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Response of Late Sowing on the Yield and Yield Contributing Character of Different Varieties of Mustard and Rapeseed in Coastal Area of Barguna

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Abstract

An experiment was carried at Multi Location Testing site Barguna to determine suitable variety of mustard (*Brassica species*.) for the late sowing condition for the coastal area of Bangladesh during rabi season of 1998-1999 and 1999-2000. Four varieties of mustard such as Daulat, Rai-5, Improved tory-7, and Ishurdi local with four sowing dates viz.15 Nov, 23 Nov, 30 Nov. and 7 Dec. were used for the experiment. The experiment was laid out in a split plot design with sowing date in the main plot and varieties in the sub plot. The results revealed that the variety Daulat (1035 kg/ha) and Ishurdi local (1014 kg/ha) produced identically superior yield irrespective of sowing time. 15 November (1164 kg/ha) and 23 November (1002 kg/ha) recorded identically superior yield irrespect of variety. Daulat and Ishurdi local variety sowing could be delayed up to 30 November to obtain a profitable yield of (872 kg/ha) and (940 kg/ha) respectively which was still economically profitable.

Key words : Mustard and rapes, Late sowing , Variety, Yield, Coastal area.

Introduction

Rapes and Mustard (*Brassica* sp.) ranks first among the oilseed crops of Bangladesh. It covers about 61.2% of the total acarage under oil seed and 52.6% of the total oil seed production. Both acarage and production of the crop have been decreasing since the start of 1990-decade maturity due to ingression of cereal crops. As a result the country is facing huge cumulative shortage in edible oil and this deficiency costs a huge amount of foreign currency for import oils and oilseed every year. These crop have been vernalization requirement. Mendhan and Scott (1975) reported that plants from later sowing more rapidly fulfil the low temperature needs to initiate earlier inflorescence and flowering. But early initiation restricts leaf production resulting in small plants, fewer pod bearing

branches and finally lower dry matter accumulation and lower yield. As the level of dry matter in plants decides the yield potential, seed yield from the late sown crops are greatly affected. Planting time plays a vital role in a country like Bangladesh, where climatic conditions vary throughout the country. Time of sowing determine the time of flowering and also it has great influence on dry matter accumulation, siliqua formation seed set, seed yield and seed oil content (Scott, *et. al*, 1973; Ali *et. al*, 1985 and Uddin *et. al*, 1986). Hossain *et al* (1984) and Uddin *et al.* (1986) concluded that the mid October was the most suitable time of sowing of rapeseed and mustard in Bangladesh (Uddin *et. al*, 1986 and Hossain *et. al*, 1984. One of the main reason for low yield of mustard in Banglsdesh is delay sowing of seeds due to delay in recession of flood water and late monsoon rain especially in the low land areas (Sarker and Paul, 1993). Bangladesh Agricultural research Institute (BARI) has developed and recommended a few high yield potential as well as late sown varieties of rape and mustard (Anonymous, 2001). These varieties may differ in their response to sowing dates for yield and yield components. Non saline phase of the Ganges tidal flood plain of southern region of Bangladesh comprise part of Barisal, Patuakhali, and Barguna districts characterized by tidal flooding of field, high rainfall in monsoon and short winter. Rice is the main crops grown in the kharif season. During the rabi season, land mainly remain fallow. Reason for fallow in the winter season delay of harvest of transplanted aman rice and wetness of soil. Land becomes free and soils comes to working condition at the end of the November to first week of January which is the time not optimum for sowing of many rabi crops due to most of the land cultivated under local T. aman and this aman rice harvest up to 1st week of January. Therefore, the present study was undertaken to find out a suitable variety of mustard and rapes for late sowing condition in coastal area of Bangladesh.

Materials and Methods

The experiment was carried out at Multilocation testing site Barguna of Bangladesh Agricultural Research Institute during rabi season of 1998-1999 and 1999-2000 under rainfed condition of coastal area. The soil of the experimental field was silty clay loam of Nalchity series containing sand 40%, clay 30% and 30% sand having pH 6.24 and organic matter content 1.03%. The experiment was laid out in split plot design with 4 replications assigned sowing date of main plot such as 15 November, 23 November, 30 November and 7 December and cultivars in sub plot viz. Daulat, Rai-5, Improved tory-7 and Ishurdi local. The unit plot size was 6m x 5m. The land was fertilized with NPKS @ 95-27-40-25 kg/ha in the form of urea, triple super phosphate, muriate and Gypsum at final land preparation because crop was cultivated in rainfed condi-

tion. Seeds were sown in line. The distance between row-to-row 30 cm and seeds were sown continuously. One weeding and one thinning at 20-25 days after sowing were done to keep the crop weed free. The plants were sprayed with malathion for the control of aphid. Data were collected on plant height, branch per plant, siliqua per plant and seeds per siliqua recorded from 10 randomly selected plants from each plot. For seed yield estimation 3m x 3m area from the middle was harvested. All the collected data were statistical analysis and means are adjudged LSD.

Results and Discussions

The area of Barguna sowing date and genotypes influenced the yield and yield attributes of rapeseed and mustard, which was discussed under the heads as follows.

Plant population /m^2

Maximum plant population/m^2 (47.75) was obtained from sowing done on 15 November (Table I). But 23 November and 30 November gave plant population/m^2 which was statistically identical. Improved tory-7 gave the highest plant population (53.50/m^2) followed by Daulat (49.50/m^2). The lowest plants/m^2 (39.60) was obtained from 7 December sowing. It is also observed that late sowing reduced soil moisture which significantly reduced the germination percentage of rape seed and mustard.

Table I. Effect of sowing date and variety on plant population/m^2 and 1000- seed weight (pooled)

Variety	Siliqua/plant Sowing date					Seed /siliqua Sowing date				
	15 Nov.	23 Nov.	30 Nov.	7 Dec.	Mean	15 Nov.	23 Nov.	30 Nov.	7 Dec	Mean
Daulat	49.50	46.50	49.25	43.5	47.19	2.05	2.0	1.92	1.94	1.98
Rai-5	43.50	43.25	44.25	39.6	42.63	1.72	1.74	1.67	1.64	1.69
Improved Tory-7	53.50	43.25	40.25	42.2	44.81	2.39	2.39	2.17	2.14	2.27
Ishurdi local	44.50	41.75	41.75	40.70	42.19	2.51	2.45	2.45	2.45	2.46
Mean	47.75	43.69	43.88	41.50		2.17	2.14	2.05	2.04	
LSD (0.05) Variety			4.37	CV(%) 6.9		LSD (0.05) Variety			0.061	CV (%) 4.1
Sowing date			6.00	CV (%) 6.4		Sowing date			0.061	CV(%) 4.2
Sowing date x Variety			8.4			Sowing date x Variety			0.123	

1000 -seed weight

Sowing date effects were less marked for seed weight except that the 7 December sowing which produced smaller seeds. Varietal characteristics were more pronounced regarding seed size. Larger seed produced by Ishurdi local (2.51 g/1000 seed) when sown on 15 November (Table I). Seed produced (1.64 g/1000 seed) by Rai-5 when sown on 7 December. This finding was agreed with Saran and Giri (1987). They reported that delayed sowing reduced 1000- seed weight and it ranged 11% compared to 25 October to 15 November.

Plant height

Sowing date linearly shortened the plant height and the different of this parameter between two successive dates were significantly (Table III). The highest plant height (120 cm) were obtained from 15 November sowing, which were reduced by 8%, 13.3% and 15 % while seed were sown on 23 November, 30 November and 7 December respectively. Further, plant height significantly varied among the genotypes studied. Daulat produced the maximum plant height (120 cm), which was similar to Ishurdi local (119 cm). The shortest plants (76.75) cm height were obtained from Improved Tory -7 when it sown on 7 December.

Siliquae/plant

Sowing date had a great influence on the number of siliquae per plant, which may have apparent impact on seed yield. The highest number of siliquae/plant (119.35) (Table II) was attained in the first sowing

Table II. Effect of sowing date and variety on siliqua/plant and seed /siliqua (pooled)

Variety	Siliqua/plant Sowing date					Seed /siliqua Sowing date				
	15 Nov.	23 Nov.	30 Nov.	7 Dec.	Mean	15 Nov.	23 Nov.	30 Nov.	7 Dec	Mean
Daulat	119.35	110.0	78.58	78.0	96.48	12.10	11.85	11.65	9.70	11.32
Rai-5	116.0	86.32	74.20	81.0	89.38	11.00	11.00	10.65	9.30	10.49
Improved Tory-7	84.54	80.00	57.05	49.02	67.65	11.55	11.00	8.80	8.95	10.07
Ishurdi local	101.25	96.20	87.50	81.60	91.63	11.45	10.40	11.00	9.90	10.69
Mean	105.28	93.13	74.33	72.40		11.52	11.06	10.52	9.46	
LSD(0.05) Variety			2.33	CV (%)	11.7	LSD (0.05) Variety			0.48	CV (%) 4.8
Sowing date			2.69	CV(%)	12.6	Sowing date			0.82	CV(%) 6
Sowing date x variety			4.84			Sowing date x Variety			1.34	

date and thus significantly reduced thereafter. A serious reduction in siliqua/plant was noted with later sowing on 23 November, 30 November and 7 December and there were 11.54%, 27.79% and 32.84% lower than that of 15 November sowing. The reason for this lowering of siliquae/plant beyond 15 November sowing may be attributable to the fact that was probably fall in temperature had presumably switched plants to earlier initiation before they reached a critical size in terms of dry matter production (Scott *et. al*, 1973). Varietals differences for pod formation were also very large with Daulat yielding the highest number of pod than that of other varieties of 15 November sowing. Ishurdi local gave higher siliqua per plant than that of other cultivar at late sowing but it also gradually decreased. Among the sowing date and cultivars Improved tory-7 produced minimum number of siliquae/plant (49.02) at last sowing date 7 December (Table II). This finding is agreement Nag *et al.* (2000). Rahman *et al.* (1993) reported that the number of siliquae/plant was greatly reduced for each week delayed after 2 November sowing (1993). Saran and Giri (1987) also obtained decreasing trends in pods/m^2 from sowing of weekly intervals on mid October to mid November.

Seeds/siliqua

The largest number of seeds per siliquae was obtained from 15 November sowing which was significantly at par than other sowing dates. Last sowing produced lowest number of seeds per siliquae (7 December) (Table II). Varieties were characteristically different in producing seed/siliqua. Daulat produced

Table III. Effect of sowing date and variety on seed yield and plant height (pooled)

Variety	Seed yield (kg/ha) Sowing date					Plant height (cm) Sowing date				
	15 Nov.	23 Nov.	30 Nov.	7 Dec.	Mean	15 Nov.	23 Nov.	30 Nov.	7 Dec.	Mean
Daulat	1360.00	1170.00	872.50	737.50	1035.00	120.00	119.00	104.5	102.25	111.44
Rai-5	977.00	725.00	552.50	467.50	680.63	115.00	113.25	111.75	111.50	112.87
Improved Tory-7	1162.00	1007.50	437.50	387.50	748.75	89.00	85.00	79.25	76.75	82.50
Ishurdi local	115700	1105.00	940.00	855.00	1014.40	119.00	111.25	102.25	97.00	107.37
Mean	1164.00	1001.90	700.63	611.90		110.75	107.12	99.37	96.87	
LSD (0.05) Variety			209.28	CV(%) 16.8		LSD (0.05)Variety		7.12	CV(%) 9.6	
Sowing date			212.82	CV(%) 16.1		Sowing date		4.24	CV(%) 0.013	
Sowing date x variety			180.26			Sowing date x variety		0.32		

highest seed/siliqua (12.10) followed by Improved tory-7 and Ishurdi local. Similarly the variety-improved tory-7 gave the lowest number of seed/siliqua in 7 December sowing. The results of the present investigation with respect of seed/siliqua fairly agreed with the findings of Ghose and Chatterjee (1998) who observed decreased seeds/siliqua in mustard and rapeseed due to later sowing.

Islam and Sarker also observed higher number of seed/siliqua (12.86) from the early sowing (1-15 November) (1993).

Table IV. Economic performance of mustard and rapeseed

Treatment	Yield (kg/ha)	Gross return (Tk/ha)	TVC(Tk/ha)	Gross margin (Tk/ha)	BCR
T1V1	1360.00	27200	14199	13001	1.92
T1V2	977.50	19550	14199	5351	1.38
T1V3	1162.50	23250	14199	9051	1.64
T1V4	1157.50	23150	14199	8951	1.63
T2V1	1170.00	23400	14199	9201	1.65
T2V2	725.00	14500	14199	301	1.02
T2V32	1007.50	20150	14199	5951	1.42
T2V4	1105.00	22100	14199	7901	1.56
T3V1	872.50	17450	14199	3251	1.23
T3V2	552.50	11050	14199	-3149	-
T3V3	437.50	8750	14199	-5449	-
T3V4	940.00	18800	14199	4601	1.32
T4V1	737.50	14750	14199	551	1.03
T4V2	467.50	9350	14199	-4849	-
T4V3	387.50	7750	14199	-6449	-
T4V4	855.00	17150	14199	2901	1.20

T1=15 Nov. ,T2 = 23 Nov. ,T3 = Nov. ,T4 = Nov., V1= Daulat,, V2 = Rai-5, V3 = Improved Tory-7, V4= Ishurdi local, TVC = Total variable cost, BCR = Benefit cost ratio

Input	kg/Tk	Output	Tk/kg
Seed	40.00	Mustard	20.00
Urea	7.00		
TSP	15.00		
MP	10.00		
Gypsum	8.00		

Seed yield

Seed yield in rapeseed and mustard is a function number of siliqua per plant, number of seeds per siliqua and seed size. Sowing seeds on 15 November produced higher seed yield (1360.00kg/ha) than other sowing dates. Later sowing significantly reduced yield by 13.93%, 39.81% and 56.02% respectively 23 November, 30 November and 7 December sowing compared to 15 November sowing. Among the varieties Daulat gave highest seed yield (1364 kg/ha) in 15 November sowing and Improved Tory-7 produced lowest yield (387.50kg/ha) in 7 December sowing (Table III). In 30 November Ishurdi local gave highest yield (940 kg/ha) comparable to Daulat (872.5 kg/ha). Delayed sowing reduced seed yield. These findings agreed with Rahman *et al* (1993). They observed that seed yield of rapeseed and mustard was gradually and significantly declined as sowing was delayed after 2 November. Bhagat and Singh concluded that seed yield of mustard reduction was a major function of sowing date and it was more or less uniform over all the varieties (Bhagat and Shingh, 1989). However Daulat and Ishurdi local gave higher yield at late sowing condition up to 30 November.

Cost and Return Analysis

The highest gross margin (13001 Tk/ha) and benefit cost ratio (1.92) were obtained from variety Daulat at 15 November sowing. These were followed by Ishurdi local at the same date of sowing. Gross margin gradually decreased for all subsequent sowing for all the varieties (Table IV).

Conclusion

From the above result it may be concluded that Daulat and Ishurdi local variety/genotype considered as late sowing (up to 30 November) in coastal area under the climatic condition of Bangladesh.

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