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Yield Component and Seed Yield of Wheat as Affected by Seed Size under the Rain-fed Condition of Dera Ismail Khan

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Abstract: Field experiments on seed sizes were conducted during 1994-95 and 1995-96 to determine its effect on yield component and seed yield of wheat cv. Pirsabak-85. The treatments consisted of Large and small seed sizes. The data indicated that crop seeded with large seed size significantly produced maximum seed yield by increased number of plant stand/m^2 and generally provided the greater seed weight both the years respectively.

Key words: Seed size, plant stand, seed yield, Pakistan

Introduction

Wheat (*Triticum aestivum* L.) is one of the most important food crops which is grown all over the world and occupies an area of 8376.5(000 hac) of Pakistan (Anonymous, 1996).

Being a staple food in Pakistan, wheat production is important to its economy. One third of the crop in Pakistan is grown under rainfed conditions where drought is frequently a problem. Establishing adequate stands at optimum time is uncertain in most of the low-rainfall wheat areas because soil moisture at planting is often marginal for plant growth. Establishing an adequate plant stand at optimum time is important in grain yield of the wheat (Russelle and Bolton, 1980). There are many reasons for this low output for example poor seed germination, poor seedling vigour, photoperiod sensitivity and low varietal performance based on different agro-ecological zones. Among these germination and seedling vigour are greatly influenced by seed size. Similarly various soybean cultivars show varying sensitivity to seed size at their different development stages (Longer *et al.,* 1986).

Under such conditions some practices under control of the growers are; seeding depth, time of seeding and the use of healthy sound seeds which play an important role in a uniform plant stand and provide maximum returns. Therefore the quality of seed is the basic input which has a great effect on the plant population and it is considered an important factor in regulating yield. Chaudhry and Goheer (1999) conducted experiment on seed size of Soybean and found maximum seed yield and also yield components like number of pods per plant, number of seeds per pod and number of seeds per plant from large and medium sized seed lowest produce was obtained from small size seed.

Present study was undertaken to determine the seed size effect on plant stand, yield component and seed yield of wheat crop under the rainfed condition at Dera Ismail Khan.

Materials and Methods

The field experiments were conducted at Arid Zone Research Institute, D.I. Khan during 1994-95 and 1995-96. A basal dose of fertilizer at 60-40-0 NPK kg/ha was broadcast and incorporated into the soil, using a rotavator for incorporation. The wheat C.V. Pirsabak-85 was categorized into two lots including large seed (well-filled) and small seed (shrinkled). The equal numbers of seeds from each lot were used for trials planting by a manually operated single row drill in the 2nd and 3rd week of November respectively. The site received 244 and 256 mm rain prior to planting in the month of June to September, Meteorological data are reported in Table 1a, b.

Table 1: (a) Meteorological data of the trial sites used in study Mean monthly and long-term average precipitation. *Arid Zone Research Institute, D.I. Khan

Year	Months							
	Oct	Nov	Dec	Jan	Feb	Mar	Aril	Total
1994-95	-	20	-	-	-	40	38	98
1995-96	29.0	-	-	8	19	28	-	85
Five year average* (1990-91-1994-95)	3.8	7.1	5.1	6.5	19.3	35.3	39.8	117

Table 1: (b) Monthly mean temperature (°C). Arid Zone Research Sub-Station, D.I. Khan

Month	1994-95			1995-96		
	Mean Max:	Mean Mini:	Mean	Mean Max:	Mean Mini:	Mean
October	30	16	23.0	32	18	25.0
November	26	13	19.5	27	9	18.0
December	20	6	13.0	21	6	13.5
January	19	4	11.5	19	4	11.5
February	22	7	14.5	23	8	15.5
March	26	12	19.0	27	14	20.5
April	29	15	22.0	35	19	27.0

The experiment was laid out in Randomized Complete Block Design, with 2 treatments consisted of large and small seed sizes having 4 replication with a plot size of 1.8 × 5 m (6 rows/plot). Data on plant stand, plant height, maturity, seed weight and seed yield from all treatments was carried out on the four central rows in each plot. Data were analyzed using the analysis of variance (ANOVA) procedure and LSD ($p<0.05$) values were calculated for comparisons among means (Steel and Torrie, 1980).

Results and Discussion

During 1993-94 test, the crop sown with large seed produced approximately two fold more plant stand (88)/m^2 and also appeared significantly with long spike 16.7 cm)/plant bearing more number of grains(20) per spike as compared to (45 plants)/m^2, 4.9 cm spike length and (17 grains)/spike from plots seeded with small seed. The large seed also positively affected the plant height and seed weight although which did not differ significantly. This positive effect of the yield components ultimately affected the seed yield (Table 2). These results are in line with Kazmi *et al.* (1991).

Table 2: Yield component and seed yield of wheat as affected by seed size during Rabi 1994-95

Treat Seed size	Plant st/m^2	Pl ht (cm)	Spike length (cm)	Grains/spike	Days to maturity	1000 seed wt (gms)	Seed yield (kg/ha)
Small	45 B	47.0	4.90 B	17.00 B	138	32.00	213.2 B
Bold	88 A	56.5	6.70 A	20.00 A	137	34.67	304.6 A
(0.050)	8	ns	1.50	1.00	nS	ns	16.50

Table 3: Yield component and seed yield of wheat as affected by seed size during Rabi 1995-96

Treat Seed size	Plant st/m^2	Pl ht (cm)	Spike length (cm)	Grains/spike	Days to maturity	1000 seed wt (gms)	Seed yield (kg/ha)
Small	38 B	61.7	8.40 A	29.00 A	142	35.47 B	776.1 B
Bold	89 A	55.00	6.73 B	23.67 B	142	36.93 A	1035.0 A
(0.050)	27	ns	1.49	2.61	ns	0.93	114.7

N.S: Non significant

Figure followed by the similar word do not differ significantly

Anyhow the appearance of the lower yield than average during this year may have been the result of no rainfall received during the growing season i.e., December to February and rain in the month of March could not contribute towards plant growth due to rise in temperature and limited duration left for crop to be recovered its growth (Table 1a).

During 1995-96, the grain yield ranged between 776.1 to 1035 kg/ha. Similar trend as during 1994-95 occurred for yield components except grains/spike (Table 3). The seed yield appeared higher than the yield obtained during 1994-95. This yield increase may have been the results of proper rain fall distribution before planting in the month of October to conserve moisture in the soil and after planting in January, February and March which positively affected the plant stand and growth (Table 1a). Anyhow the yield is still lower than the average yield which may be due-to insufficient rainfall during growing season as compared to average distribution (Table 1a).

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