Annual Activities of the Year 2021-2022
Soil Resource Development Institute, Rangpur

1.Progress of Nirdeshika Updating

Office	Field survey			Map finalization		
	District	**Target**	**Achievement**	**District**	**Target**	**Achievement**
Divisional Office, Rangpur	Kurigram	Chilmari	Completed	Nilphamari	Dimla	Completed
Regional office, Gaibandha	Bandarban	Alikadam	completed	Gaibandha	Saghata	Completed
	Bandarban	Thanchi	completed	-	-	
Regional office, Lalmonirhat	Bandarban	Ruma	Completed	Kurigram	Bhurungamari	Completed
	Rangamati	Longodu	Completed	-	-	
Regional office, Dinajpur	Nilphamari	Domar	Completed	Dinajpur	Birol	Completed
Regional office,Thakurgaon	Bandarban	Naikkhongchari,	Completed	Panchagarh	PanchagarhSadar	Completed

Office	Draft report preparation			Final report preparation		
	District	**Target**	**Achievement**	**District**	**Target**	**Achievement**
Divisional Office, Rangpur	Gaibandha	Sunderganj	Sent to HQ	Lalmonirhat	Aditmari	Sent to Nirdehika cell
Regional office, Gaibandha	Joypurhat	Joypurhat Sadar	Sent to Divisional Office, Rajshahi			
	Bogra	Sariakandi	Sent to Nirdesika cell			
Regional office, Lalmonirhat	Kurigram	Bhurungamari	Going on	Lalmonirhat	Kaliganj	Published
				Nilphamari	Joldhaka	Published
Regional office, Dinajpur	Dinajpur	Birol	Processing	Dinajpur	Parbatipur	Completed
Regional office, Thakurgaon	Kishoreeganj	Pakundia	Completed			

2.Informationon Upazila Surveyed during 2021-2022 (Divisional Office, Rangpur
2(a) Name of Upazila& District: Sunderganj, Gaibandha

2(b)Change in Land Type (for floodplain, piedmont and terrace area)

Land type	Previous (Year)		Present (Year)		% increase/ decrease	Possible reasons
	Area (ha)	%	Area (ha)	%		
Highland	9,266	22.48	8,595	20.85	1.63 (decrease)	Due to increase of settlement, industries.
Medium Highland	17,652	42.83	16,007	38.84	3.99 (decrease)	
Medium Lowland	5,365	13.02	6,928	16.81	3.79 (increase)	Due to changes in river, pond and char land.
Lowland	611	1.48	795	1.93	0.45 (increase)	
Very lowland	-	-	-	-	-	
Miscellaneous	8,320	20.19	8,889	21.57	1.38 (increase)	Due to changes in river, pond and char land.
Total	41,214	100	41,214	100		

2.Information on Upazila Surveyed during 2021-2022 **(Regional Office, Lalmonirhat)**
2(a) Name of Upazila & District:

Upazila name	District name
Ruma	Bandarban
Longodu	Rangamati

2(b) Change in Land

Type (for floodplain, piedmont and terrace area): Kaliganj upazila, Lalmonirhat.

Land type	Previous (Year)		Present (Year)		% increase/ decrease	Possible reasons
	Area (ha)	%	Area (ha)	%		
Highland	6447	27.2%	4874	20.6%	6.6% decrease	Due to increase of settlement, industries, change in river, pond, char land.
Medium Highland	12995	54.8%	10594	44.7%	10.1% decrease	
Medium Lowland	1873	7.9%	1400	5.9%	2% decrease	
Miscellaneous	2379	10%	6826	28.8%	18.8% increase	
Total	23694	100	23694	100		

2.Information on Upazila Surveyed during 2021-2022 **(Regional Office, Gaibandha)**
2(a) Name of Upazila & District:

Upazila	District
Alikadam	Bandarban
Thanci	Bandarban

2(b)Change in Land Type (for floodplain, piedmont and terrace area): Joypurhat Sadar Upazila

Land type	2013 (Year)		2022 (Year)		% increase/ decrease	Possible reasons
	Area (ha)	%	Area (ha)	%		
Highland	9905	41.5	8552	35.8	5,7% decrease	Due to increase of settlement, industries, change in river, pond,
Medium Highland	9442	39.6	8305	34.8	4.8% decrease	
Medium Lowland	631	2.6	565	2.4	0.2% decrease	
Miscellaneous	3886	16.3	6442	27.0	10.7 increase	
Total	23864	100	23864	100		

2(d) Change in Land Use (for floodplain, piedmont and terrace area)

2(d)Change in LandUse (for floodplain, piedmont and terrace area): Joypurhat Sadar Upazila

Land Use	Land type	2013 (year)		2022 (year)		% increase/ decrease	Possible reasons
		Area (ha)	%	Area (ha)	%		
1.Boro-fallow-T.aman		5277	22.1	906.8	3.8	-18.3%	Due to increasing croping intensity new cropping pattern adapted
2.wheat/maize-jute-T.aman		3640	15.3	3006	12.4	-2.9%	
3.Potato/musterd-Boro-T.aman		6700	28.1	3699	15.5	-12.6%	
4. Rabi & kharif vegetable		1843	7.7	2458	10.5	+2.8%	
5.Sugarcane/Banana		1902	7.9	1122	4.7	-3.2%	
6.Boro/wheat-Aus-T.aman				1528	6.5	+6.5%	
7.Potato-Maize-T.aman				2793	11.7	+11.7%	
8.Boro-Fallow-fallow		209	0.9			-0.9%	
9.Wheat/Maize-fallow-T.aman				550	2.4	+2.4%	
10.Orchard				765	3.2	+3.2%	
11.Others		407	1.7	600	2.5	+0.8%	
Miscellaneous		3886	16.3	6442	27.0	+10.7%	
Total		23864	100	23864	100		

2.InformationonUpazilaSurveyed during 2021-2022 **(Regional Office, Dinajpur)**

2(a) Name of Upazila& District : Chirirbandar , Dinajpur

2(b)Change in Land Type (for floodplain, piedmont and terrace area)

Land type	Previous (Year)		Present (Year)		% increase/ decrease	Possible reasons
	Area	%	Area	%		

	(ha)		(ha)			
Highland	17174	56.00	14269	46.2	-9.8	due to increase of settlement area & washing out soil due to heavy rainfall
Medium Highland	10561	34.00	9051	29.3	-4.7	due to silt deposition after flooding
Medium Lowland	-	-	516	1.7	+1.7	due to beel area protection from misuse
Miscellaneous	3133	10.00	7032	22.8	+12.8	due to increasing trend of population
Total	30868	100.0	30868	100.0		-

2(d)Change in LandUse (for floodplain, piedmont and terrace area)

Land Use	Land type	Previous (year)		Present (year)		% increase/ decrease	Possible reasons
		Area (ha)	%	Area (ha)	%		
1.Perennial	HL	-	-	1586	5.13	+5.13	Perennial Orchard & Boro cultivation increased. Aus &TA cultivation decreased. Vegetable Production increased
2. Annual	HL	1345	4.35	1675	5.42	+1.07	
3. Rabi Crops-Kharif Vegetable	HL	1064	3.44	2069	6.70	+3.26	
4. Rabi crops-Aus/Jute- Fallow	HL	1874	6.07	-	-	-6.07	
5. Rabi crops-Fallow- T. Aman	HL	2392	7.74	-	-	-7.74	
6. Rabi crops-Aus/Jute- T. Aman	HL	5970	19.34	-	-	-19.34	
7.Fallow-Fallow-T. Aman	HL	2082	6.74	-	-	-6.74	
8.Boro-Fallow- T. Aman	HL	1041	3.37	2086	6.76	+2.99	
9.Potato/mutard-Boro(M)/Maize-T. Aman (M)	HL	-	-	1143	3.70	+3.70	
10.Boro(M)-T. Aus- T. Aman(M)	HL	-	-	89	0.29	+0.29	
11.Rabicrops-Fallow-T.Aman	HL	-	-	3588	11.62	+11.62	
12.Rabi crops-Maize- T. Aman	HL	-	-	2860	9.27	+9.27	
13.Rabicrops-Fallow-T.Aman	MHL	2392	7.74	1428	4.63	-3.11	
14.Fallow-Fallow-T. Aman	MHL	2029	6.57	-	-	-6.57	
15.Boro-Fallow-T. Aman	MHL	5916	19.26	2822	9.14		
16.Fallow-Aus/Jute- T. Aman	MHL	194	0.63	726	2.35		
17.Rabicrops-Aus/Jute- T. Aman	MHL	1436	4.75	596	1.93		
18.Rabicrops-T.Aus-T.Aman	MHL	-	-	139	0.45	+0.45	
19.Potato/mutard-Boro(M)/Maize-T. Aman (M)	MHL	-	-	2632	8.52	+8.52	
20.Boro-Fallow-Fallow	MLL	-	-	397	1.29	+1.29	
Miscellaneous	-	3133	10.0	7032	22.8	+12.8	
Total		30868	100.0	30868	100.0		

2.Information on Upazila Surveyed during 2021-2022**(Regional office, Thakurgaon)**

2(a) Name of Upazila& District:

Upazila name	District name
Naikkhongchari	Bandarban
Rowmari	Kurigram

2(b) Change in Land Type (for floodplain, piedmont and terrace area): Pirganj Upazila, Thakurgaon.

Land type	Previous (Year)		Present (Year)		% increase/ decrease	Possible reasons
	Area (ha)	%	Area (ha)	%		
High land	19,110	54.07%	17,851	50.52%	3.55% decrease	Due to increase of settlement, industries, change in river, pond, char land.
Medium High land	10,864	30.74%	10,484	1.07%	10.1% decrease	
Medium Low land	770	2.18%	479	1.35%	0.83% decrease	
Miscellaneous	4,597	13.01%	6,527	18.46%	5.45% increase	
Total	35,341	100	35,341	100		

3. Union Sahayika Preparation

Name of Office	District	Upazila	No. of shahayika prepared
Divisional Office,Rangpur	Gaibandha	Sadullapur	5 (Noldanga,khordokomorpur,Rasulpur,Damodorpur ,Jamalpur)
Regional Office, Gaibandha	Gaibandha	Gaibandha Sadar	5 (Malibari,Gidari,Boali,kholahati,Pourosova)
Regional Office, Lalmonirhat	Lalmonirhat	Lalmonirhat Sadar	5 (Borobari, Mohendranagar, Kulaghat, Mogholhat, Panchogram)
Regional Office, Dinajpur	Dinajpur	Chirirbandar	5 (Fotejongopur, Nasratpur, Tetulia, Alokdihi, Sathnala)
Regional office, Thakurgaon	Thakurgaon	Pirganj	5 (Jabarhat, Bairchuna, Pirganj Pourashava, Sengaon, Hajipur)

4. Mobile Soil Testing Services (MSTL)

Name of Office	Rabi/2022	District	Total no. of sample analyzed	Kharif/2022	District	Total no. of sample analyzed
Divisional Office, Rangpur	Saidpur	Nilphamari	50	Kaunia	Rangpur	54
Regional Office, Gaibandha	Gaibandha sadar	Gaibandha	50	Sadullapur	Gaibandha	50
Regional Office, Lalmonirhat	Kaliganj	Lalmonirhat	51	Ulipur	Kurigram	50
Regional Office, Dinajpur	Birampur	Dinajpur	50	Ghoraghat	Dinajpur	50
Regional	pirganj	Thakurgaon	50	Atwari	Panchagarh	50

office, Thakurgaon						

5.Yield Data of STB Field Trial

Name of Office	SL No.	Name of Upazila	Name of District	Crop (s) & variety (s)	Average yield (t/ha)		Yield increase/decrease (%)
					Farmer s' field	Demonstration plot	
Divisional Office, Rangpur	01.	Rangpur Sadar	Rangpur	Potato Asterix	33.5	40	19
	02.	Kaunia	Rangpur	BRRI dhan-58	6.07	8.1	33
Regional Office, Dinajpur	01.	Dinajpur Sadar	Dinajpur	Boro BRRI Dhan 81	3.61	4.47	23
	02.	Birol	Dinajpur	BARI Ghom 33	3.9	4.7	20

6. Distribution of Fertilizer Recommendation Card

Name of Office	District	Upazila	Type of service		No. of card distributed	Remarks
			Nirdeshika based recommendation	Online based recommendation		
Divisional Office, Rangpur	Rangpur	Mithapukur	135	60	195	(MSTL 100)
	Rangpur	Rangpur Sadar	250	100	250	
	Rangpur	Badarganj	250	50	300	
	Rangpur	Pirganj	230	50	280	
Regional Office, Gaibandha	Gaibandha	Sadar	240	300	540	
	Gaibandha	Saghata	200	300	500	
	Gaibandha	sadullapur	60	300	360	
	Gaibandha	Palashbari		300	300	
Regional Office, Lalmonirhat	Lalmonirhat	Sadar	240	-	240	
	Kurigram	Sadar	300	-	300	
Regional Office, Dinajpur	Dinajpur	Fajilpur	500	-	500	
Regional office, Thakurgaon	Thakurgaon	Sadar, Baliadang, Ranishangkail, Pirganj, Haripur	206	-	206	(MSTL 100, Soil Test based 40)

7. Training Programme

7(a)Training Received

Name of Office	Title of the programme	Duration	Host organization	Participant	
				Designation	Number
Divisional Office, Rangpur	Data Entry on ArcGIS Software	1day	SRDI	SSO	01
Regional Office, Gaibandha	Data Collection	1day	SRDI	SO	01

Regional Office, Lalmonirhat	Training on Digital Map Preparation Using GIS & Remote Sensing Software	3 days	SRDI	SSO	1
	Training on Upazila Field Survey	2 days	SRDI	SSO	1
Regional Office, Dinajpur	Use of Survey 123 Apps	01day	SRDI, HQ	Scientific Officer	1
Regional office, Thakurgaon	Training on Digital Map Preparation Using GIS & Remote Sensing Software	3 days	SRDI	SO	1
	Training on Upazila Field Survey	2 days	SRDI	SO	1

7(b)Training Imparted

Name of Office	Title of the programme	Duration	Host organization	Participant	
				Type	Number
Divisional Office, Rangpur	Soil sample collection & Identification of adulterated fertilizers	01day	SRSRF PROJECT, SRDI	Farmers, SAAO & Fertilizer dealer	45
	Soil sample collection & Identification of adulterated fertilizers	01day	SRSRF PROJECT, SRDI	Farmers, SAAO & Fertilizer dealer	45
	Data Entry on ArcGIS Software	01day	SRDI, Rangpur	SAAO	30
	MSTL	01day	SRDI, Rangpur	Farmers	100
Regional Office ,Gaibandha	Data Entry on ArcGIS Software	01day	SRDI, Gaibandha	SAAO	30
	MSTL	01day	SRDI, Gaibandha	Farmers	100
Regional Office, Lalmonirhat	MSTL	01day	SRDI, Lalmonirhat	Farmers	100
	Data Entry on ArcGIS Software	01day	SRDI, Lalmonirhat	SAAO	30
Regional Office, Dinajpur	Method of Soil Sample Collection, use of Balance fertilizers and Fertilizer Management	01 day	SRDI	Farmers	25*4=100 45*2=90 190
	Use of Survey 123 Apps	01day	SRDI	SAAO	30
Regional office, Thakurgaon	MSTL Farmers Training at Pirganj upazila During Rabi season.	1 Day	SRDI, Thakurgaon	Farmers	50
	MSTL Farmers Training at Atwari upazila During Rabi season.	1 Day	SRDI, Thakurgaon	Farmers	50
	Data Entry on ArcGIS Software	1 Day	SRDI, Thakurgaon	SAAO	30

8. Advisory Services to Beneficiaries

Name of Office	District	Upazila	Agency	Service Provided
Divisional Office, Rangpur	Rangpur	Sadar	Students of Begum Rokeya University	Technical Support & Advisory Service Provided
	Rangpur	Sadar	Students of Carmichael College	Technical Support & Advisory Service Provided
	Nilphamari	Kishoreganj	Farmers	Advisory Service Provided
Regional Office, Lalmonirhat	Lalmonirhat	Aditmari	I Farmer Pvt. Ltd.	Technical Support Provided
	-	-	MS students of Shahjalal University of Science & Technology (SUST)	Technical Support Provided
	Lalmonirhat	Sadar	USDA	50 Farmers training imperted
	Lalmonirhat	Sadar	BMDA	50 Farmers training imperted
Regional Office, Gaibandha	Gaibandha	Palashbari	Upazila Agricultural Office	Uses of Upazila nirdeshika
	Gaibandha	Gaibandha sadar	Upazila Agricultural Office	Uses of Upazila nirdeshika & union soyahika
Regional Office, Dinajpur	Dinajpur	Dinajpur Sadar	HSTU	Profile Description
			BADC	soil sample collection
Regional office, Thakurgaon	Thakurgaon	Pirganj	BSFIC	Technical Support Provided
	-	-	Undergraduate students of Hajee Mohammad Danesh Science & Technology University of (HSTU)	Technical Support Provided
	Thakurgaon	Sadar	ESDO	50 Farmers training imperted

9. Distribution of saplings and/seedlings

Name of Office	Upazila	District	Number		Total	Remarks
			Fruits	Vegetables		
Divisional Office, Rangpur	Mithapukur	Rangpur	50	30	80	
	Gangachara	Rangpur	50	50	100	
	Pirganj	Rangpur	60	100	160	
	Kaunia	Rangpur	60	150	210	
	Sadar	Rangpur	50	60	110	

Regional Office,Gaibandha	Gaibandha sadar	Gaibandha	100	200	300	
	Sadullapur	Gaibandha	100	200	300	
	Sundarganj	Gaibandha	50	250	300	
	Saghata	Gaibandha	50	250	300	
Regional Office, Lalmonirhat	Sadar	Lalmonirhat	300	200	500	-
	Sadar	Kurigram	300	200	500	-
Regional Office, Dinajpur	Dinajpur Sadar	Dinajpur	600	1366	1966	
	Birol	Dinajpur	250	432	682	
Regional office, Thakurgaon	Thakurgaon	Ranishangkail	660	330	990	-
	Thakurgaon	Sadar	374	187	561	-
	Panchagarh	Atwari	300	150	450	-

10. Research Experiment **(Divisional office, Rangpur)**

Year: 2018-2019(1st Year)

EFFECT OF LIMING ON IMPROVEMENT AND CONSERVATION OF SOIL HEALTH, IMPROVEMENT OF ENVIRONMENT AND YIELD OF CROP IN ACIDIC SOIL OF TISTA FLOODPLAIN (AEZ-3)

Khandakar Taheratul Hosna[1], Md. Kamaruzzaman[2] , Md. Nurul Islam[3]

Introduction: The wheat yield in this country is low. There are several reasons that can explain the yield variation, which cover both biotic and abiotic factors. Among the biotic factors, unavailability of high yielding varieties (Rerkasem et al., 1993), incidence of diseases and pests (Hossain et al., 1995) and abiotic factors such as high temperature (Orakwue, 1984), moisture stress (Bingham, 1966) and nutrient deficiency (Rerkasem et al., 1991; Jahiruddin et al., 1992; Islam et al., 1999) are responsible for lower productivity of wheat in the tropics and subtropics. Among these factors, the most dominating factor that is a vital barrier for crop productivity is problem soil like acidic soil, saline soil etc.

There are different types of problem soils in Bangladesh. These soils restrict the growth of plants and make crop production difficult and sometimes impossible. Special management practices need to be applied in such soils for economic crop production. Acid soil in Bangladesh is one of the problematic soils. The potential of acid soil for crop production is limited due to less availability of phosphorus and toxicity of aluminum.

Nutrient availability in soil depends on the pH value of soils. On the basis of pH, soil are classified as alkaline, neutral and acidic having pH range 6.6 to 7.4. (Hausenbuiller, 1972). Most of the plant nutrients are highly available in neutral soil having pH 6.6 to 7.4. But soil acidity is a major growth-limiting factor for plants in many parts of the world (Adams, 1980). Aluminum toxicity is responsible for poor yields in acid soils (Lierop, 1984). Infertility of Acid soil is a major limitation to crop production on highly weathered and leached soil throughout the world (Mokolobate and Haynes, 2004) . There are some reclamation process for acid soils, for instance liming that increases the availability of P, Ca, Mg and Mo and renders iron, and manganese insoluble and harmless, increases fertilizer effectiveness and decreases plant diseases (Sahai, 1990).

From the above discussion, it is clear that liming has great impact for increasing the productionof wheat. So, it becomes essential to investigate into the response of wheat to different doses (treatments) of lime. In view of the above discussion, the present study was designed and carried out with the objectives as below:

- To evaluate the effects of liming on yield and yield attributes of wheat from different doses of lime.
- To evaluate the effects of liming on the changes of nutrients status of soil after harvest of wheat from different treatments of lime.

Material and Methods

The 1st experiment was set up at Chadkhana union of Kishoreganjupazila under Nilphamari district and The 2nd experiment was set up at Betgari union of Gangacharaupazila under Rangpur district .The test crop was wheat. BARI Gom-30 was used as test crop forthese experiment.There were five different doses of lime which were applied in wheat as follows- T1 : Control, T2 : 0.5 t lime ha-1, T3 : 0.75 t lime ha-1, T4 : 1.0 t lime ha-1 andT5 : 1.25 t lime ha-1. The experiment was laid out in Randomized Complete Block Design(RCBD) with three replications. The experimental areas were divided into15 (5×3) units of plots as per treatments and replications. One meter drains separated unit blocks from one another. Each plot measuring 5m× 4 m.

Analysis of soil samples& Data:

Soil samples were collected randomly from 9 different spots of the field from a depth of 0-15cm. and were analyzed as per standard methods for soil texture, pH, organic matter, total N and available P, K, S, Ca, Mg, Zn, B and Mn contents. The data were analyzed statistically by F-test to examine whether the treatment effects were significant or not. The mean comparisons of the treatments were evaluated by LSD test if the treatments were significant.

The analysis of variance (ANOVA) for different parameters was done by computer using "Statistix-10" software program.

Results and Discussion

Effects of liming on changes of Soil properties of post-harvest soils:

The phosphorus content in soil was significantly influenced by the application of lime. The treatment T4 (1.0 tha^{-1}) obtained the highest P content (110.53µg g^{-1} soil) than the other four treatments T5 (1.25 tha^{-1}), T3 (0.75 tha^{-1}), T2 (0.5 tha^{-1}) and T1 (control) respectively (Table-1). Application of lime increased phosphorus content in soil.The S content in soil was also significantly influenced by the different doses of lime. The highest S content (26.17µg g^{-1} soil) was obtained at the treatment T4(1.0 tha^{-1}) and the lowest S content was obtained at control. The treatment T5 (1.25 tha^{-1}) was in second position(Table-1). Application of lime increased K content in soil. The highest K content (0.29meq 100 g^{-1}soil) was obtained at treatment T4 (1.0 tha^{-1}) and T5 (1.25 tha^{-1}). The lowest K content (0.23meq 100 g $soil^{-1}$) was found in control (Table-1). The pH of soil also significantly influenced by the application of lime. Application of lime increased soil pH . The highest pH was obtained at treatment T5 and the pH of the treatment T4 was in second position. The lowest soil pH was in treatment T1 (control) (Table-1).The Zn content was also significantly influenced by the treatments of lime. The highest Zn content (1.86 µg g^{-1} soil) was obtained at the treatment T4 and T5 . The Zn content at the treatment T3 and T2 were decreased respectively and the lowest Zn content was obtained at the control (0 tha^{-1}) of the soil sample analysis (Table-1). The results which were obtained at the soil sample analysis after the harvest of wheat showed that the highest P and S content was obtained at the treatment T4 (1.0 tha-1) (Table-2). which might result in highest flowering and fruiting. For these reason, we obtained the highest yield at the treatment T4 (1.0 tha^{-1})

Table 1:Effects of liming on soil properties of post harvest soils at Wheat field

Treatments	pH	Organic Matter(%)	N(%)	K(meq $100g^{-1}$soil)	Mg(meq $100g^{-1}$soil)	P(µg g^{-1}soil)	S(µg g^{-1}soil)	Zn (µg g^{-1}soil)
Analytical Values before 1st Year Experiment	5.20	1.78	0.09	0.17	0.36	95.42	16.65	0.65
Analytical Values after 1st Year Experiment								
T_1: Control	5.20c	1.79 b	0.09	0.23 b	0.80 d	105.87c	14.96 b	1.10 b
T_2: 0.5 t ha^{-1}	5.41 b	1.86 b	0.09	0.25 b	1.26 b	106.36 bc	16.76 b	1.25 b
T_3 :0.75 t ha^{-1}	5.57a	2.00 a	0.10	0.28a	1.21 b	106.88 bc	23.34 a	1.28 b
T_4:1.0 t ha^{-1}	5.65a	1.83 b	0.09	0.29 a	1.09 c	110.53 a	26.17 a	1.86 a
T_5 :1.25 t ha^{-1}	5.69 a	1.97 a	0.10	0.29 a	1.56 a	108.43ab	24.38 a	1.86 a
F-test	**	**	NS	**	**	**	**	**
$LSD_{0.05}$	0.146	0.103	0.017	0.029	0.084	2.27	3.99	0.238
CV (%)	1.44	2.76	9.21	5.72	3.59	1.12	10.04	8.52

**= Significant at 1% level of probability, NS = Not significant

Table 2: Effects of liming on growth and yield components of wheat

Treatments	Plant Height at Maturity (cm)	Tillers $Hill^{-1}$ (no.)	Spike Length (cm)	Grains $Spike^{-1}$	1000-grains weight (g)	Grain yield (t ha^{-1})
T_1: Control	84.59 c	3.00 b	7.91 b	34.58 c	44.40 b	4.57 b
T_2: 0.5 t ha^{-1}	85.16 bc	3.33 b	8.68 a	43.99 b	46.80 ab	5.29 a
T_3 :0.75 t ha^{-1}	87.14 bc	3.93 a	8.84 a	47.35 a	47.90 ab	5.37 a
T_4:1.0 t ha^{-1}	91.12 a	4.27 a	8.97 a	49.43 a	50.10 a	5.56 a
T_5 :1.25 t ha^{-1}	89.56ab	4.00 a	8.93 a	48.17 a	49.40 a	5.49 a

F-test	*	**	**	**	*	**
$LSD_{0.05}$	4.52	0.442	0.347	2.70	3.59	0.337
CV (%)	2.75	6.35	2.14	3.21	3.99	3.42

**= Significant at 1% level of probability, *= Significant at 5% level of probability

Yield Components:

The application of different doses of lime significantly increased the plant height, the effective number of tillers hill^{-1}, spike length plant^{-1}, the number grain spike^{-1} , 1000 grain weights (g) and Grain yield (t ha^{-1}) are presented in Table 2. The treatment T_4 (1.0 t lime ha^{-1}) produced grain yield of 5.56 ton ha^{-1} which was statistically higher to those in T_1, T_2, T_3 & T_5 treatments.

Results and Discussion (2nd Experiment)

Effects of liming on changes of Soil properties of post-harvest soils:

The phosphorus content in soil was significantly influenced by the application of lime. The treatment T3 (0.75 tha^{-1}) obtained the highest P content (27.28 µg g^{-1} soil) than the other four treatments T4 (1.0 tha^{-1}), T2 (0.5 tha^{-1}), T5 (1.25 tha^{-1}) and T1 (control) respectively (Table-1). Application of lime increased phosphorus content in soil. The S content in soil was also significantly influenced by the different doses of lime. The highest S content (84.56µg g^{-1} soil) was obtained at the treatment T3(0.75 tha^{-1}). The treatment T4 (1.0 tha^{-1}) was in second position(Table-1).The potassium content in soil was also significantly influenced by the different treatments of lime (Table-1). Application of lime increased K content in soil. The highest K content (0.20meq 100 g^{-1} soil) was obtained at treatment T3(0.75 tha^{-1}) and the lowest K content (0.17meq 100 g soil^{-1}) was found in control (Table-1). The pH of soil also significantly influenced by the application of lime. Application of lime increased soil pH . The highest pH was obtained at treatment T5 and the lowest soil pH was in treatment T1 (control) (Table-1).The results which were obtained at the soil sample analysis after the harvest of wheat showed that the highest P and S content was obtained at the treatment T3 (75.0 tha-1) (Table-1). which might result in highest flowering and fruiting. For these reason, we obtained the highest yield at the treatment T3 (0.75tha^{-1}).

Table 1: Effects of liming on soil properties of post harvest soils at Wheat field

Treatments	pH	Organic Matter(%)	N(%)	K(meq 100g^{-1}soil)	Mg(meq 100g^{-1}soil)	P(µg g^{-1}soil)	S(µg g^{-1}soil)	Zn(µg g^{-1}soil)
Analytical Values before 1st Year Experiment	5.75	2.13	0.11	0.10	0.40	24.44	14.43	0.61
Analytical Values after 1st Year Experiment								
T_1: Control	5.72 c	1.67 b	0.08	0.17	0.55 d	24.50 d	19.18 d	4.38 b
T_2: 0.5 t ha^{-1}	5.81 bc	1.65 b	0.08	0.19	0.89 c	25.85 bc	32.94 c	5.45 a
T_3 :0.75 t ha^{-1}	5.86 abc	1.90 a	0.09	0.20	1.05 bc	27.28 a	84.56 a	2.10 d
T_4:1.0 t ha^{-1}	5.92 ab	1.74 b	0.09	0.19	1.14 b	26.77 ab	56.08 b	3.26 c
T_5 :1.25 t ha^{-1}	5.98 a	1.94 a	0.09	0.18	1.38 a	24.88 cd	14.56 d	1.61 d
F-test	*	**	NS	NS	**	**	**	**
$LSD_{0.05}$	0.146	0.158	0.016	0.030	0.188	1.24	5.30	0.636
CV (%)	1.30	4.64	10.07	8.42	9.77	2.55	6.78	10.03

**= Significant at 1% level of probability, *= Significant at 5% level of probability, NS = Not significant

Table 2: Effects of liming on growth and yield components of wheat

Treatments	Plant Height at Maturity (cm)	Tillers Plant^{-1} (no.)	Spike Length (cm)	Grains Spike^{-1}	1000-grains weight (g)	Grain yield (t ha^{-1})
T_1: Control	87.14 c	3.53 d	6.90 b	28.17 c	47.60 b	4.52 c
T_2: 0.5 t ha^{-1}	95.11 ab	4.93 b	8.58 a	47.39 ab	48.70 b	5.22 b
T_3 :0.75 t ha^{-1}	96.49 a	5.53 a	8.86 a	48.77 a	50.90 a	5.63 a
T_4:1.0 t ha^{-1}	96.47 a	5.27 a	8.84 a	48.75 a	49.00 b	5.52 ab
T_5 :1.25 t ha^{-1}	92.28 b	4.13 c	8.45 a	45.41 b	48.40 b	4.65 c
F-test	**	**	**	**	**	**
$LSD_{0.05}$	3.72	0.337	0.526	2.71	1.67	0.342
CV (%)	2.11	3.83	3.35	3.29	1.81	3.56

**= Significant at 1% level of probability

The application of different doses of lime significantly increased the plant height, the effective number of tillers hill^{-1}, spike length plant^{-1}, the number grain spike^{-1} , 1000 grain weights (g) and Grain yield (t ha^{-1}) are presented in Table 2. The treatment T_3(0.75 t lime ha^{-1}) produced grain yield of 5.6 ton ha^{-1} which was statistically higher to those in T_1, T_2, T_4& T_5 treatments.

Conclusion:

The different characters of wheat viz. plant height, tillers hill-1, spike length, grains sipke-1 and grain yield were significantly increased by the application of lime. For the 1st experiment application of 1.0 tlime ha-1 significantly increased most of the growth parameters of wheat compared to other doses. For the 2nd experiment application of 0.75tlime ha-1 significantly increased most of the growth parameters of wheat compared to other doses The lowest value was found for most of the growth parameters atcontrol for both experiment. The application of lime had significant effect on the grain yield of wheat. For the 1stexperiment thehighest grain yield was found at treatment T4 (1.0 t ha-1), For the 2nd experiment the highest grain yield was found at treatment T3 (0.75 t ha-1). From the present study, it may be concluded that wheat plant significantly responded to different doses of lime. Thus, the application of 1.0 t lime ha-1 is enough for the satisfactory yield of wheat for the 1st experiment where the initial pH was 5.2 and the application of 0.75 tlime ha-1 is enough for the satisfactory yield of wheat for the 2nd experiment where the initial pH was 5.75. The application of lime had positive impact on yield attributes resulted in higher yield of wheat.

Year: 2019-2020 (2nd year)

Introduction same as 1st year

Material and Methods (Little bit changes in Treatments)

1st Experiment was conducted at Chadkhana union of Kishoreganj Upazila under Niphamari District and 2nd Experiment was conducted at Razarhat union of RazarhatUpazila under Kurigram District from November 2019 to March 2020. It belongs to the Agro Ecological Zone 3 (Tista Floodplain). There were six different doses of lime:T1 : Control , T2 : 1.0 t lime ha-1, T3 : 2.0 t lime ha-1, T4 : 3.0 t lime ha-1, T5 : 4.0 t lime ha-1 ,T6 : 5.0 t lime ha-1. The experiment was laid out in a Randomized Complete Block Design with three replications. There were altogether 18 (6×3) unit plots (5m ×4 m). Inter-block and Inter-plot spacing were 1m and 0.7m respectively. Ten plants from each plot were sampled randomly recording for yield parameters.

Results and Discussion (1st Experiment)

Effects of liming on changes of Soil properties of post-harvest soils:

The phosphorus content in soil was significantly influenced by the application of lime. The treatment T4 (3.0tha^{-1}) obtained the highest P content (62.51µg g^{-1} soil), treatment T2 (1.0 tha^{-1}) was in second position.(Table-1). The S content in soil was also significantly influenced by the different doses of lime. The highest S content (25.79µg g^{-1} soil) was obtained at the treatment T2 (1.0 tha^{-1}) (Table-1).The pH of soil also significantly influenced by the application of lime. The Ca and Mg content in soil was also significantly influenced by the different doses of lime (Table-1).

Table 1: Effects of liming on soil properties of post harvest soils at Wheat field

Treatments	pH	Organic matter	N	P	K	S	Zn	Ca	Mg
Initial	**5.40**	**1.65**	**0.08**	**68.36**	**0.12**	**3.44**	**0.45**	**1.69**	**0.30**
T_1: Control	5.15 d	3.64 ab	0.183	61.00 ab	0.313	23.57 a	1.25 a	2.23 b	0.900 b

T_2: 1.0 t lime ha^{-1}	5.54 c	3.62 ab	0.183	61.41 ab	0.273	25.79 a	0.743 c	2.34 ab	1.31 a
T_3: 2.0 t lime ha^{-1}	5.60 bc	3.41 b	0.163	59.88 bc	0.296	16.07 b	0.690 c	2.40 ab	1.35 a
T_4: 3.0 t lime ha^{-1}	5.85 a	2.85 c	0.143	62.51 a	0.330	25.41 a	0.696 c	2.45 ab	1.39 a
T_5: 4.0 t lime ha^{-1}	5.48 c	2.68 c	0.140	60.44 ab	0.243	18.69 b	1.32 a	1.79 c	0.856 b
T_6: 5.0 t lime ha^{-1}	5.81ab	3.73 a	0.180	57.89 c	0.276	24.01 a	1.10 b	2.56 a	1.39 a
F-test	**	**	NS	**	NS	**	**	**	**
$LSD_{0.05}$	0.225	0.281	0.056	2.19	0.097	2.96	0.138	0.239	0.195
CV (%)	2.24	4.71	19.15	2.03	18.02	7.46	7.99	5.76	9.22

**= Significant at 1% level of probability, NS = Not significant

Table 2: Effects of liming on growth and yield components of wheat

Treatments	Plant height at maturity (cm)	Tillersplant^{-1}(no.)	Spike length (cm)	Grains spike^{-1}	1000-grains weight (g)	Grain yield(g)/20 m^2)
T_1: Control	93.54 b	3.15 d	7.85 c	35.98 d	45.19 d	4.23 c
T_2: 1.0 t lime ha^{-1}	101.00 a	5.33 a	9.30 a	49.86 a	50.47 a	5.51 a
T_3: 2.0 t lime ha^{-1}	99.53 a	4.77 b	8.88 ab	48.93 a	49.77 ab	4.90 b
T_4: 3.0 t lime ha^{-1}	92.86 b	4.60 bc	8.74 b	45.20 b	49.14 b	4.71 b
T_5: 4.0 t lime ha^{-1}	94.13 b	4.36 c	8.55 b	43.83 b	47.73 c	4.39 c
T_6: 5.0 t lime ha^{-1}	82.42 c	4.41 c	8.44 b	41.73 c	47.20 c	4.39 c
F-test	**	**	**	**	**	**
$LSD_{0.05}$	1.90	0.299	0.434	1.57	0.793	0.223
CV (%)	1.11	3.73	2.76	1.95	0.90	2.63

**= Significant at 1% level of probability

Yield Components:

The application of different doses of lime significantly increased the plant height, the effective number of tillers hill^{-1}, spike length plant^{-1}, the number grain spike^{-1}, 1000 grain weights (g) and Grain yield (t ha^{-1}) are presented in Table 2.The treatment T_2(1.0 t lime ha^{-1}) produced grain yield of 5.51 t ha^{-1} which was statistically higher to those in T_1, T_3, T_4 , T_5&T_6 treatments.

Results and Discussion (2nd Experiment)

Effects of liming on changes of Soil properties of post-harvest soils:

The phosphorus content in soil was significantly influenced by the application of lime. The Sulphur content in soil was also significantly influenced by the application of lime The treatment T4 (3.0tha^{-1}) obtained the highest S content (10.70 µg g^{-1} soil) than the other five treatments T3 (2.0 tha^{-1}), T2 (1.0tha^{-1}), T5 (4.0tha^{-1}), T6 (5.0tha^{-1}) and T1 (control) respectively (Table-1). Application of lime increased S content in soil. The Mg content in soil was also significantly influenced by the different doses of lime. The highest Mg content (1.50µg g^{-1} soil) was obtained at the treatment T4 (3.0tha^{-1}). The treatment T5 (4.0 tha^{-1}) was in second position(Table-1). The potassium content in soil was also significantly influenced by the different treatments of lime (Table-1). Application of lime increased K content in soil. The highest K content (0.147meq 100 g^{-1} soil) was obtained at treatment T3 (2.0tha^{-1}) and The treatment T4 (3.0 tha^{-1}) was in second position (Table-1).The pH of soil also significantly influenced by the application of lime. Application of lime increased soil pH . The highest pH was obtained at treatment T6 and the lowest soil pH was in treatment T1 (control) (Table-1).

Table 1: Effects of liming on soil properties of post harvest soils at Mustard field

Treatments	pH	Organic matter	N	P	K	S	Zn	Mg
Inital	**5.20**	**1.44**	**0.07**	**42.96**	**0.11**	**2.16**	**2.19**	**0.55**
T_1: Control	5.21 c	1.81 c	0.093	53.44 b	0.110	2.62 d	0.84 a	0.586 c
T_2: 1.0 t lime ha^{-1}	6.05 b	1.94 b	0.093	54.43 b	0.123	7.54 b	0.39 c	0.626 c
T_3: 2.0 t lime ha^{-1}	6.26 ab	2.04 a	0.100	55.52 b	0.147	9.41 a	0.13 d	1.30 b
T_4: 3.0 t lime ha^{-1}	6.38 a	2.02 a	0.100	55.94 b	0.127	10.70 a	0.087 d	1.50 a
T_5: 4.0 t lime ha^{-1}	6.43 a	1.99 ab	0.100	67.19 a	0.107	4.92 c	0.380 c	1.41 ab

T_6: 5.0 t lime ha^{-1}	6.53 a	1.92 b	0.097	67.39 a	0.117	4.65 c	0.563 b	1.36 ab
F-test	**	**	NS	**	NS	**	**	**
$LSD_{0.05}$	0.276	0.080	0.015	4.87	0.037	1.86	0.126	0.178
CV (%)	2.50	2.34	8.40	4.64	17.33	15.70	17.82	8.64

**= Significant at 1% level of probability, *= Significant at 5% level of probability, NS = Not significant

Effects of liming on changes of growth and yield components of Mustard

Table 2: Effects of liming on growth and yield components of Mustard

Treatments	Plant height at maturity (cm)	Branchplant^{-1}(no.)	Pod length(cm)	Pod branch^{-1}	1000-seedweight (g)	Grain yield(t ha^{-1})
T_1: Control	118.70 b	5.33 e	5.46 c	55.00 d	3.57 c	1.30 d
T_2: 1.0 t lime ha^{-1}	126.70 a	8.66 a	5.53 bc	104.70 bc	3.66 c	2.13 bc
T_3: 2.0 t lime ha^{-1}	128.30 a	7.66 b	5.83 ab	108.00 ab	3.87 ab	2.50 ab
T_4: 3.0 t lime ha^{-1}	129.00 a	8.65a	5.93 a	111.00 a	4.00 a	2.66 a
T_5: 4.0 t lime ha^{-1}	127.70 a	6.66 c	4.53 e	107.30 ab	3.69 bc	1.90 c
T_6: 5.0 t lime ha^{-1}	126.30 a	6.00 d	4.93 d	101.00 c	3.68 bc	1.87 c
F-test	*	**	**	**	**	**
$LSD_{0.05}$	6.31	0.521	0.336	5.44	0.191	0.386
CV (%)	2.75	4.00	3.45	3.05	2.76	10.27

**= Significant at 1% level of probability

Yield Components:

The application of different doses of lime significantly increased the plant height, the effective number of branchesplant^{-1}, pod length, the number of podsbranch^{-1}, 1000 seeds weight (g) and Grain yield (t ha^{-1}) are presented in Table 2.The treatment T_4 (3.0 t lime ha^{-1}) produced grain yield of 2.66 t ha^{-1} which was statistically higher to those in T_1, T_2,T_3, T_5&T_6 treatments.

Conclusion:

The different characters of wheat viz. plant height, tillers hill-1, spike length, grains sipke-1 and grain yield were significantly increased by the application of lime. For the 1st experiment application of 1.0 tlimeha-1 significantly increased most of the growth parameters of wheat compared to other doses. For the 2nd experiment application of 3.0 tlimeha-1 significantly increased most of the growth parameters of mustard compared to other doses. The lowest value was found for most of the growth parameters atcontrol for both experiment. The application of lime had significant effect on the grain yield of wheat and Mustard. For the 1stexperiment thehighest grain yield was found at treatment T2 (1.0 tha-1), For the 2nd experiment the highest grain yield was found at treatment T4 (3.0 tha-1). From the present study, it may be concluded that the application of 1.0 tlimeha-1 is enough for the satisfactory yield of wheat for the 1st experiment where the initial pH was 5.40 and the application of 3.0 tlime ha-1 is enough for the satisfactory yield of mustard for the 2nd experiment where the initial pH was 5.20. The application of lime had positive impact on yield attributes resulted in higher yield of wheat and Mustard.

Year: 2020-21(3rd year)

Introduction same as 1st year, Material and Methods same as 2nd year

Material and Methods (Little bit changes in Treatments)

1st Experiment was conducted at Balapara, Sadar Upazila under Rangpur District. There were five different doses of lime:T1 : Control , T2 : 0.5 tlimeha-1,T3 : 0.75 tlime ha-1, T4 : 1.0 t limeha-1, T5 : 1.25 tlimeha-1. The 2nd Experiment was conducted at Sarai union,

Kaunia Upazila under Rangpur District. There were six different doses of lime:T1 : Control , T2 : 1.0 t lime ha-1,T3 : 1.5 tlime ha-1, T4 : 2.0 tlimeha-1, T5 : 2.5 tlimeha-1 ,T6 : 3.0 tlimeha-1. The experiment was laid out in a Randomized Complete Block Design with three replications. 10 plants from each plot were sampled randomly recording for yield parameters.

Results and Discussion (1st Experiment)

OM and liming effects on changes of Soil properties of post-harvest soils:

The phosphorus content in soil was significantly influenced by the application of lime. The treatment T5 ($1.25tha^{-1}$) obtained the highest P content (38.49µg g^{-1} soil), treatment T4 (1.0 tha^{-1}) was in second position.(Table-1). Application of lime increased phosphorus content in soil.The S content in soil was also significantly influenced by the different doses of lime. The highest S content (17.98µg g^{-1} soil) was obtained at the treatment T4(1.0 tha^{-1}) and the lowest S content was obtained at control. The treatment T5 (1.25 tha^{-1}) was in second position(Table-1).The pH of soil also significantly influenced by the application of lime. Application of lime increased soil pH . The highest pH was obtained at treatment T4. The lowest soil pH was in treatment T1 (control) (Table-1).

Table 1: Effects of liming on soil properties of post harvest soils at Wheat field

Treatments	pH	Organic matter	N	P	K	S	Zn	Br	Ca	Mg
Inital	**5.25**	**1.10**	**0.10**	**17.96**	**0.21**	**15.28**	**1.24**	**0.13**	**1.72**	**0.52**
T_1: Control	4.97 c	2.36ab	0.118	16.72 c	0.177ab	12.45 c	0.943 b	0.620 c	1.63 c	0.856 b
T_2: 0.5 t lime ha^{-1}	5.11 c	2.29 b	0.123	19.02bc	0.150 b	18.89 a	1.587 a	0.767 b	3.65b	0.993 b
T_3: 0.75 t lime ha^{-1}	5.19 bc	2.30 b	0.130	23.62 b	0.153 b	15.18 b	1.027 b	0.723 b	4.03 b	1.077ab
T_4: 1.0 t lime ha^{-1}	5.51 a	2.51 a	0.145	34.43 a	0.163 b	17.98 a	1.14 b	0.943 a	5.19 a	1.277a
T_5: 1.25 t lime ha^{-1}	5.47 ab	1.98 c	0.101	38.49 a	0.203 a	17.40 a	1.447 a	0.873 a	4.92a	1.247 a
F-test	**	**	NS	**	*	**	**	**	**	**
$LSD_{0.05}$	0.281	0.152	0.032	4.78	0.031	2.21	0.207	0.099	0.757	0.223
CV (%)	2.95	3.74	14.21	9.93	10.00	7.43	9.27	7.52	10.69	11.38

**= Significant at 1% level of probability, *= Significant at 5% level of probability, NS = Not significant

Effects of liming on changes of growth and yield components of wheat

Table 2: Effects of liming on growth and yield components of wheat

Treatments	Plant height at maturity (cm)	Tillers $plant^{-1}$ (no.)	Spike length (cm)	Grains $spike^{-1}$	1000-grains weight (g)	Grain yield(g)/20 m^2)
T_1: Control	98.52 e	3.98 d	8.20 d	44.33 e	43.00 e	4.02 c
T_2: 0.5 t lime ha^{-1}	99.94 d	4.12 cd	8.97 c	48.66 d	45.00 d	4.52 b
T_3: 0.75 t lime ha^{-1}	101.50 c	4.53 bc	9.52 b	50.33 c	48.00 c	4.83 ab
T_4: 1.0 t lime ha^{-1}	106.30 a	5.33 a	10.30 a	54.01 a	53.01 a	5.19 a
T_5: 1.25 t lime ha^{-1}	103.90 b	4.66 b	9.98 a	52.66 b	50.02 b	4.97 a
F-test	**	**	**	**	**	**
$LSD_{0.05}$	0.425	0.487	0.453	0.491	0.386	0.362
CV (%)	0.22	5.71	2.56	0.52	0.43	4.08

**= Significant at 1% level of probability

Yield Components:

The application of different doses of lime significantly increased the plant height, the effective number of tillers $hill^{-1}$, spike length $plant^{-1}$, the number grain $spike^{-1}$, 1000 grain weights (g) and Grain yield (t ha^{-1}) are presented in Table 2.The treatment T_4(1.0 t lime ha^{-1}) produced grain yield of 5.19 ton ha^{-1} which was statistically higher to those in T_1, T_2, T_3& T_5 treatments.

Results and Discussion (2nd Experiment)

Effects of liming on changes of Soil properties of post-harvest soils:

The phosphorus content in soil was significantly influenced by the application of lime. The treatment T6 ($3.0tha^{-1}$) obtained the highest P content (62.27 µg g^{-1} soil) the treatment T2 ($1.0tha^{-1}$) was in second position(61.85 µg g^{-1} soil) (Table-1). Application of lime increased phosphorus content in soil.The potassium and Zinc content in soil were also significantly influenced by the different treatments of lime (Table-1). Application of lime increased K and Z content in soil. The Ca and Mg content in soil were also significantly influenced by the different treatments of lime. The treatment T2 ($1.0tha^{-1}$) obtained the highest Ca and Mg content (Table-1). The pH of soil also significantly influenced by the application of lime. Application of lime increased soil pH . The highest pH was obtained at treatment T6 and the lowest soil pH was in treatment T1 (control) (Table-1).

Table 1: Effects of liming on soil properties of post harvest soils at Wheat field

Treatments	pH	Organic matter	N	P	K	S	Zn	Br	Ca	Mg
Inital	**5.20**	**1.03**	**0.10**	**35.02**	**0.12**	**19.05**	**2.03**	**0.12**	**3.46**	**0.88**
T_1: Control	4.94 b	1.44 bc	0.163	60.36ab	0.196	5.53 c	2.37 d	0.817 c	3.77 c	1.047bc
T_2: 1.0 t lime ha^{-1}	5.40 ab	1.34 c	0.113	61.85 a	0.200	10.35 b	2.57 cd	1.04b	4.847 a	1.223 a
T_3: 1.5 t lime ha^{-1}	5.61 a	1.56 ab	0.133	58.17 c	0.190	6.20 c	2.15 d	1.05 b	4.32 b	1.20 ab
T_4: 2.0 t lime ha^{-1}	5.52 a	1.57 a	0.133	60.43ab	0.203	14.37 a	2.87bc	1.237 a	4.46 b	1.07abc
T_5: 2.5 t lime ha^{-1}	5.53 a	1.38 c	0.120	59.30bc	0.163	12.95 a	3.03ab	1.367 a	3.89 c	1.217ab
T_6: 3.0 t lime ha^{-1}	5.87 a	1.33 c	0.113	62.27a	0.206	13.73 a	3.36 a	1.227 a	4.27b	1.017 c
F-test	*	**	ns	**	ns	**	**	**	**	*
$LSD_{0.05}$	0.509	0.126	0.056	1.94	0.056	1.91	0.417	0.159	0.276	0.159
CV (%)	5.23	5.00	24.97	1.81	14.22	10.20	8.64	7.93	3.65	7.98

**= Significant at 1% level of probability, *= Significant at 5% level of probability, NS = Not significant

Effects of liming on changes of growth and yield components of Wheat

Table 2: Effects of liming on growth and yield components of wheat

Treatments	Plant height at maturity (cm)	Tillers $plant^{-1}$ (no.)	Spike length (cm)	Grains $spike^{-1}$	1000-grains weight (g)	Grain yield(g)/20 m^2)
T_1: Control	98.68 d	3.98 c	4.037 e	45.03 e	46.20 c	4.53 d
T_2: 1.0 t lime ha^{-1}	107.20 a	5.00 a	5.33 a	54.33 a	54.53 a	5.20 a
T_3: 1.5 t lime ha^{-1}	105.00 b	4.65 b	5.03 b	50.66 b	52.13 b	4.98 ab
T_4: 2.0 t lime ha^{-1}	104.30 c	4.03 c	4.98 b	48.33 c	51.74 b	4.83 bc
T_5: 2.5 t lime ha^{-1}	104.70 bc	4.33 bc	4.66 c	48.03 cd	51.58 b	4.79 bcd
T_6: 3.0 t lime ha^{-1}	104.30 c	4.23 c	4.33 d	47.83 d	51.34 b	4.68cd
F-test	**	**	**	**	**	**
$LSD_{0.05}$	0.467	0.340	0.237	0.474	1.38	0.264
CV (%)	0.25	4.27	2.74	0.53	1.48	3.02

**= Significant at 1% level of probability

Yield Components:

The application of different doses of lime significantly increased the plant height, the effective number of tillers $hill^{-1}$, spike length $plant^{-1}$, the number grain $spike^{-1}$, 1000 grain weights (g) and grain yield (t ha^{-1}) are presented in Table 2.The treatment T_2 (1.0 t lime ha^{-1}) produced grain yield of 5.20tha^{-1} which was statistically higher to those in T_1, T_3,T_4, T_5&T_6 treatments.

Conclusion:

For both experiment application of 1.0 tlime ha-1 significantly increased most of the growth parameters of wheat compared to other doses. The lowest value was found for most of the growth parameters atcontrol for both experiment. The application of lime had significant effect on the grain yield of wheat.

From the present study, it may be concluded that wheat plant significantly responded to different doses of lime. Thus, the application of 1.0 t lime ha-1 is enough for the satisfactory yield of wheat for both experiment where the initial pH was 5.25 and 5.20 respectively.

Overall Conclusion:

It may be concluded that lime application in Tista Floodplain (AEZ 3) in the Gangachara soil series increased soil pH level along with soil health which increased yield attributes and yield of Wheat and Mustard.Thus, the application of 1.0 t lime ha-1 is enough for the satisfactory yield of wheat where the initial pH was 5.20 to 5.40 and the application of 0.75 tlime ha-1 is enough for the satisfactory yield of wheat where the initial pH was 5.75. For Mustard 3.0 tlime ha-1 may be optimum where the initial pH was 5.20 at Gangachara soil series in AEZ 3. However, it was the only three years research findings, further research may be carried out for the recommended doses on the effect of lime on different crops of different soil series for conserving soil health and sustainable crop production

References

[1]. Adams, F. 1981.Nutritional imbalance and constraints to plant growth on acid soil. J. Plant Nutrition, 4:81-87.

[2]. Charles A. Black, C.A.1992. Soil Fertility Evaluation and Control.Lewis Publishers, London, 647-718 [7]. Clark, R. B., Zeto, S. K., Baligar V. C. and Richey K. D.. 1997. Growth traits and mineral concentrations of maize hybrids on unlimed and limed soil. J. of Plant Nutrition 20(12): 1795.

[3]. Hausenbuiller, R.L. 1972. Soil Science: Principle and Practices. W.M.C. Brown Company, Pub. USA.

[4]. Haynes, R. J. 1984. Lime and phosphorus in the soil plant system. Adv. Agron. 37: 249-315.

[5]. Islam M. R., Islam, M. S., Jahiruddin, M. and Hoque, M. S. 1999. Effects of sulphur, zinc and boron on yield, yield components and nutrient uptake of wheat. Pakistan J. Sci. Ind. Res. 42: (8), 137-140.

[6]. Islam, A.K. M.S., Edward, D.G. and Asher, C.J. 1980. pH optima for crop growth; Results of a following solution culture experiment with six species. Plant Soil 54:339-357

[7]. Jackson, M.L. 1962. Soil Chemical Analysis.Prentice Hall of India Pvt. Ltd. New Delhi. pp. 10-14.

[8]. Jahiruddin, M., Ali, M. S., Hossain, M. A., Ahmed, M. U. and Hoque, M. M. 1995. Effect of boron on grain set, yield and some other parameters of wheat cultivars.Bangladesh J. Agril.Sci 22(1): 179-184.

[9]. Jahiruddin, M. Hoque, M. S., Haque, A. K. M. M. and Roy, P. K. 1992. Influence of boron, copper and molybdenum on grain formation on wheat. Crop Res. 5: 35-42.

[10]. Luthra, V.K. 1978. Liming and leaching of acid sulphate soils, M. Sc. Thesis No. AE-78-3, AIT, Bangkok, Thailand.

[11]. Sahai, V. N. 1990. Fundamental of Soil Science.Kalyani Publishers, Ludhiana, New Delhi. P 76-84.

[12]. Shah, W. A., Bakht, J., Ullah, T., Khan A. W. and Zubair, M. 2006. Effect of sowing dates on the yield and yield components of different wheat varieties. J. Agron. 5(1): 106-110.

[13]. UNDP and FAO. 1988. Land Resources Appraisal of Bangladesh for Agricultural Development. Report 2, Agroecological Regions of Bangladesh. UN Dev. Prog. Food and Agric. Org.: 212-221.