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DEVELOPMENT OF UNION LEVEL DIGITAL DATABASES AND MAPS OF MAIZE GROWING AREAS AT PIRGONJ IN THAKURGAON DISTRICT

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Abstract

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 upazilla namely Pirgonj of Thakurgaon district. For summer and winter maize; union, upazila, district and country level digitized maps were used in the study. Geographical Information System (GIS), Global Positioning System (GPS) and Management Information System (MIS) related Information Technology (IT) were also applied. Total cultivable land 28138 ha in Pirgonj upazila and area and production of maize were 5100 ha and 34508.75 t respectively. Sixteen (16) varieties were cultivated in the study areas and maximum area (74.09%) of maize was cultivated by the executive varieties NK40, Pacific 984, 900M Gold, 900M, 3396, and Supergold. Average maize yield of the study areas was 6.77 t/ha during 2012-13. A web site was 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.

Keywords: Maize, Area, Cultivation, Production, Variety, Union, ICT and Digital database.

Introduction

Agriculture is the backbone of the nation but agricultural land is the scarcest means of production in Bangladesh. 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. Thakurgaon districtis the third highest maize production area (28315ha) in Bangladesh.We selected Pirgonj upazila which is maximum yield production of maize at all upazilas in Thakurgaon 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.

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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, 2009).

Due to wide adaptability, maize is grown in the varied environmental conditions in Bangladesh, from sub-tropical low land at sea level to high elevation. 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. Status of those varieties in the farmers' field demands through investigation.

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. By using ICT, collection, documentation of different information and preparation of maps can be done. So, the study was done with the following objectives:

(1) To determine the variety wise area coverage of maize in block, union, upazila and district.

(2) To develop a system for data collection, documentation and mapping of maize.

(3) To develop a database using GIS, GPS and MIS on the basis of IT.

Materials and method

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. Sites was selected purposively at Pirganj upazila of Thakorgaon district. Simple random sample procedure was followed for data collection and complete enumerations of different varieties of maize were taken for whole population.

Primary data were collected as follows:

1. Summer and winter maize data were collected from maize growers of different upazilas by Sub Assistant Agriculture Officers (SAAO) during 2012-13.
2. Collected data were recorded by the concerned researcher from SAAO as per prescribed database structure.
3. The data schedule was filled up by UAO/SAAO and passed through internet.
4. At the time of data collection, GPS technology was used.
5. A web site 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 program SPSS and Excel were applied in addition to Arc View GIS program and digitized maps of union, upazila, district and country were utilized in this study.

Table-1. Indexing on area, production and yield of maize cultivation in Bangladesh.

Year		Area (ha)	Production (t)	Yield (t/ha)	Indexing on the basis of base year			Status (base year)		
1969-70 Base year line					**Area**	**Prod.**	**Yield**	**Area**	**Prod.**	**Yield**
1969-70		3239	3000	0.93	100	100	100	1	1	1
1974-75	1	2834	2000	0.71	87.5	66.7	76.2	0.9	0.7	0.8
1979-80	2	2024	1000	0.49	62.5	33.3	53.3	0.6	0.3	0.5
1984-85	3	3644	3000	0.82	112.5	100	88.9	1.1	1	0.9
1989-90	4	3239	3000	0.93	100	100	100	1	1	1
1994-95	5	2713	2680	0.99	83.8	89.3	106.7	0.8	0.9	1.1
1999-00	6	3162	4075	1.29	97.6	135.8	139.1	1	1.4	1.4
2005-06	7	98447	521525	5.3	3039.6	17384	571.9	30.4	173.8	5.7
2007-08	8	223886	1346000	6.0	6912.2	44866.7	646.5	69.1	448.7	6.5
2008-09	9	174000	1137000	6.53	5372.3	37900	705.5	53.7	379	7.1
2009-10	10	230000	1435000	6.24	7101.3	47833	673.6	71	478.3	6.7
2010-11	11	2,27060	15,52267	6.84	7010.2	51742	735.5	70	517.4	7.3
2011-12	12	2,87243	19,86879	6.92	8868.3	66229	744.1	88.7	662.3	7.4
2012-13	13	3,12566	21,83183	6.98	9650.08	72772.77	750.54	96.5	727.7	7.5

Source: B.B.S. and DAE.

In 1969-70, area of maize was 3239 ha and production was 3000 t pre-independence whereas in 2012-13 those were 312566 ha and 2183183 t, respectively. After 44 years, area, production and yield of maize were increased 96.5, 727.7 and 7.5 times respectively (Table-1).

Table- 2. Indexing on availability of maize crop in Bangladesh (base year1969-70).

Year	Sl. No	Population	Production (t)	Maize Availability		
				(kg/h/y)	(g/h/m)	(g/h/d)
1969-70		69882512	3000	0.04	3.58	0.12
1974-75	1	78328571	2000	0.03	2.13	0.07
1979-80	2	87981429	1000	0.01	0.95	0.03
1984-85	3	98529274	3000	0.03	2.54	0.08
1989-90	4	109300867	3000	0.03	2.29	0.08
1994-95	5	118885011	2680	0.02	1.88	0.06
1999-20	6	128172293	4075	0.03	2.65	0.09
2004-05	7	136314875	521525	3.83	318.82	10.63
2007-08	8	141028719	1343444	9.53	793.84	26.46
2008-09	9	142600000	1137000	7.97	664.45	22.15
2009-10	10	144171281	1435000	9.95	829.45	27.65
2010-11	11	145759875	1552267	10.65	887.45	29.58
2011-12	12	152518015	19,86879	13.03	1085.60	36.19
2012-13	13	156194958	2183183	13.98	1164.77	38.83

Source: Population census of Bangladesh, B.B.S. and DAE.

In 1969-70, maize crop availability was 0.12 g/h/d but in 2013 it was 38.83 g/h/d including seed and wastage (Table-2).

Table 3. Area and production of major maize growing districts of Bangladesh, 2012-13.

SL.No	District	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	
2	Chuadanga	41500	13.28	31.49	324750	14.88	34.19	
3	Thakurgao	28315	9.06	40.55	195957	8.98	43.17	
4	Lalmonirhat	25090	8.03	48.58	162995	7.47	50.63	
5	Rangpur	16670	5.33	53.91	101077	4.63	55.26	
6	Manikganj	16070	5.14	59.05	105263	4.82	60.08	
7	Panchagar	14945	4.78	63.84	95016	4.35	64.44	
8	Jhenaidah	13803	4.42	68.25	89525	4.10	68.54	
9	Rajshahi	12874	4.12	72.37	77104	3.53	72.07	
10	Bogra	9281	2.97	75.34	71752	3.29	75.36	
11	Gaibandha	8350	2.67	78.01	59467	2.72	78.08	
12	Nilphamari	7845	2.51	80.52	50377	2.31	80.39	
	Bangladesh	312566			2183183			6.98

Area and production of maize in Bangladesh were 312566 ha and 2183183 t respectively in 2012-13. Table-3 indicates the top 12 districts' coverage 80.52% area which contributes 80.39% of total production.

Results and discussion

In total, there were 20 blocks under 10 unions in the upazila Pirganj of Thakurgaon districts, (Table-4). Different agricultural information of maize production under the upazila was noted below:

Table 4. Blocks, unions and cultivable lands Pirganj upazila in Thakurgaon district, respectively in 2012-13.

Upazila	Pirganj (Thakurgaon)
Block	20
Union	10
Cultivable land (ha)	28,138

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

Data were collected from the maize growers of the targeted 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**.**

Table 5. Union wise area (ha), production (t) and yield (t/ha) of maize at Pirganj, Thakurgaon, 2012-13

Union	Area (ha)	Production (t)	Yield(t/ha)
Bhamradeha	380	2806.25	7.38
Koharani ganj	660	4083	6.19
Khangaon	260	1680	6.46
Suaidpur	410	3050	7.44
Pirganj	320	2590	8.09
Hagipur	725	4705	6.49
Dalatpur	215	1585.5	7.37
Sengaon	330	3251	9.85
Jabarhat	350	2673	7.64
Burchuna	1450	8085	5.58
Total	5100	34508.75	6.77
Average	510	3450.87	-
Max	1450	8085	9.85
Min	215	1585.5	5.58
Std	368.60	1886.37	1.19
Cv%	72.27	54.66	16.45

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

There were 20 blocks under 10 unions at Pirganj upazila. Total area, production and yield of maize at this upazila were 5100 ha, 34508.75 t and 6.77 t/ha, respectively during 2012-13 (Table5).

Table 6. Variety wise area coverage (ha) of maize at Pirganj, Thakurgaon, 2012-13.

Variety / Union	900M	900M Gold	NK -40	Pacific -11	Pacific-84	Pacific-999	224	9120	3396	Pioneer	Sunshine	Super Gold	Asta	827	962	GP-50	Total
Bhamradeha	0	35	160	0	30	0	0	10	0	30	40	75		0	0	0	380
Koharani ganj	5	75	260	0	43	80	45	0	0	10	0	59	80	0	3	0	660
Khangaon	35	0	80	0	30	10	0	20	0	35	35	0		15	0	0	260
Suaidpur	0	0	190	0	80	0	0	5	0	80	0	50		5	0	0	410
Pirganj	5	20	190	0	30	0	0	20	0	10	0	30		0	5	10	320
Hagipur	10		300	15	110	55	5	50	0	0	15	65	100	0	0	0	725
Dalatpur	0	20	90	15	30	0	0	5	0	12	0	5	10	10	8	10	215
Sengaon	10		159		35	40	15	0	0	0	18	35		0	18	0	330
Jabarhat	5	50	168	10	55	32	0	5	0	5	0	0	6	5	6	3	350
Burchuna	30	300	500	0	120	0	200	0	300	0	0	0		0	0	0	1450
Total	100	500	2097	40	563	217	265	115	300	182	108	319	196	35	40	23	5100
Percentage	1.96	9.80	41.12	0.78	11.04	4.25	5.20	2.25	5.88	3.57	2.12	6.25	3.84	0.69	0.78	0.45	100.00

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

Varietal status of maize at Pirganj was presented in Table-6. Out of 5100 ha maize area at Pirganj; 2097 ha, 563 ha and 500 ha were occupied by NK40, pacific-984, and 900M Gold, respectively and the rest by varieties.

Table 7. Variety wise production(t) of maize at Pirganj, Thakurgaon, 2012-13

Variety / Union	900M	900M Gold	NK -40	Pacific -11	Pacific -984	Pacific-999	224	9120	3396	Pioneer	Sunshine	Super Gold	Asta	962	GP-50	Total
Bhamradeha	0	288.75	1150	0	220	0	0	90	0	210	300	547.5	0	0	0	2806.25
Koharani ganj	37	0	1781	0	338	355	208	0	0	83	0	863	400	18	0	4083
Khangaon	230	0	480	0	205	120	0	130	0	270	145	0	0	0	0	1580
Suaidpur	0	177	1626	0	380	0	0	55	0	482	0	280	0	0	0	3000
Pirganj	35	170	1670	0	219	0	0	155	0	0	0	237	0	34	70	2590
Hagipur	110	0	2045	255	545	347.5	40	350	0	0	150	362.5	500	0	0	4705
Dalatpur	0	160	720	127.5	183.5	0	0	37.5	0	94	0	26	60	52	70	1530.5
Sengaon	110	0	1490	45	333	400	133	0	0	0	210	350	0	180	0	3251
Jabarhat	75	470	1295	42.5	380	165	45	37.5	0	40	0	0	42	37	16.5	2645.5
Burchuna	120	1610	3650	0	465	0	950	0	1290	0	0	0	0	0	0	8085
Total	717	2875.75	15907	470	3268.5	1387.5	1376	855	1290	1179	805	2666	1002	321	156.5	34276.25
Percentage	2.09	8.39	46.41	1.37	9.54	4.05	4.01	2.49	3.76	3.44	2.35	7.78	2.92	0.94	0.46	100.00

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

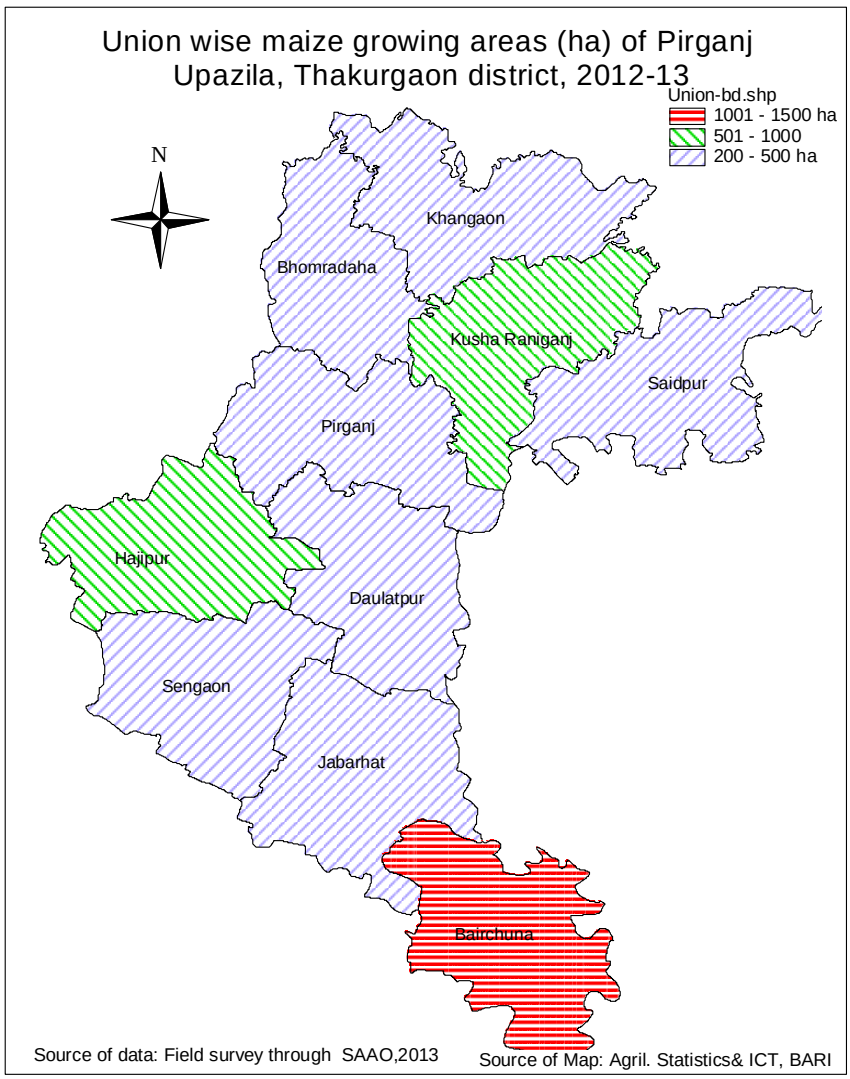
Out of 34276.25 t maize production at Pirganj in 2012-13; 15907 t (46.14%), 3268.5 t (9.54%) and 2875.75t (8.39%) were contributed by three varieties NK40, Pacific -984 and 900M Gold and the rest by varieties (Table -7).

Table 8. Area (ha), production (t) and yield (t/ha) of maize at Pirganj of Thakurgaon district, respectively, 2012-13.

Area	Area (ha)	Production (t)	Yield(t/ha)
Pirganj (Thakorganj)	5100	34508.75	6.77

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

Cultivated area of maize in the study areas was 5100 ha. production was 34508.75 t and yield of maize was 6.77 t/ha (Table-8) at Pirganj, in Thakorganj.



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

Table 9. Price (Tk/Kg), cost(Tk/Kg), benefit (Tk/Kg) and benefit cost ratio (BCR) of maize at Pirganj of Thakurgaon district, 2012-13.

Area	Price (Tk/Kg)	Cost(Tk/Kg)	Benefit/Profit (Tk/Kg)	BCR
Pirganj (Thakorganj)	13.68	7.15	6.53	1.91

Benefit Cost Ratio (BCR) of maize was 1.91 at Pirganj in Thakorganj district. (Table-9)

Conclusion

In this study, 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 also developed. Sixteen (16) varieties were cultivated and Maximum area (74.09%) of maize was cultivated by the executive varieties NK-40, Pacific-984, 900M Gold, 900M, 3396 and Super gold. A web site was developed for variety wise area coverage data collection of maize as well as for other crops. This web site can be used through mobile phone. It is noted that BARI maize varieties were not cultivated in the study areas. However, it was found in some places of Manikganj, Kushtia, Dinajpur, Chuadanga, Jamalpur and Sherpur etc. Where germination capacity of BARI maize varieties needs improvement and their cultivation must be expanded rapidly in the farmers' fields. Furthermore dwarf type maize variety should be released. Besides adopting HYVs, management practices should be improved. Finally it was revealed that enhancement of maize production could be gained by vertical and horizontal expansion.

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