

Development of union level digital database and map of maize growing areas at Shaturia in Manikgang district

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Abstract

Digital databases of different parameters such as area, production, yield and varietal information etc of maize were obtained. Union, upazila and district maps of maize were developed in the study. A study was conducted during 2012-13 to build union level digital databases and maps of maize growing areas using both primary and secondary data. Primary data were collected from maize growing areas of the upazila namely, Shaturia, of Manikgang district. In this study, union, upazila, district and country level digitized maps were used for summer and winter maize. Geographical Information System (GIS), Global Positioning System (GPS), Management Information System (MIS) and related Information Technology (IT) were utilized to develop a website. Total cultivable land 9773ha in Shaturia upazila, area and production of maize were 5187ha and 30105.65t, respectively. Ten varieties were cultivated in the study areas. Maximum area (88.74%) of maize was cultivated by the executive varieties NK-40, Pacific-984, 900M, Miracale and Sunshine. Average maize yield of the study areas was 5.80 t/ha during 2012-13 season. A web site developed for variety-wise area coverage data collection of maize as well as for other crops. This web site can also be used in mobile phone.

Key Words: Maize, Production, Variety, Mapping, GIS, GPS, ICT and Digital database

Introduction

Agriculture is the backbone of the nation but agricultural land is the scarcest means of production in Bangladesh. Digital databases of different parameters such as area, production, yield and varietal information etc of maize were obtained. Union, upazila and district maps of maize were developed in the study. Maize is one of the most important food grains in the world as well as in developing countries. It is a high yielding crop occupies first position among the cereals in terms of yield. According to the report of BBS (2003) maize, wheat and rice are very contributory cereals in Bangladesh producing 5.36 t/ha, 2.21 t/ha and 2.15 t/ha respectively. Bangladesh with a total population of 131.5 million is the ninth most populous country in the world with an annual population growth rate of 1.5 in 2001 (BBS, 2002). At present food production in Bangladesh is not sufficient as compared to the population growth. To overcome this situation, agricultural lands should be utilized more efficiently through cultivating high yielding crops like maize. Maize is playing an important role in the economy of Bangladesh. The area under maize cultivation is increasing

day by day due to high demand. Maize has great potential in this country. Total area of maize production in 2010 was 152,000 ha with an average yield of 5.8 Mg/ha (FAOSTAT, 2012). When grown in the winter months (Rabi season), maize yields of up to 12 Mg/ha have been reported (Ali et al., 2008). Manikgang district is the sixth highest maize production area (16070ha) in Bangladesh. We selected Shaturia upazila which is maximum yield production of maize at all upazilas in Manikgang district. Besides, the genetic yield potential of maize is also very high. There is an important scope of increasing the current yield and production in the country. Maize can be used as food for ensuring food security presently as well as in future increasing population of the country.

In terms of area, maize holds rank 3rd followed by rice and wheat. Because of higher nutritional status, it could be a good source of nutrients for mal-nourished people in Bangladesh. It is now widely used in the poultry farms as animal feed, as well as the people consume roasted and fried maize in Bangladesh. Moreover, as a food item, maize is used in different forms such as maize

flour, maize flour mixed with wheat flour etc. (Roy, et. al 2009)

Potentiality for growing maize is high in almost throughout Bangladesh. So, it is under cultivation both in winter and summer season and well suited to the existing agronomic conditions, particularly rain fed condition.

Bangladesh Agricultural Research Institute (BARI) has been conducting research activities for varietal development of maize since 1976. Initially, thrust was given for development of composite varieties. So far, BARI developed 19 varieties among them eight open pollinated and 11 hybrid varieties. The yield potentiality of the released composite varieties varies from 5.5 to 7.0 t/ha and that of the hybrid varieties ranges 7.4 - 12.0 t/ha (BARI, 2011). Status of those varieties in the farmers' field demands through investigation. It is noted that BARI maize varieties are not cultivated in the study areas. However, it is found in some places of Manikganj, Kushtia, Dinajpur, Chuadanga, Jamalpur and Sherpur etc. Germination capacity of BARI maize varieties needs improvement and their cultivation must be expanded rapidly in the farmers' fields. Dwarf type maize variety should be released.

Now a day of ICT, it is necessary to build a IT based system for data collection of maize from root level. This system might be used for all other crops. It would be used for data collection of summer and winter maize from upazila, union even block level. ICT based information bank of maize cultivation can be useful for the cultivators of the country. To develop such a database we have been considered the following objectives:

- to determine the variety wise area coverage of maize in block, union, upazila and district.
- to develop a online portal (website) for easily usable from mobile phone.
- to develop a database through GIS,GPS and MIS

Materials and methods

Both primary and secondary data were used in the study. For primary data, two field surveys were done for summer and winter maize during 2012-13. Site was selected purposively at Shaturia, upazila of Manikganj district. Simple random sample procedure was followed for data collection and complete enumeration of different

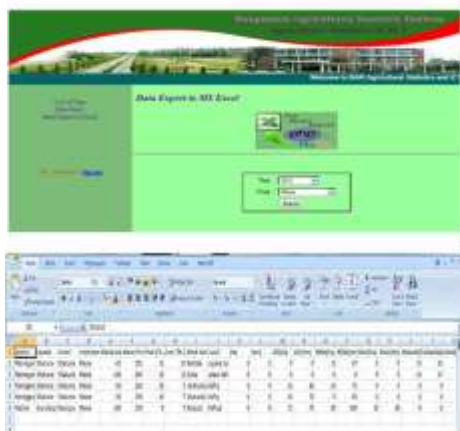
varieties of maize was taken for whole population.

Primary data were collected as follows:

- Summer and winter maize data were collected from maize growers of different upazilas by Sub Assistant Agriculture Officers (SAAO) during 2012-13.
- Collected data were recorded by the concerned resea
- rcher from SAAO as per prescribed database structure.
- The data schedule was filled up by UAO/SAAO and passed through internet.
- At the time of data collection, GPS technology was used.
- A website was developed which was used through mobile phone for data collection.

The online data collection system through dedicated web portal is www.asictbari.net





Secondary sources were NGOs and GOs such as Soil Resources Development Institute (SRDI), Bangladesh Bureau of Statistics (BBS) and Department of Agricultural Extension (DAE) as well as (FAO). Statistical package programs such as Excel, SPSS and MS word were applied in addition to Arc View GIS program and digitized maps of union, upazila, district and country were utilized in this study.

Area and production of maize in Bangladesh were 312566 ha and 2183183 respectively in 2012-13. Table 1 indicates the top 12 districts' coverage

80.53% area which contributes 80.39% of total production. Manikganj district is the sixth position for cultivating maize in 2012-13. In this season, its cultivation area and production are 16070ha and 105263t respectively.

Results and discussion

In total, there were 22 blocks under 9 unions in the upazila Shaturia, of Manikganj district, (Table 2). Different agricultural information of maize production under the upazila was noted below:

Data were collected from the maize growers of the target upazila regarding cultivable land, area production, as well as yield of the crop. Databases of cultivable land, area, production and yield of maize in 2012-13 were prepared according to district, upazila and union.

There were 22 blocks under 9 unions at Shaturia upazila. Union wise information of area, production and yield of maize of this upazila are presented in Table 3. In 2012-13 area, production and yield of maize were 5187ha, 30105.65t and 5.80 t/ha, respectively but in 2011-12 those of maize were 3508 ha, 19829 t and 5.65t/ha, at Shaturia.

Table 2. No. of blocks, unions and cultivable lands of shaturia upazila of Manikganj district in 2012-13

Upazila	Shaturia (Manikganj)
Block	22
Union	9
Cultivable land (ha)	9,773

Source: Survey data of maize growers, 2012-13 collected by SAAO, DAE/Researcher, BARI.

Table 1. Area and production of major maize growing districts of Bangladesh, 2012-13

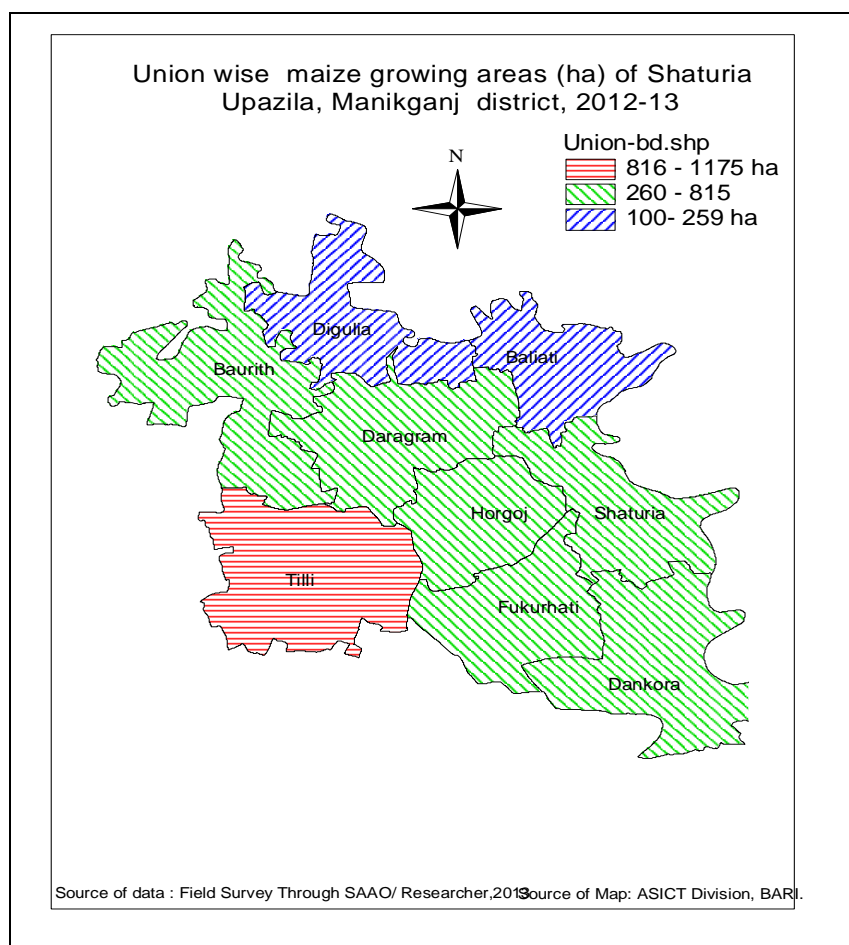
Sl. no	District/ Country	Maize area (ha)	Percentage of area	Cumulative % of area	Production (t)	Percentage of prod.	Cumulative % of production	Yield
1	Dinajpur	56938	18.22	18.22	421710	19.32	19.32	7.41
2	Chuadanga	41500	13.28	31.49	324750	14.88	34.19	7.83
3	Thakurgao	28315	9.06	40.55	195957	8.98	43.17	6.92
4	Lalmonirhat	25090	8.03	48.58	162995	7.47	50.63	6.50
5	Rangpur	16670	5.33	53.91	101077	4.63	55.26	6.10
6	Manikganj	16070	5.14	59.05	105263	4.82	60.08	6.56
7	Panchagar	14945	4.78	63.84	95016	4.35	64.44	6.36
8	Jhenaidah	13803	4.42	68.25	89525	4.10	68.54	6.49
9	Rajshahi	12874	4.12	72.37	77104	3.53	72.07	5.99
10	Bogra	9281	2.97	75.34	71752	3.29	75.36	7.73
11	Gaibandha	8350	2.67	78.01	59467	2.72	78.08	7.12
12	Nilphamari	7845	2.51	80.52	50377	2.31	80.39	6.42
	Bangladesh	312566			2183183			6.98

Source: BBS and DAE 2012-13.

Table 3. Union wise area (ha), production (t) and yield (t/ha) of maize at Shaturia, Manikganj, 2012-13

Union	Area (ha)	Production (t)	Yield (t/ha)
Baurith	815	4596	5.64
Digulia	170	1007	5.92
Baliati	259	1678.7	6.48
Shaturia	590	3570	6.05
Tilli	1175	6162.25	5.24
Daragram	515	3106	6.03
Horgoj	500	2965.7	5.93
Dankora	513	3088	6.02
Fukurhati	650	3932	6.05
Total	5187	30105.65	5.80
Average	576.33	3345.07	-
Max	1175.00	6162.25	6.48
Min	170.00	1007.00	5.24
Std	295.89	1516.86	0.34
Cv%	51.34	45.35	5.67

Source: Survey data of maize growers, 2012-13 collected by SAAO, DAE/Researcher, BARI.



Map 1 Union wise maize growing areas (ha) of Shaturia upazila, Manikganj district, 2012-13.

In a map, Tilli union is the major maize production area at Shaturia in Manikganj district but yield is height (6.48t/h) in Baliati union.

Varietal status of maize at Shaturia is given in Table-4. Out of 5187ha maize area at Shaturia; 2196 ha, 685ha and 668ha are occupied by Pacific-984, Miracale and Sunshine, respectively and the rest by others.

Out of 30105.65t maize production at Shaturia in 2012-13; 11853.85t (39.77%), 4345.25t (14.43%) and

4221.8t (14.02%) were covered by three varieties Pacific-984, Sunshine and Miracale and the rest by others (Table 5).

Cultivated area of maize in the study areas was 5187 ha. production was 30105.65t and yield of maize was 5.80 t/ha (Table-6) at Shaturia in Manikjong district. Benefit Cost Ratio (BCR) of maize was 1.44 at Shaturia in Manikjong district. (Table 7)

Table 4. Variety wise area coverage (ha) of maize at Shaturia, Manikganj, 2012-13

Union	Variety										Total
	900M	900M Gold	NK-40	Pacific-984	Sunsine	Miracale	Getco	Uttaran	Pioneer	Pacific-749	
Baurith	90	-	100	155	170	190	10	20	60	20	815
Digulia	15	-	20	60	30	40	0	0	0	5	170
Baliati	15	-	30	39	130	40	0	0	5	0	259
Shaturia	5	-	95	175	70	110	0	55	80	0	590
Tilli	105	80	130	790	10	20	0	30	0	10	1175
Daragram	45	-	80	240	80	60	0	10	0	0	515
Horgoj	72	-	105	115	50	105	0	20	25	8	500
Dankora	32	-	25	202	68	90	0	20	70	6	513
Fukurhati	50	-	40	420	60	30	0	50	0	0	650
Total	429	80	625	2196	668	685	10	205	240	49	5187
Percentage	8.27	1.54	12.05	42.34	12.88	13.21	0.19	3.95	4.63	0.94	100.00

Source: Survey data of maize growers, 2012-13 collected by SAAO, DAE/Researcher, BARI.

Table 5. Variety wise Production (t) of maize at Shaturia, Manikganj, 2012-13

Union	Variety											Total
	900M	900M Gold	NK-40	Pacific-984	Sunshine	Miracale	Getco	Uttaran	Pioneer	Pacific 749	Pacific 994	
Baurith	451.5	0	479	675.5	1120	1088.5	70	129	360	80	142.5	4596
Digulia	79	0	110	331	195	271	0	0	0	21	0	1007
Baliati	96	0	196	222.6	851	271.5	0	0	32	0	9.6	1678.7
Shaturia	22.5	0	502	994.3	454.5	685.5	0	376	535.3	0	0	3570
Tilli	959.8	120	715	3947.5	65	115	0	195	0	45	0	6162
Daragram	242.5	0	470	1407.5	516	405	0	65	0	0	0	3106
Horgoj	388.2	0	641	679	323.75	614.5	0	130	154.5	34.75	0	2965.7
Dankora	163.5	0	112.5	1201.5	460	545.8	0	131.2	446.5	27	0	3088
Fukurhati	360	0	257	2395	360	225	0	335	0	0	0	3932
Total	2763.0	120	3482.5	11853.9	4345.3	4221.8	70	1361.2	1528.3	207.75	152.1	30105
(%)	9.18	0.40	11.57	39.37	14.43	14.02	0.23	4.52	5.08	0.69	0.51	100.00

Source: Survey data of maize growers, 2012-13 collected by SAAO, DAE/Researcher, BARI.

Table 6. Area, production and yield of maize at Shaturia of Manikganj district, during, 2012-13

Area	Area (ha)	Production (t)	Yield(t/ha)
Shaturia (Manikgonj)	5187	30105.65	5.80

Source: Survey data of maize growers, 2012-13 collected by SAAO, DAE/Researcher, BARI.

Table 7. Price, cost, benefit and benefit cost ratio (BCR) of maize at Shaturia, of Manikganj district, during 2012-13

Area	Price (Tk/Kg)	Cost(Tk/Kg)	Benefit/Profit (Tk/Kg)	BCR
Shaturia, Manikganj	17.94	12.47	5.47	1.44

Conclusion

Ten (10) varieties were cultivated in the study areas. Maximum area (88.74%) of maize was cultivated by the executive varieties NK-40, Pacific-984, 900M, Miracale and Sunshine. A digital database or web site (www.asictbari.net) was developed for variety wise area coverage data collection of maize as well as for other crops. This database are will be used in government or non government agricultural organization. This web site can be used through mobile phone.

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