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Yield and Yield Components of Wheat as Influenced by Seed Rates and Sowing Dates

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Abstract: Number of plant emergence/m^2 and 1000 grain weight were significantly affected by seed rates. The number of plants emerged per unit area increased while 1000 grain weight decreased with increase in seed rates. The effect of seed rates on productive tillers/m^2, seed grade recovery and grain yield ha^{-1} were not significant. Emergence/m^2, productive tillers/m^2, 1000 grain weight, seed grade recovery and grain yield ha^{-1} significantly decreased as the sowing was delayed from the first week of November till the third week of December. In overall, November sowing was superior to the December sowing.

Key words: Yield, sowing dates, seed rates, germination, wheat

Introduction

Seed rates at superoptimal level impose stress of the available moisture, nutrients, light and temperature because, competation between individual plant for these resourses increases and hence adversely affect crop yield while crop seeded at suboptimal level usually have lower yield because of substandard plant population. Khan *et al*. (1970) concluded that a seed rate more than 80 kg ha^{-1} for Maxipak is westeful variety of wheat is not recommended because 80 kg ha^{-1} produced significantly higher yield than 100 or 120 kg ha^{-1} (Khan *et al*., 1977). Nazir *et al*. (1987) reported greater number of productive tiller and grain yield when the wheat was seeded at the rate of 100 kg ha^{-1} as compared with lower seed rates of 40, 60 and 80 kg ha^{-1}. Mujahid (1972) obtained more productive tiller and compared with 60, 80 and 100 kg ha^{-1} but 1000 the grain weight reduced with increase in seed rate. Ahmad *et al*. (1995) observed decrease in seed weight with increase in seed rate from 40 to 120 kg ha^{-1}. Seed size increases only when the plant densities are too low for optimum yield (McGraw *et al*., 1986) and seed size decreases only at very high plant density (Kromer and Gross, 1987).

Sowing times also plays an important role in the establishment of any crop and its production. Wheat sown in October is more profitable as compared with December sowing because of more productive tiller (Ishag and Taha, 1974; Khan and Salim, 1986). Mid November sowing is better than December because of greater number of spike/m^2, heavier grain and grain yield (Razzaq *et al*., 1986; Zeb *et al*., 1987). December sowing produced lower grain yield of than November sowing (Waraich *et al*., 1982; Ahmad *et al*., 1992).

Materials and Methods

The was conducted at Malakhander Research Farm, NWFP. Agricultural University Peshawar during the crop season, 1997-1998. Wheat variety Bakthwar-92 was sown on November 1st ,10th, 20th, 30th and December 10th and 20th using four seed rates viz. 62, 74, 86 and 99 kg ha^{-1}. The experiment was laid out in RCS design with split plot arrangement having four replications. Net sub-plot size of 1.8×5 meters having 6 rows of 30 cm apart used. A basal dose of 123 kg N/ha and 60 kg P/ha was used. All the Phosphorus and half of the nitrogen was applied at the time of sowing and remaining nitrogen was applied with the first irrigation. Data was recorded on emergence/m^2, productive tiller/m^2, 1000 grain weight, seed grade recovery and grain yield kg ha^{-1}. For calculating seed grade recovery Round Commercial Stainer number 8/64 was used to seperate seed into different sizes i.e. (a). Plump grain(upper side one and (b). shrivelled grain (seived side).

Results and Discussion

Sowing dates and seed rates had significant effect on emergence/m^2 (Table 1). The high number of 129 and 124 seedling were emerged in plots sown on 10th Nov. and 1st Nov., while lowest number of seedling/m^2 (65) were recorded from late December sowing. Reduction in emergence/m^2 with delay in sowing from Nov. to Dec. may be due to the fall in temperature from Nov. to Dec. Waraich *et al*. (1982) found significantly higher emergence/m^2 when sowing was done on 26th Nov. as compared with those sown earlier or later than 26th Nov. Various seed rates had significant effect on emergenct/m^2 as highest number of 106.67/m^2 seedling emerged in plots seeded with 99 kg ha^{-1} while lowest (91.54) seedling were emerged when a seed rate of 62 kg ha^{-1} was used. The higher number of seedling/m^2 at high seed rates is mainly due to the more number of seed sown per unit area. Significantly higher seedling/m^2 at the higher seed rate of 150 kg ha^{-1} as compared with 100 and 50 kg ha^{-1} have been reported by Ayaz *et al*. (1997). The effect of sowing dates was significant on number of productive tillers/m^2 while seed rates had no significant effect on tiller production (Table 2). Significantly higher (432.64) productive tiller/m^2 (433) were recorded in plots sown on 1st Nov., while lowest tillers of 243.63/m^2 were noted in plots sown on 20th Dec. These results may be attributed to the favourable conditions (temperature etc.) which helped in establishing good crop stand by the earlier sowing. Highest tiller/m^2 has been reported by Razzaq *et al*. (1986) from the plot sown on 15th Nov.and were at par with 31 Oct. in their study.

Data pertaining to 1000 grain weight was significantly effected both by sowing dates and seed rates (Table 3). Plots sown in Nov. (between 1st Nov. and 30th Nov.) had significantly higher 1000 grain weight ranging from 28.78 to 30.16 g as compared with those sown in Dec. (10-20th Dec.). These results are in agreement with those reported by Razzaq *et al*. (1986) who found significantly heavier grain when wheat was sown upto 30th Nov. December sown plots have lower grain weight in their study. Zeb *et al*. (1987) have similar findings. Different seed rates had significant effect on 1000 grain weight. Significantly higher grain weight was observed in plots sown within the range of 62 to 86 kg ha^{-1} seed rate (28.71 to 29.32 g) while lowest 1000 grain weight of 27.53 g was obtained from 99 kg ha^{-1} sown plot obtaining grain weight at highbrseed rate, can be due to the competation among plants for all

Table 1: Emergence/m^2 of wheat cv. Bakhtwar-92 as affected by seed rates and sowing dates

Sowing dates	Seed Rates (Kg ha^{-1})				
	62	74	86	99	Mean
1st Nov	101.50	117.00	131.25	145.75	123.88 a
10th Nov	139.50	126.50	124.50	126.00	129.13 a
20th Nov	83.75	102.25	108.50	109.50	101.00 b
30th Nov	84.75	103.50	94.50	128.00	102.69 b
10th Dec	71.0	68.25	77.50	76.25	73.25 c
20th Dec	68.75	65.25	72.25	54.50	65.19 c
Mean	91.54c	97.13bc	101.42ab	106.67a	

Table 2: Number of productive tillers/m^2 of wheat cv. Bakhtwar-92 as affected by seed rate and date of sowilig

Sowing dates	Seed Rates (kg ha^{-1})				
	62	74	86	99	Mean
1st Nov	395.98	371.95	479.85	482.78	432.64 a
10th Nov	349.95	381.88	311.63	335.35	344.7 b
20th Nov	402.48	376.63	303.78	394.63	369.38 b
30th Nov	320.13	305.5	368.98	355.45	337.51 b
10th Dec	382.23	317.1	364.4	360.88	356.15 b
20th Dec	259.55	200.45	282.35	232.15	243.63 c
Mean	351.72	325.58	351.83	360.2	

Means of the same category followed by different letters are significantly different using LSD test at 5% level of significance

Table 3: 1000 grain weight (g) of wheat cv. Bakhtwar-92 as affected by seed rate and sowing dates

Sowing dates	Seed Rates (Kg ha^{-1})				
	62	74	86	99	Mean
1st Nov	29.70	31.05	29.20	29.38	29.83 a
10th Nov	29.68	30.35	31.43	29.18	30.16 a
20th Nov	29.50	29.75	29.55	26.30	28.78 a
30th Nov	30.78	29.48	30.20	29.18	29.91 a
10th Dec	27.53	27.83	26.00	25.98	26.83 a
20th Dec	25.10	27.45	26.30	25.18	26.01 a
Mean	28.71a	29.32a	28.78a	27.53bb	

Table 4: Seed grade recovery (%) of wheat cv. Bakhtwar-92 as affected by seed rates and sowing dates

Sowing dates	Seed Rates (Kg ha^{-1})				
	62	74	86	99	Mean
1st Nov	72.75	76.00	67.00	71.75	71.88 a
10th Nov	77.50	71.00	71.25	62.50	70.56 a
20th Nov	74.00	73.00	71.75	63.25	70.50 a
30th Nov	68.75	73.50	72.00	73.75	72.00 a
10th Dec	65.50	63.75	59.50	63.50	63.06 b
20th Dec	54.75	54.25	59.75	57.75	56.63 c
Mean	68.88	68.58	66.88	65.42	

Means of the same category followed by different letters are significantly different using LSD test at 5 percent level of significance

Table 5: Grain yield kg ha^{-1} of wheat cv. Bakhtwar-92 as affected by seed rate and sowing dates

Sowing dates	Seed Rates (Kg ha^{-1})				
	62	74	86	99	Mean
1st Nov	3045.83	2612.50	2916.67	3075.00	2912.50 abc
10th Nov	3083.34	3266.67	2816.67	2804.17	2992.71 ab
20th Nov	3195.84	3366.67	2441.67	3270.84	3068.75 a
30th Nov	2762.50	2045.84	2291.76	2775.00	2468.75 bc
10th Dec	1841.76	2537.50	2508.33	2608.34	2373.96 c
20th Dec	1420.84	1208.34	1950.00	1429.17	1502.09 d
Mean	2558.34	2506.25	2487.50	2660.42	

Means of the same category followed by different letters are significantly different using LSD test at 5 percent level of significance

available resources, which was imposed by higher rate resulting in greater number of plant per unit area. Highest 1000 grain weight at the lowest seed rate of 40 kg ha^{-1} as compared with 60, 80,100 and 120 have been reported by Ahmad *et al*. (1995). Mujahid (1972) observed decline in 1000 grain weight when seed rate of 130 kg ha^{-1} was used as compared with 60, 80 and 100 kg ha^{-1} of seed rate although grain yield/ha was higher at 130 kg ha^{-1}.

Seed grade recovery was significantly affected by date of sowing only (Table 4). Plot sown in Nov. (1st to 30th Nov.) had significantly higher seed grade recovery (70.56 to 72%) as compared with those sown in Dec. (56.63 to 63.06%). Thses results are in agreements with those reported by Zeb *et al*. (1987) who reported reduction in seed weight and grain yield with delay in sowing from 25th Oct. to 24th Dec.

Data recorded on grain yield kg ha^{-1} is presented in Table 5. The data showed that the effect of sowing dates was significant while seed rates had no significant effect on grain kg ha^{-1}. Plots sown on 20th Nov. had highest grain yield of 3068 75 kg ha^{-1} followed by 10th and 1st Nov. plantation. The lowest grain yield of 1502.09 kg ha^{-1} was produced by 20th Dec. sown plots. These results are supported by Waraich *et al*. (1982). Ashraf (1968) obtained as much as double grain yield of wheat when sown in Nov. as compared with those sown in month of Dec. The non significant effect of seed rate in our study is in contrast to those reported by Mishra (1993) who found greator yield when crop was sown at a seed rate of 125 kg ha^{-1} as compared with 100 and 150 kg ha^{-1} seed rate. Chatha and Nazir (1984) studied the effect of five seeding rates ranging from 18 to 92.5 kg ha^{-1} and concluded that seeding rate below 92.5 kg ha^{-1} did not improve grain yield of wheat in timely sown crop. Nazir *et al*. (1987) have observed that 100 kg ha^{-1} of seed rate had significantly greater number of productive tiller and grain yield as compared with 40, 60 and 80 kg ha^{-1} sown seed. Our results suggest that seeding rate between 6299 did not effect the grain yield of wheat variety Bakhtwar-92, while delaying in sowing from November to late December significantly decreases the grain yield.

References

Ahmad, G., P. Shah and A. Bari, 1995. Effects of different seed rates on the yield and yield components of wheat cv. Pirsabak-85. Sarhad J. Agric., 11: 569-573.

Ahmad, I., Z. Ahmad, S.Z. Mustafa and N.I. Hashmi, 1992. Performance of elite wheat lines at various locations under two planting times. Pak. J. Agric. Res., 13: 6-10.

Ashraf, M., 1968. Effect of different planting times and seed rate level on the growth, yield and quality of Mexican wheat under Lyllapur condition. M.Sc. Thesis, University of Lyllapur, Faisalabad.

Ayaz, S., P. Shah and M. Ali, 1997. Influence of seeding density and geometry of planting on emergence, tillering and biological yield of wheat. Sarhad J. Agric., 13: 219-222.

Chatha, M.R. and M.S. Nazir, 1984. Effect of plant population and geometary of planting on yield and growth behaviour of wheat. Pak. J. Agric. Res., 5: 138-140.

Ishag, H.M. and M.B. Taha, 1974. Production and survival of tillers of wheat and their contribution to yield. J. Agric. Sci., 83: 117-124.

Khan, A. and M. Salim, 1986. Grain yield as influenced by seeding dates in wheat in NWFP. Pak. J. Agric. Res., 7: 14-16.

Khan, R.A., S. Ahmad, M.S. Gill and M.S. Sharar, 1970. Seed rate requirement for wheat as influenced by tillage intensity and planting methods. Pak. J. Agric. Sci., 7: 1-6.

Khan, S.A., H.C. Joshi and J.P. Tandon, 1977. Response of dwarf wheats to nitrogen and seed rates under irrigated condition of Kumaon Hill in Uttar Pradesh. Indian J. Agric. Res., 11: 94-96.

Kromer, M. and K.L. Gross, 1987. Seed mass, genotype and density effects on growth and yield of *Oenothera biennis* L. Oecologia, 73: 207-212.

McGraw, R.L., P.R. Beuselinck and R.R. Smith, 1986. Effect of latitude on genotype × environment interactions for seed yield in birdsfoot trefoil. Crop Sci., 26: 603-605.

Mishra, C.M., 1993. Response of wheat genotypes to seed rates on dry land. Ind. J. Agric., 38: 288-289.

Mujahid, Z.H., 1972. Effect of row spacing and seed rates on the growth and yield of wheat variety Chenab-70. M.Sc. Thesis, University of Faisalabad, Faisalabad.

Nazir, M.S., M. Ahmed, M. Siddiq and R. Ahmed, 1987. Wheat productivity as affected by seeding density and geometry of planting. Sarhad J. Agric., 3: 409-415.

Razzaq, A., K. Zada and P. Shah, 1986. Effect of sowing dates and varieties on yield and yield components of wheat in the Peshawar valley. Sarhad J. Agric., 2: 29-40.

Waraich, S., A. Yasmin and S. Ashraf, 1982. Genetic parameters influenced by seeding dates in wheat. Pak. J. Agric. Res., 3: 273-276.

Zeb, A., A. Badshah, M. Ahmad, T. Mohammad and I. Khan, 1987. Yield and quality response of different wheat cultivars to date of sowing. Sarhad J. Agric., 3: 431-440.