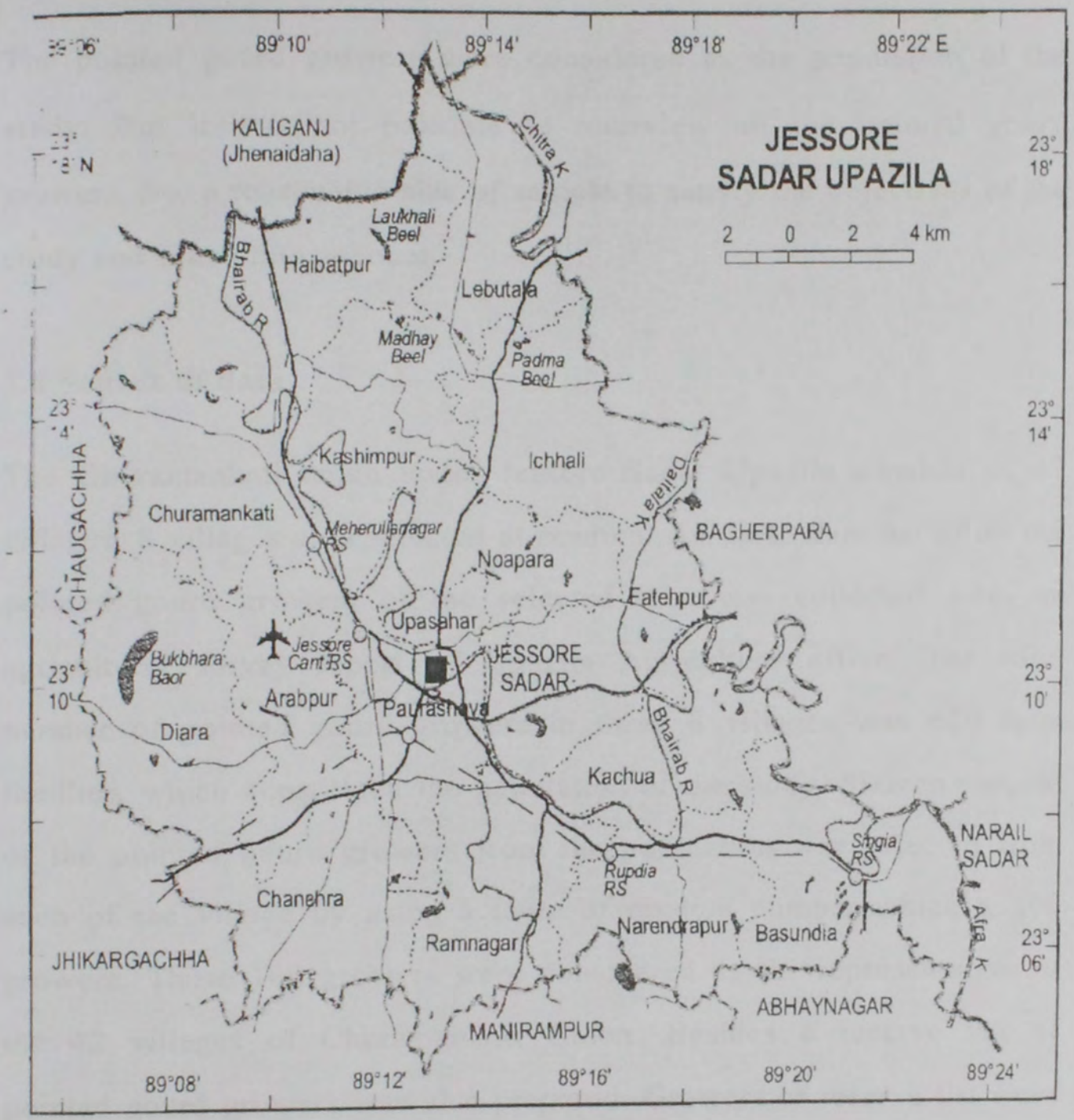

Fig 2. Map of Jessore Sadar Upazila showing the study area

3.3 Selection of sample and sampling techniques

The pointed gourd growers were considered as the population of the study. But it was not possible to interview all the pointed gourd growers. So, a reasonable size of sample to satisfy the objectives of the study was taken into account.

3.4 Source of data

The Churamankati union under Jessore Sadar Upazila consists of 42 villages, 8 villages area selected at random. An up to date list of all the pointed gourd growers of the selected area was collected from an agricultural survey report of Upazila Agriculture office. The total number of pointed gourd growers in these 8 villages was 620 farm families, which constituted the population of the study. Sixteen percent of the pointed gourd growers from the population was selected from each of the village by using a table of random number which a 100 growers. These 100 growers were considered as the representative of the 42 villages of Churamankati Union. Besides a reserve list of pointed gourd growers was also prepared. Growers of reserve list were used only when a respondent included in the original list was not available during data collection. Distribution of the farmers constituting population, sample and reserve list are shown in Table 1.

Table 1. Distribution of pointed gourd growers constituting the population, sample and reserve list in different villages of Churamankati Union

Name of the village	Number of pointed gourd growers	Growers	
		Sample	Reserve list
Nurpur	80	14	3
Shabaj pur	100	14	4
Bijoynagar	120	20	4
Churamankati	75	12	3
Lebutala	98	13	3
Bolpur	60	10	3
Mominnagar	45	8	3
Hoibatpur	42	9	2
Total	620	100	25

3.5 Instrument for collection of data

For collection of relevant information, an interview schedule was carefully prepared keeping the main objectives of the study in mind. The interview schedule was prepared in Bengali to ensure easy communication between the researcher and the respondent. The interview schedule initially prepared was pre-tested by administering the same to twelve pointed gourd growers of the study area.

The prepared interview schedule was helpful to identify questions and statements were made in the schedule on the basis of the pre-test experience. The schedule was multiplied in its final form for the collection of data. An english version of the interview schedule has been presented in Appendix 1. The Bengali version of the interview schedule was used during final data collection.

3.6 Collection of data

The period of data collection was from 15th August to 25th November 2005. The data for the study were collected from the primary sources. The interview was conducted individually in the houses of the respondents during their leisure period. Some growers from the original list were not available during interview, and hence the pointed gourd growers were replaced from the reserve list.

The researcher took all possible care to establish rapport with them. While any respondent faced difficulty in understanding any question out most care was taken to explain the issue. Excellent cooperation was obtained from the respondents and others concerned persons during the time of interview.

3.7 Handling of data

Local units were converted into standard units. All the individual responded to questions of the interview schedule.

3.8 Processing of data

After completion of survey work, the data were compiled from interview schedule. Descriptive and tabular methods were mainly followed for conduction of the study. The filled in interview schedules were scrutinized and the collected data were edited in order to remove errors, inconsistencies and ambiguities. After necessary editing the collected data were transferred to master sheet and summarized to favourable tabulation. A list of tables was prepared in accordance with objectives of the study.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter represents the findings and discussions in the following section about the present production practices of pointed ground in Jessore district of Bangladesh.

4.1 Growers age

Table 2. Different aged group involved in pointed gourd cultivation in Jessore Sadar Upazila

Category	Farmers involvement in pointed gourd cultivation %
Young aged (below 35 yrs)	28
Middle aged (36-50 yrs)	52
Old (above 51yrs)	20

In Jessore Sadar, most of the farmers were middle aged and they were energetic and laborious. They were interested to take risk for better economic return. About 52% of the middle aged farmers were involved in cultivation of pointed gourd (Table 2).

4.2 Growers educational level

Table 3. Education level of pointed gourd growers in Jessore Sadar Upazila

Category of farmers	Farmers involved in pointed gourd cultivation %
Illiterate	24
Primary education	32
Secondary education	34
Above SSC	10

It was evident that farmers having secondary education (34%) were more involved in pointed gourd cultivation compared to the farmers of other educational background (Table 3). Involvement of farmers above SSC level was very poor because they remained busy with other jobs.

4.3 Growers farm size

Table 4. Category of farm size in Jessore Sadar Upazila

Category	Farmer's involvement in pointed gourd cultivation (%)
Marginal (0.02-0.2 ha)	42
Small (0.2-1.0 ha)	30
Medium (1.0- 3 ha)	20
Large (> 3 ha)	8

In Jessore sadar, comparatively the smaller farmer cultivated pointed gourd extensively (Table 4). Generally, the large farmers were less interested to pointed gourd cultivation because pointed gourd pollination needs large amount of manual labour for hand pollination. Relatively small farmers preferred to cultivate pointed gourd because they could hand pollinate by themselves or by the family members engaged.

4.4 Use of variety

The success of crop production, largely depends on selection of correct cultivar. The cultivated variety of pointed gourd were mainly Kajla, White Bombai, Black Bombai and Dorakata etc.

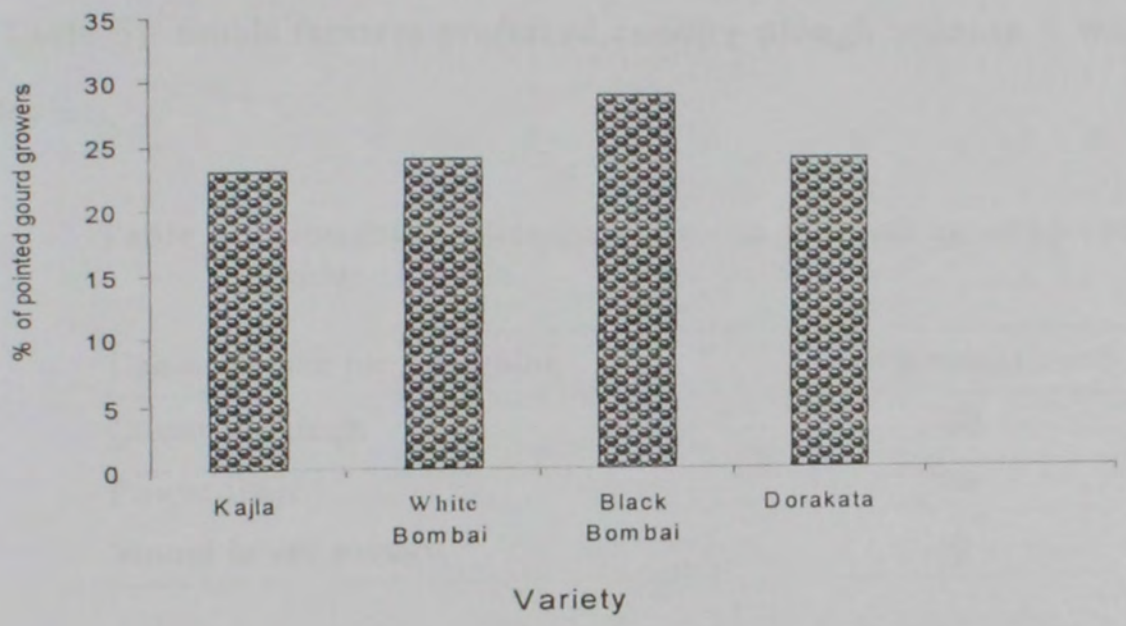

Fig 3. The extent of use of vatiety of pointed gourd among the in Jessore Sadar.

The growers generally use locally available high yielding variety. The fruit of Black Bomboi was larger than other variety with an average yield of 18.7 t/ha. Yield of White Bombai, Kajla and Dorakata were 17.4 t/ha, 17.2 t/ha and 16.8 t/ha, respectively. The farmers used Black Bombai was the most preferred variety among the growers in Jessore sadar (Fig. 3).

4.5 Land preparation

Generally in Bangladesh, land is prepared by country plough. The uses of devices for ploughing and laddering, are related to the size of the farm. For pointed gourd cultivation, farmers of small category used country plough (60%) while large farmer used power tiller (40%) for ploughing (Table 5). Small farmers preferred country plough because it was a low cost device.

Table 5. Ploughing through different method as observed in Jessore Sadar Upazila

Use of device for ploughing	% of growers used
Country plough	60
Power tiller	40
Mould board plough	0

Levelling is so much important for cultivation of pointed gourd. Different farmers used different devices for levelling the soil. Country plough and tractor levellers were used by 60% and 36% farmers, respectively. But only 4% farmer used spade and hand roller for soil leveling Table 6.

Table 6. Levelling the land by different method as observed in Jessore Sadar

Device	% of growers used
Country plough	60
Tractor levellers	36
Other (spade and hand roller)	4

4.6 Planting material

Pointed gourd farmers of Jessore Sadar generally propagated their plants from tip cutting, tuberous root and vine cutting. Most farmers (78%) used tip cutting for pointed gourd cultivation.

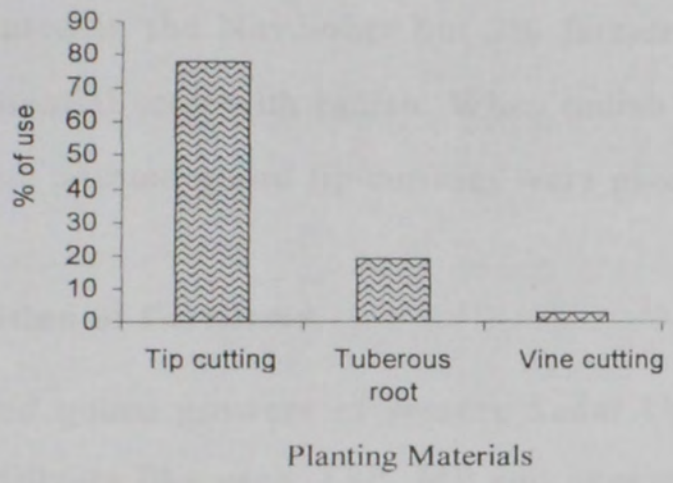

Fig 4. Different planting materials used for pointed gourd cultivatoin in Jessore Sadar.

19 % farmers using tuberous roots, or 3% farmers using vine cutting (Fig. 4). The yield of tip cutting was 16.96 t/ha and developed very quickly. But yield of tuberous root and vine cutting were16.8 t/ha and17.3 t/ha, respectively.

4.7 Planting system and method

Generally pointed gourd growers grew pointed gourd in square system and line sowing. They prepared long beds with 1 m width. They sown tip cutting in bed and press soil over it. Pointed gourd growers of Jessore Sadar Upazila followed this system about 80-100%.

4.8 Planting time

Planting in right time is very much necessary. Pandit *et al.*, (2001). Stated that root cuttings of pointed gourd cv. Darmodor, were planted on 30 October reordered the highest yield. The 95% farmers in Jessore Sadar Upazila planted tip cutting in the month of October every year and 3% farmers planted in the November but 2% farmers pointed gourd as a relay crop or sequential crop with radish. When radish was going to be mature, in the same time pointed gourd tip cuttings were placed for further cultivation.

4.9 Application of Fertilizer

Pointed gourd growers of Jessore Sadar Upazila applied cowdung as manure, fertilizers like urea, TSP, MP and gypsum. Application of fertilizer dose varied from place to place. The growers of Jessore Sadar Upazila applied variable amount of NPK fertilizers. Singandhupe *et al.*(2003) recommended 80: 74: 32 kg/ha NPK for pointed gourd cultivation. The farmers of Jessore Sadar used comparatively higher amount of NPK compared to the recommended doses. The doses of cowdung ranged between 15-18 t/ha. Application of urea, TSP and MP ranged from 230-260, 268-286 and 140-162 kg/ha, respectively (Table 7). Farmers applied cowdung and TSP at the time of land preparation with $^1/_3$ of urea. They applied the remaining quantity of urea as top dressing at 20-30 days interval from early growing stage to sequential harvesting. They used to apply MP in 3 instalments, first at before growth stage, secondly at early flowering and finally at late flowering stage. Only farmers in Churamankati were found to use gypsum @ 43 kg/ha.

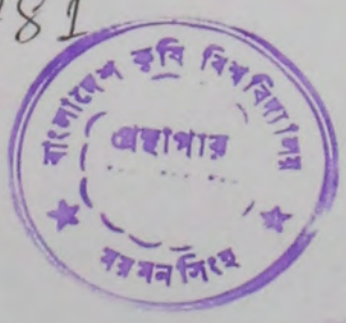

Table 7. Amount of manures and fertilizers used by the pointed gourd growers in different villages of Jesshore Sadar Upazila

Fertilizer name	Nurpur	Shabajpur	Bijoynagar	Churaman-kati	Lebutala	Bolpur	Momin-nagor	Hoibat-pur
Cowdung (t ha^{-1})	17- 18	17-18	17	18-19	15-16	17-18	16-17	17
Urea (kg ha^{-1})	247	245	260	230	240	235	242	236
TSP (kg ha^{-1})	276	272	275	268	271	274	286	278
MP (kg ha^{-1})	152	160	160	140	156	147	162	156
Gypsum (kg ha^{-1})	-	-	-	43	-	-	-	-

The educated growers used comparatively more manure but lower amount of chemical fertilizers, where illiterate farmers used higher amount of chemical fertilizer and lower amount of manure (Table 7.1).

Table 7.1. Use of manures and fertilizers as influenced by the educational level of the farmers in Jessore Sadar Upazila

Educational level of the farmers	Use of Manure	Use of fertilizer
Illiterate	Low	High
Primary	Medium	Medium
Secondary	Medium	Medium
Above SSC	High	Low

Educated growers know harmful effects of chemical on soils, they also realized that chemical fertilizer reduces the fertility of soil and causes environmental pollution. On the contrary, manure increase the fertility of soil and improved soil health.

4.10 Sources of planting material

Generally pointed gourd is cultivated by using their tip cutting and tuberous roots but farmers of Churamankati Union mainly used tip cutting. Collection of planting material for a big garden is not always easy. The small farmer collected planting material from their own source. Large farmer used to collect planting material 60% from own source and 40% from other available sources (Table 8).

Table 8. Sources of planting material used by the different pointed gourd farmers in Jessore Sadar Upazila

Category of farmer	% of planting material collection	
	Own source (%)	Other source (%)
Marginal	100	0
Small	100	0
Medium	80	20
Large	60	40

4.11 Irrigation needed and response of growers for successful production

Generally soil moisture is needed for all type of vegetable production but availability of water must be considered for their successful cultivation. Irrigation at 100% pan evaporation resulted in 18.1% higher fruit yield than 60% pan evaporation and 7-10 days interval was better than other intervals (Singandhupe *et al.* 2003).

Table 9. Irrigation and days of intervals in pointed gourd field in Jessore Sadar Upazila

Types of growers	% of farmer irrigate	Intervals (days)		
		10-15 days (%)	16-20 days (%)	21-25 days (%)
Marginal	75	10	20	70
Small	85	15	20	65
Medium	95	20	30	50
Large	100	50	30	20

In Jessore Sadar, 75% of the marginal farmers irrigated their pointed gourd field, while 100% of the large farmers irrigate their crop. Rashid, (1999) Suggested an interval of 10-15 days between two irrigation for successful pointed gourd production. 50% of large farmer used to irrigate their crop at 10-15 days interval; only 30% at 16-20 days and the rest 20% at 21-25 days interval. But the marginal and small farmers used to irrigate comparatively at wider intervals. 70% of the marginal farmer used to irrigate at 21-25 days interval but 10% at 10-15 days interval and 20% at 16-20 days interval.

4.12 Intercultural practices

At Sadar Upazila of Jessore, most of the pointed gourd farmers used different intercultural operations mainly weeding, pruning, mulching, earthing up, staking and fruit thinning which was carried out by 20% farmers.

Table 10. Different intercultural operation and response of pointed gourd farmers in Jessore Sadar Upazila

Intercultural operation	% of pointed gourd farmers	
	Frequently	Occasionally
Weeding	95	5
Pruning	90	10
Mulching	85	15
Earthing up	85	10
Staking	100	0
Fruit thinning	20	0

4.13 Weed management

Growers of Jessore Sadar Upazila generally used khurpi or nirani for weed control. The relative weed control devices were the used of spade and weedicide etc. Weeding was done just at initial stage of plant growth and before fertilizer application. Two to three times weeding were found sufficient depending on the intensity of weed growth. Most farmers in Jessore Sadar, (90%) used nirani for successful weed control but some large farmers (5%) used weedicide occasionally (Table 11). Large farmers used weedicides like paraquate or gamoquate for selected weed control in pointed gourd field. Weedicide application though harmful for environment was found to reduce weed management cost.

Table 11: Different devices used for weeding in pointed gourd cultivation in Jessore Sadar Upazila

Weed control devices	Frequently (%)	Occasionally (%)
Spade	0	10
Nirani	90	10
Hand pulling	0	5
Weedicide (paraquate)	0	5

4.14 Plant protection measure

Generally die back, yellow leaves, purple stopped, leaf and root rot etc diseases were found in pointed gourd field in Jessore Sadar Upazila. To control these diseases farmers used Fan fan oil, suntup, cypermethrin, carolux, cutup and DithaneM-45 etc. But best result was reported from the Dithane M-45 @ 2 kg/ha application. Several type of insects like stem and fruit borer, fruit fly, *Apomecyna saltator*, ear wig and ant etc were reported in pointed gourd field. Farmers used Malathion, Diaginon, Bavistin, Champion and Matatox for insects control. But best result was found from Malathion@ 0.03%. However, progressive farmers preferred Integrated Pest Management (IPM) for diseases and insect's control.

4.15 Method of pollination

Though pointed gourd is a dioecious vegetable so pollination is the main limiting factor for fertilization. Generally natural pollination occurs with the help of pollinating agent (flies and honey bees etc.). But for better yield, 97% pointed gourd growers used to hand pollinate (Plate 1) and about 1% farmers spray pollen grains over the pointed gourd flowers (Table 12).

Table 12. Different methods of pollination used by the farmers of Jessore sadar Upazila

Use of methods	% farmer used
Natural pollination	2
Hand pollination	97
Spraying pollen grain solution	1

Plate 1: Photograph showing hand pollination done by the pointed gourd farmers in Churamankati union under Jessore Sadar Upazila

4.16 Use of trellis

Pointed gourd is basically a vine type vegetable. So it needs some support for successful production. In Jessore Sadar Upazila, farmers used trellis made of bamboo, wire and nets along with jute stick. About 98% farmers used trellis made of bamboo for pointed gourd cultivation. (Table 3). Yadav *et al.* (1989) used trellis and obtained higher yield at the closer spacing with the bower system. Prasad and Singh, (1987) recorded best plant growth and the highest yield of 146.15 q/ha) on 1.0 m bamboo support compared to the control (trails over the ground) yield of 57.46 q/ha.

Table 13. Use of trellising for pointed gourd cultivation in Jessore Sadar Upazila

Type of trellising	% of growers used
Trellis	98
No trellis	0
In single stick	2

4.17 Harvesting

Pointed gourd is a critical crop where fruit setting depends mainly on successful pollination. In case of pointed gourd, harvesting is done from 7 to 15 days after fruit setting (Maity *et al.*, 1995). In Jessore Sadar Upazila, 55% farmers harvested the crop after 10-15 days of fruit setting while 5% of farmers harvested after above 15 days (Table 14).

Table 14. Days of harvesting from fruit setting in Jessore Sadar

Harvest from fruit setting (day)	% of growers performed
Bellow 10 days	40
10-15 days	55
Above 15 days	5

4.18 Transportation

Jessore Sadar Upazila is the place where pointed gourd is grown intensively than other places of Bangladesh. Generally small or marginal farmer carry their pointed gourd on foot but the large farmesr, whose production is high, generally transport their produce by van or Riksha. Occasionally the middle men used to collecte pointed gourd from the small and marginal farmers and transport to the market (Table15).

Table 15. Means of transportation of pointed gourd for marketing in Jessorel Sader Upazila

Means of transportation	% of farmer used
Manual labour	12
Van/Riksha	88
Truck	0

4.19 Marketing

The produced pointed gourd was sold in farm 45% and in village market 55% (Table 16). Most farmers used some pointed gourd for their own consumption and used to sell the rest. Mainly middle man were the buyer of pointed gourd in Jessore Sadar Upazila because most of the family grew pointed gourd. The middle man collected pointed gourd and when huge amount marketed to town.

Table 16. The selling place of pointed gourd in Jessore Sadar Upazila

Selling place	% of sell
In farm	45
Village market	55
Town	0

4.20 Cost of production

Recording of cost of production is needed to determine the profitability of crop enterprise. The pointed gourd growers of Jessore Sadar Upazila were not very much aware about cost of pointed gourd cultivation. The approximate cost of production for pointed gourd cultivation were collected according to their response. The average cost of production of pointed gourd growers in Jessore Sadar Uapzila were placed as below for an hectare.

A. Non material cost: (Tk)

Item	Total labour	Tk. Per labour	Total Tk.
Land preparation	20	50	1000
Material planting	10	50	500
Weeding	20	50	1000
Staking/bamboos	10	50	500
Irrigation	10	50	500
Fertilization	8	50	400
Insecticide spraying	6	50	300
Pollination	125	20*	2500
Harvesting	70	50	3500
Transportation	100	50	5000
Marketing	80	50	4000
Guard	180	50	9000
			Total = 28200

* Timely fixed labour for 2 hours at morning

B. Material cost (Tk.)

Item	Total Tk.
Planting material	1000
Bamboos	2000
Fertilizer	9500
Insecticide	3000
	Total =15500

C. Total return from per hectare after one year

Item	Yield	Price in TK	Total Tk.
Pointed gourd production	16.25 t/ha	8000/ton	130000
Cutting selling	-	-	1000
Stake/ bamboo sell	-	-	2000
			Total = 133000

Total cost = non material+material cost = 28200 +15500 =43700 Tk.

Total return =133000 Tk.

Profit = Total return – Total cost =133000–43700=89300 Tk.

Per hectare pointed gourd production cost was 43700 Tk. and return was 133000Tk. So, profit is 89300 Tk. So, pointed gourd cultivation appeared highly profitable. The Benefit Cost Ratio (BCR) is an important criteria for measuring the profitability for growing a crop. The BCR was calculated by using the following formula:

$$BCR = \frac{\text{Gross return (Tk/ha)}}{\text{Total cost of production (Tk/ha)}}$$

$$= \frac{133000}{43700} = 3.04$$

The BCR of pointed gourd was 3.04 in Jessore Sadar but varied from village to village.

The average yield of pointed gourd was 16.25 t/ha in Jessore Sadar Upazila but varied from village to village. Almost similar yields were obtained in Nurpur (16.20 t/ha), Shabajpur (16.15 t/ha), Bijoynagar (16.o1 t/ha), Churamankati (16.88 t/ha), Lebutala (16.21 t/ha), Bolpur (16.19 t/ha), Mominnagar (16.20 t/ha) and Hoibatpur (16.16 t/ha), respectively.

4.21 Involvement of labour for pointed gourd cultivation

Farmers of Churamankati Union were not rich. So most of them are engaged in agriculture. The relative labour involved in pointed gourd cultivation are as below

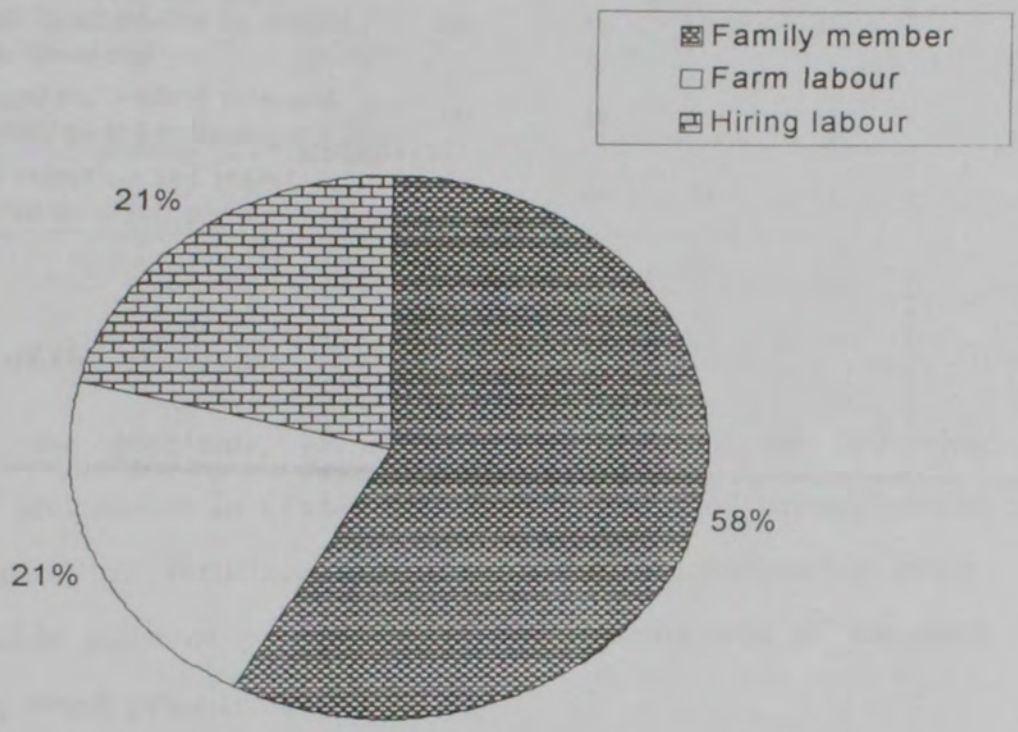

Fig 5. Pie chart showing labour use for pointed gourd cultivation in Jessore sadar

From above Fig.5, showed that about 58% of labour from family members that were not self sufficient and 21% of hired labour.

4.22 Problems of pointed gourd cultivation

During pointed gourd cultivation growers faced different problems. Among these some were like, critical pollination, high price of fertilizers, high yielding variety and disease infection. Problem faced by the pointed gourd growers of Jessore Sadar Upazila during cultivation are shown in Table 17.

Table 17: Problem faced by pointed gourd growers during cultivation in Jessore Sadar Upazila

Problems	Percentage distribution of growers against the extent problem			
	Very much	Much	Little	Not at all
1. Problems of pollination	60	30	10	0
2. High price of fertilizers and insecticides	50	30	20	0
3. Lower prices of pointed gourd incase of local market as middle man was involved	60	30	10	0
4. No recognized variety released for pointed gourd cultivation	40	30	20	10
5. Disease infection and insect infestation as lower yield	45	24	20	11

4.23 Solution of the problems

Based on the problems, identified growers stated the following solutions which are shown in (Table 18). Development of hermaphrodite variety, distribution of fertilizer and insecticides in reasonable price, ensuring reasonable price of pointed gourd and development of transport system were very much prioritized.

Table: 18. Probable solution of problem related to pointed gourd cultivation in Jessore Sadar Upazila

Solution	(%) growers
1. Development of hermaphrodite variety	94
2. Distribution of fertilizers and insecticides in reasonable price	82
3. Development of transport system	71
4. Diseases and insects are properly maintained	67

CHAPTER 5

SUMMARY AND CONCLUSION

Eight villages of Jessore Sadar Upazilla in Jessore district were surveyed for understanding the recent production practices of pointed gourd cultivation. During survey different categories of growers were interviewed at field or at home. The study was undertaken during the period of survey from 15th August to 25th November 2005. The survey findings have been summarised and placed below.

The middle or large farmers faced problem in finding large number labour for hand pollination during 7-8 O'clock in the morning. Hand pollination is not a problem for small farmers. The educated farmers comparatively prefer pointed gourd cultivation and adapt new practices. Among the farmers with educational level above SSC, 90% was involved in pointed gourd cultivation. While 82% of the farmers with education of SSC level grew pointed gourd, only 74% of the illiterate farmers, who cannot read or write grew pointed gourd. Again, more of the marginal and small farmers grew pointed gourd compared to medium or large farmers. About 85% of the marginal farmers and 67% of the small farmers cultivated pointed gourd where as only 60% medium farmers and 30% of large farmers were in pointed gourd cultivation.

Generally the pointed gourd plot was 20-25% of the whole farm in case of small farmers and 10-12% of the middle farmers but 5-8% in case of large farmers. The pointed gourd has no recognised variety.

Farmers grew local varieties such as Kajla, White bombai, Black bombai and Dorakata etc. Among the varieties, Black bombai used 29% farmers in Jessore sadar upazila which yield was highest 18.7 t/ha. A great majority of the farmers (78%) used tip cutting whereas 19% farmers used tuberous root but only 3% farmers used vine cutting. Generally in Bangladesh, land is prepared by country plough. For pointed gourd cultivation, farmers of small category used country plough (60%) while large farmers used tractor (40%) for ploughing but most of the farmers (60%) used country plough for levelling the soil. Most of the farmers (95%) in Jessore Sadar Upazila plated tip cutting in the month of October whereas 3% in November but 2% as relay or sequential crop with radish.

Farmers of Jessore Sadar Upazila applied cowdung as manure, fertilizers like Urea, TSP, MP and gypsum. They used comparatively higher amount of NPK compared to the recommended doses. The doses of cowdung ranged between 15-18 t/ha. Application of Urea, TSP and MP ranged from 230-260, 268-286 and 140-162 kg/ha, respectively. Farmers applied cowdung and TSP at the time of land preparation with $^{1}/_{3}$ of urea. They applied the remaining quantity of urea as top dressing at 20-30 days interval from early growing stage to sequential harvesting. They used to apply MP in 3 instalments, first at before growth stage, secondly at early flowering and finally at late flowering stage. Only farmers in Churamankati were found to use gypsum @ 43 kg/ha.

In Jessore Sadar, 50% of the large farmers used to irrigate their crop at 10-15 days interval; only 30% at 16-20 days and the rest 20% at 21-25 days interval. But the marginal and small farmers used to irrigate

comparatively at wider interval. Farmer of Jessore Sadar Upazila, used nirani 90% for weed control but large farmers used weedicide (paraquate) to control selected weed. They used Dithane M-45 @ 2 kg/ha to control disease and Malathion @ 0.03% for insect control. Pollination in the main limiting factor for pointed gourd cultivation. 97% farmers used hand pollination whereas 2% occurs natural pollination but spraying pollen grain solution was only 1%. 98% farmers used to bamboo trellis and only 2% used single stick. But no ground trailing was found.

In Jessore Sadar Upazila 55% farmers harvested their crop after 10-15 days of fruit setting while 5% farmers harvested after above 15 days. The harvested (88%) fruits were transported by mainly Riksha/van but 12% by on root. Most of the crop (55%) were sold in village market but other 45% in farm after consuming. Pointed gourd cultivation was profitable in Jessore Sadar Upazila the average yield of pointed gourd was 16.25 t/ha which price was 133,000 Tk. but need only 43700 Tk. for production. The BCR was 3.04 which varied from village to village. From the survey study it was found that pollination is the main problem of pointed gourd production. Unavailability and high price of fertilizers and insecticides were other problems. In local market, price of pointed gourd is low, usually generates low net return to the farmers. By developing a new hermaphrodite variety, ensuring proper supply of fertilizers and insecticides by government, good communication facilities and development of disease resistant and insect tolerant variety more farmers may be attracted for pointed gourd cultivation.

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