http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 3 (9): 1409-1411, 2000

Seed Rates and Sowing Dates Effect on the Performance of Wheat Variety Bakhtawar-92

[1]Amanullah Jan, [1]Ijaz Hamid and [2]Talah Muhammad
[1]Department Of Agronomy, NWFP, Agricultural University, Peshawar, Pakistan
[2]NIFA, Peshawar, Pakistan

Abstract: All the parameters i.e. total and productive tillers m^{-2}, plant height, days to 50% heading and maturity, grains $spike^{-1}$ were significantly affected by sowing dates. Both the total and productive tillers m^{-2} were highest when the crop was sown on 1st November and lowest when sowing was done on 20th December. Heading and maturity were delayed in the plot sown earlier, grain $spike^{-1}$ were highest on 20th November and 1000 grain weight were highest upto the sowing date of 30th November. Seed rates had only significantly affected 1000 grain weight which reduced when the seed rate was increased to 99 kg ha^{-1}.

Key words: Growth of wheat affected by seed rates and dates, tillers, plant height, 1000 grain weight

Introduction

Deviation from the optimal range of seed density usually have adverse effect on plant growth and yield. In case of suboptimal seed rates the available resources for plant growth are not efficiently utilized or even wastage of the resources occurs. Similarly at level more than optimal seed rates, the competition of leaves for radiant energy due to over lapping is intensified. Roots compete for moisture and the essential element in soil. The %age of tillers producing ears, number of grains ear^{-1} and grain size are all reduced, due to dense population even where nutrients and water are not limiting (Donald and Hamblin, 1976). Maximum grain yield, straw yield and higher net return can he obtained at seed rate of 200 kg ha^{-1} as compared with 150 or 175 kg ha^{-1} (Thakur *et al*., 1996). Like seed rates controversy exist in the available literature in optimum sowing dates of wheat. Khan (1968) recommended that wheat should be sown in middle of October than late sowing because of more tiller $plant^{-1}$, more $spikelet\ spike^{-1}$, number of grains spike and maximum 1000 grain weight. Different sowing dates had significant effect on germination, number of fertile tiller, number of grain $spike^{-1}$ and grain yield. Furthermore crop sown during the 3rd week of November was superior than other sowing dates (Waraich *et al*., 1982). Keeping in view the importance of seed rates and sowing dates on the growth and yield of wheat the present experiment was conducted with the collaboration of the breeder of the variety Bnkhtawar-92 at Peshawar with objective to determine optimum seed rate and best time of sowing for the variety.

Materials and Methods

Wheat variety Bakhtawar-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 RCB design with split plot arrangement having four replications. Net sub-plot site of 1.8 × 5 meters having 6 rows of 30 cm apart used. A basal dose of 123 kg N ha^{-1} and 60 kg P ha^{-1} 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 total tillers and productive tillers m^{-2}, plant height, days to heading, days to maturity, grains $spike^{-1}$ and 1000 grain weight.

Results and Discussion

Sowing dates had significant effect on total tillers m^{-2} as well as productive tillers m^{-2} (Table 1, 2). Highest number of total tillers (432.80) and productive tillers (432.64 m^{-2}) were recorded in 1st November sown plots and lowest of 259.12, 258.62 total tillers and productive tillers m^{-2} were observed in 20th December sown plots respectively. The data indicated that (1) Both total and productive tillers m^{-2} decreased with delay in sowing from 1st November. The decrease in total tillers and productive tiller m^{-2} with time of sowing maybe due to changes in temperature as the mean maximum temperature of the experimental site was dropped by about 9°C from 1st November to 20th December. Rate of leaf initiation and appearance on main column are linearly related to the temperature of the shoot meristern (Ong and Baker, 1985). The decrease in tillers m^{-2} with time are in agreement with those reported by Razzaq *et al*. (1986), Black and Siddoway (1977) and Ahmad and Singh (1958). They concluded that late sowing tend to reduce tillers in wheat with delay in sowing. The effect of seed rates on total tillers and productive tiller m^{-2} was not significant. It can be seen from Table 1 that although the highest seed rates had more total and productive tillers m^{-2} but this differences are not statistically significant. More tillers m^{-2} at 100 kg ha^{-1} as compared with 40, 60 or 80 kg ha^{-1} has been reported by Nazir *et al*. (1987). The nonsignificant difference in total tillers and productive tillers m^{-2} might be due to the fact that the highest seed rate of 99 kg ha^{-1} was probably not supemptimal where tillers in general arid productive tillers in particular are adversely affected due to mutual competition.

Table 2 shows the effect of sowing dates and seed rats on plant height. Sowing dates had significantly affected plant height. Plots sown upto 20th November had more plant height (88.69-92.85 cm) as compared with other sowing dates. Lowest plant height of 70.84 cm was recorded in plots sown on 20th December. These result reveals that with delay in sowing plant height was decreased and this again could be due to the fall in temperature. Significantly short stature plant were noticed in plots sown on 15th December as compared with 31st October (Razzaq *et al*., 1986). Differences in plant height of seed sown on 15th Novernber and 30th November were also significant in their study.

The effect of seed rates on plant height was not significant and is contrary to the observation that plant height increases with increase in seed density due to mutual competition for the available resources particularly light. It could be due to the fact that in present experiment using the highest dose of 99 kg ha^{-1} was probably not superoptimal.

Table 1: Number of total tillers and productive tillers m^{-2} of wheat cv. Bakhtawar-92 as affected by date of sowing and seed rates

	Seed Rates (kg ha^{-1})				
Sowing dates	62	74	86	99	Mean
# Total Tillers 1st Nov	395.98	371.95	480.35	482.93	432.80 a
10th Nov	350.33	382.88	311.63	336.0	345.20b
20th Nov	402.48	377.08	303.78	397.68	370.25b
30th Nov	320.18	305.50	368.97	355.45	337.53h
10th Dec	382.75	317.10	364.40	361.42	356.40b
20th Dec	259.55	262.45	282.6	232.35	259.12c
Mean	351.88	336.08	351.95	360.97	
# Productive Tillers					
1st Nov	395.98	371.95	479.85	482.78	432.64a
10th Nov	349.95	381.33	311.63	335.35	344.6b
20th Nov	402.48	376.63	303.78	394.63	369.38b
30th Nov	320.13	305.50	368.98	355.45	337.51h
10th Dec	382.23	315.41	364.4	360.88	356.15b
20th Dec	259.55	260.45	282.35	232.15	258.62 c
Mean	351.72	335.21	351.83	360.2	

Table 2: Plant height (cm) of wheat cv. Bakhtawar-92 as affected by date of sowing and seed rates

	Seed Rates (kg ha^{-1})				
Sowing dates	62	74	86	99	Mean
1st NOV	93.59	83.56	91.28	90.34	89.69 a
10th Nov	95.28	93.09	93.12	89.91	92.85 a
20th Nov	88.09	90.31	86.09	90.28	88.69 a
30th Nov	80.22	79.65	83.06	83.25	81.55 b
10th Dec	79.25	76.14	78.03	81.22	78.66 b
20th Dec	70.15	69.63	72.78	70.81	70.84 c
Mean	84.43	82.06	84.06	84.30	

Table 3: Days to heading of wheat cv. Bakhtawar-92 as affected by date of sowing and seed rates

	Seed Rates (kg ha^{-1})				
Sowing dates	62	74	86	99	Mean
1st Nov	157.50	157.50	157.50	157.50	157.50 a
10th Nov	153.75	153.75	153.75	153.75	153.75 b
20th Nov	150.00	150.00	150.00	150.00	150.00 c
30th Nov	145.00	145.00	145.00	145.00	145.00 d
10th Dec	137.75	137.75	137.75	137.75	137.75 e
20th Dec	123.75	123.75	123.75	123.75	123.75 f
Mean	144.63	144.63	144.63	144.63	

Table 4: Days to maturity of wheat cv. Bakhtawar-92 as affected by date of sowing and seed rates

	Seed Rates (kg ha^{-1})				
Sowing dates	62	74	86	99	Mean
1st Nov	186.75	186.75	186.75	186.75	186.75 a
10th Nov	184.50	184.50	184.50	184.50	184.50 b
20th Nov	180.50	180.50	180.50	180.50	180.50 c
30th Nov	175.50	175.50	175.50	175.50	175.00 d
10th Dec	172.50	172.50	172.50	175.50	172.00 e
20th Dec	169.75	169.75	169.75	169.75	169.75 f
Mean	178.08	178.08	178.08	178.08	

Table 5: Number of grains $spike^{-1}$ of wheat cv. Bakhtawar-92 as affected by date of sowing and seed rates

	Seed Rates (kg ha^{-1})				
Sowing dates	62	74	86	99	Mean
1st Nov	62.78	60.23	61.04	62.79	61.71 b
10th Nov	61.39	58.79	59.57	63.59	60.91b
20th Nov	62.92	68.79	68.38	67.94	67.01 a
30th Nov	57.84	62.19	68.84	61.61	62.62 b
10th Dec	64.47	60.94	57.75	57.16	60.08 b
20th Dec	62.65	60.61	64.23	64.19	62.92b
Mean	62.01	61.93	63.35	62.88	

Table 6: 1000 grain weight (g) of wheat cv. Bakhtawar-92 as affected by seed rates and sowing dates

	Seed Rates (kg ha^{-1})				
Sowing dates	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 b
20th Dec	25.10	27.45	26.30	25.18	26.01 b
Mean	28.71 a	29.32 a	28.78 a	27.53 b	

Means of the same category followed by different letters are significantly different using Least Significant Difference (LSD) test at 5% level of probability

Plant height was not significantly affected by seed rate of 113 kg ha^{-1} in the study conducted by Khan and Makhdum (1988). The data presented in Table 3 and 4 shows that sowing dates had significant effect on days to 50% heading and maturity at 5% level of probability. With delay in sowing from 1st November to 20th December there was corresponding decrease in number of days to 50% heading and maturity. Minimum days of 123.75 to 50% heading was recorded in 20th December sown plot while maximum of 157.5 days in case of 1st November sown plot (Table 3). Similarly minimum days of 169.75 were taken to maturity by 20th December sown plot while maximum of 186.75 days to that sown on 1st November (Table 4). These results shows that delay in sowing had enhanced both heading and maturity. These results are in agreement with those reported by Ashraf (1968), Khan (1983) and Waraich *et al*. (1982) where less days to heading and maturity were noticed with delay in sowing of wheat. As far as the effect of seed rate is concerned it is evident from Table 3 and 4 that both days to 50% heading and maturity were not significantly affected by seed rates. Data on number of grains $spike^{-1}$ are presented in Table 5 which shows that sowing had significant effect on grains $spike^{-1}$. Maximum grains of 67.01 $spike^{-1}$ were noticed in plot sown on 20th November. Plot sown earlier or later than 20th November had lower number of grain $spike^{-1}$. Delay in sowing from 15 November to 15. December decreased grains $spike^{-1}$ and grain weight (Khan, 1983). The effect of seed rates on grains spike was not statistically significant in the present experiment and the results are in agreement with those reported by Khan (1983) using a seed rate of in range of 39-113 kg ha^{-1}. It can be seen from Table 6 that sowing dates had significantly affected 1000 grain weight. Highest 1000 grain weight was recorded in plots sown in period of Ist November-30th November. 1000 grain weight decreased significantly after 30th November. Decrease in 1000 grain weight decreased with delay in sowing from 15 November to 15 December have been reported by Khan (1983). Mid November sown plots produced maximum 1000 grain weight as compared with others dates Razzaq *et al*. (1986). Seed rates had significantly affected 1000 grain weight. Maximum 1000 grain weight was recorded in the range of 62-86 kg ha^{-1} seed rate which was 28.71 to 29.32 gram. Seed weight was significantly reduced (27.53 g) when a seed rate of 99 kg ha^{-1} was used. 1000 grain weight decreased with increase in seed rate from 60 to 130 kg ha^{-1} (Mujahid, 1972). It is reported that 1000 grain weight was higher at 50 kg ha^{-1} seed rate as compared with 120 kg ha^{-1} (Table 6). Zeb *et al*. (1987) had sown wheat on different dates from 25th October to 24th December and concluded that late sowing reduced seed weight.

Reference

Ahmad, N.R. and R. Singh, 1958. Response of wheat varieties of different sowing dates and seed rates in Agra district. Indian J. Agric., 11: 17-24.

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.

Black, A.L. and F.H. Siddoway, 1977. Hard red and durum spring wheat responses to seeding date and NP-fertilization on fallow. Agron. J., 69: 885-888.

Donald, C.M. and J. Humblin, 1976. The biological yield and harvest index of cereals as agronomic and plant breeding criteria. Adv. Agron., 28: 361-405.

Khan, A.Z., 1983. Comparison of transplanted and direct seeded crops of wheat, barley and tricticle on different dates. M.Sc. Thesis, University of Agriculture, Peshawar, Pakistan.

Khan, M.I., 1968. Effect of sowing dates and seed rates on the yield of Maxi-Pak 85. Annual Report, Punjab Agricultural Research Institute, Faisalabad.

Khan, M.S. and M.I. Makhdum, 1988. Maximizing wheat grain yield by adopting optimum seed rate in the Southern Punjab. Pak. J. Agric. Res., 9: 16-18.

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.

Ong, C.K. and N.R. Baker, 1985. Control of Leaf Growth. In: Temperature and Leaf Growth, Baker, N.R. and W. Davis (Eds.). Cambridge University Press, Cambridge, UK., pp: 175-200.

Razzaq, A., P. Shah, M. Sartaj, K. Saeed and D. Muhammad, 1986. Effect of planting time and straw yield of wheat varieties. S. J. Agric., 2: 327-334.

Thakur, S.S., I.B. Pandey, S.J. Singh and S.S. Mishra, 1996. Effect of seed rate and row spacing on late sown wheat in alluvial calcareous soil. J. Res. Birsa Agric. Univ., 8: 123-126.

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. Blodshah, M. Ahmad, T. Muhammad and I. Khan, 1987. Yield and yield quality response of different wheat cultivars to date of sowing. Sarhad J. Agric., 3: 431-440.