

EFFECTS OF DIFFERENT SEED RATES, SOWING DATES AND WEED CONTROL ON GRAIN YIELD OF WHEAT

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ABSTRACT

An experiment was conducted to study the effect of different sowing dates, seed rates and weed control. The study was carried out in a split-split plot Design at Agricultural Research Institute Tarnab, Peshawar with three replications. Dates of sowing were kept in main plots, seed rates in sub plots and weed control in sub-sub plots. Crop was sown on well-prepared seed bed on 3rd and 18th November and 3rd December during 2004. Highly significant differences were noticed for different dates of sowing and weed control treatments, while seed rates shown non-significant differences. Highest yield of 3251 kg ha⁻¹ was obtained in weed control as compared with no weed control (2907kg ha⁻¹) in early sown wheat crop while yield decreased with delay in sowing.

Key words: Seed rates, sowing dates, weed control, grain yield.

INTRODUCTION

Unfortunately wheat (*Triticum aestivum* L) yield in Pakistan is very low as compared with many other countries and even the farmer's yield within the country is 30-35% of the potential yield. Weeds are unwanted plants, which are deleterious to crops and reduce yield. Weeds must be removed for economic, social and aesthetic reasons. In crop production, weeds are one of the major factors reducing crop yield. Weeds cause serious threat to the wheat crop through its competition for water, sunlight and space with crop and causes considerable reduction in grain yield. The losses caused by weeds have been estimated to be much higher than those caused by insect pests and diseases together. Generally the yield of wheat crop is reduced by 25 to 30 % due to weeds infestation. Losses in wheat yield due to weeds amount to be more than 28 billions at national level and 2 billions in NWFP (Hassan and Marwat, 2001). Hence, weed control is the most important factor in order to increase the wheat yield and to meet the food requirements of the country.

Wheat is grown throughout the world as its products are consumed as a primary food for majority of the world's inhabitants. Wheat is a most important crop in NWFP as well as in Pakistan. Wheat cultivation is the backbone of the whole agricultural system in our country being a major food grain crop in Pakistan, as it is essentially better from nutritional point of view than the other cereals. Wheat supplies about 73% of the calories and proteins of the average diet (Heyne, 1987). In 2000-2001, the country not only obtained self-sufficiency but also was in a position to export one million tons of wheat. Now in spite of increasing population, the wheat demand is increased but its production has become stagnant (Khan, 2001). In Pakistan, wheat yield of 6500 kg ha⁻¹ has been obtained by the researchers as well as the progressive farmers, while in NWFP the total cultivated area and production was 842.2 thousand ha and 1163.4 thousand tons,

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respectively during 2003-04. However, our average provincial and country production are limited to 1300 and 2500 kg ha⁻¹ respectively (Anonymous, 2004). This production indicates the vast potential gap, which can be bridged up, if available measures are adopted. Population of NWFP is increasing at unprecedented pace. NWFP has not become self sufficient in wheat because of several constraints but the gap between demand and supply can be reduced if efforts are made to increase the per unit yield through vertical improvement. Decrease in crops yield due to weed infestation has been well documented by Saeed et. al (1977) and Mehmood (1987).

Different studies are available on the efficacy of different herbicides for weed control in wheat crop like Khan et al. (1999), Khan et al., (2004) and Hassan, et al. (2003). In view of integrating the chemical and cultural control strategies, an experiment was conducted with the objective to study the effects of seed rates, sowing dates and weed control on the grain yield of wheat.

MATERIALS AND METHODS

An experiment was carried out at Agricultural Research Institute, Tarnab, Peshawar, Pakistan during 2004-05 in a split-split plot design with three replications. The crop was sown on well-prepared seedbed comprising seeding dates (3rd and 18th November, and 3rd December, 2004), Seed rates were 100, 125 and 150 kg ha⁻¹ in sub plots and weed control in sub-sub plots. The fertilizer was applied @120:90:60 NPK kg ha⁻¹ by applying all the fertilizers with half dose of N during land preparation, while remaining half dose of N was applied with the first irrigation. Puma Super and Buctril-M were sprayed @ 1.25 and 1.5 L ha⁻¹, respectively after first irrigation when the soil was in good moisture condition. Two irrigations were given due to high rainfall during the crop season. Four central rows were harvested and the data were recorded on the plant height, number of tillers, 1000 grain weight and grain yield. All the data were subjected to analysis of variance (ANOVA) and LSD through MSTATC computer programme as outlined by Steel and Torrie (1980) to compare the mean differences.

RESULTS AND DISCUSSION

Results indicate that the earlier the crop was planted, the better the yield was obtained (Table-1). Significantly higher yield was obtained with earlier planting both in weed control and no weed control plots. Herbicide application showed significant response in increasing yield. Although dates of sowing have significant effect on yield in both weed control and no weed control plots. In case of sowing dates, wheat yield was significantly higher with weed control as compared with no weed control. From the perusal of data it was observed that increase in seed rate from 100 kg ha⁻¹ and 150 kg ha⁻¹ has no significant effect on yield even with or without application of herbicides. The interaction between seed rates and dates of sowing, seed rates and weed control, and dates of sowing and weed control was significant. Higher yield can be expected from early sown crop as compared with late planted crop. Consequent decline was observed in wheat grain yield as the *Avena fatua* density increased in plots. Mohibullah and Ali, (1974), Azhar (1969) and Hayee and Amanullah (1972) reported that use of balanced fertilizer and appropriate plant population influences the yield and yield components of high potential wheat varieties.

In case of number of tillers (Table-2), there were significant differences between weed control and no weed control plots and also in relation with seed rates. In early sown crop, seed rate of 100 kg ha⁻¹ showed better results for numbers of tillers, while in late sown crop with 125 kg ha⁻¹ of seed rate manifested better results than 150 kg ha⁻¹ for number of tillers. Data showed that early sowing up to 1st week of November produces

maximum number of tillers even with seed rate of 100 kg ha⁻¹. Interaction between seed rates and dates of sowing, seed rates and weed control, and dates of sowing and weed control was also significant. Ali *et al.* (1985) also noticed that to harvest good yield of wheat cultivars i.e. Chenab-79 and Indus- 79 under irrigated conditions of Faisalabad, these cultivars should be seeded @ 3.75 million seeds ha⁻¹ as it leads to good stand of the crop. Chenab79, however, appeared to possess higher inherent yield potential and better adaptability than Indus-79. This fact can not be denied that seeding densities and use of nitrogen fertilizer within reasonable limits increased tillering, number of grains/spike and grain yield (Farsar and Dougherty, 1977; Piech *et al.*, 1977 and Ahmad, 1979).

In case of plant height (Table-3), data showed highly significant differences among different seeding dates, while non-significant differences were observed between weed control as well as no weed control plots. The interaction between seed rates and dates of sowing, seed rates and weed control was significant and dates of sowing and weed control was also non significant. Seed rate did not show any effects on plant height. However, plant height of wheat crop was slightly higher in non-treated plots as compared with herbicides treated plots, which may be due to wheat plants competition with weeds. The herbicides have no significant effect on 1000 grain weight (Table-4). However more 1000 grain weight was observed with early and mid planted crop as compared with late planted crop. Herbicides application showed good response as compared to increased seed rate for weed control. The increase in seed rate also did not give any clear response for increasing yield with delay in planting. However with delay in planting increase seed rate mostly shows increased yield, but in this study most probably due to rainy season increased seed rate could not raise yield.

CONCLUSIONS AND RECOMMENDATIONS

Results indicated that the wheat crop should be planted at proper time (First week of November) for obtaining maximum production. Seed rate of 100 kg ha⁻¹ should be used for getting better plant population. Herbicides can play best role as compared to increased seed rate.

Table-1. Effect of sowing dates, seed rates and weed control on grain yield of wheat during 2004-05.

Weed control	Sowing dates	Seed rates (kg ha ⁻¹)			Mean
		100	125	150	
Wc	1	3251 a	3095 ab	3090 ab	3145
	2	2611 d	2473 de	2528d	2537
	3	1655 gh	1700 g	1630 gh	1662
Nwc	1	2978 bc	2875 c	2867 c	2907
	2	2334 ef	2222 f	2272 f	2276
	3	1494 h	1543 gh	1664 h	1500
LSD _{0.05}	98.27				

Table-2. Effects of sowing dates, seed rates and weed control on number of tillers of wheat during 2004-05.

Weed control	Sowing Dates	Seed rate (kg ha ⁻¹)			Mean
		100	125	150	
WC	1	458 a	377 bc	358 cd	398
	2	289 efgh	368 c	303 ef	326
	3	313 de	253 fghi	214 ij	260
NWC	1	428 ab	361 cd	328 cde	372
	2	242 hij	298 efg	250 fghi	263
	3	246 ghij	214 ij	19 5j	218
LSD _{0.05}	28.44				

Table-3. Effects of sowing dates, seed rates and weed control on plant height of wheat during 2004-05.

Weed control	Sowing Dates	Seed rate kg ha ⁻¹ .			Mean
		100	125	150	
Wc	1	85 ab	83 abc	84 abc	84
	2	80 bcd	78 cd	75 d	78
	3	68 e	65 e	68 e	67
Nwc	1	88 a	87 a	87 a	87
	2	78 cd	79bcd	79 bcd	79
	3	68 e	62 e	68 e	66
LSD _{0.05}	7.053				

Table- 4: Effects of sowing dates, seed rates and weed control on 1000 grain weight of wheat during 2004-05.

Weed control	Sowing Dates	Seed rates kg ha ⁻¹			Mean
		100	125	150	
Wc	1	40 abc	42 ab	46 a	43
	2	34 c	36 bc	36 bc	35
	3	35 bc	40 abc	37 bc	37
Nwc	1	39 abc	40 abc	39 abc	39
	2	41 abc	40 abc	40 abc	40
	3	35 bc	35 bc	35 bc	35
LSD _{0.05}	6.203				

REFERENCES CITED

- Ahmad, F. 1979. Growth and yield components of new short duration wheat genotypes at different fertility levels. M. Sc. (Agric) Thesis, Univ. Agric. Faisalabad.
- Ali, M., Khokhar, S. M. Sheikh and S. N. Mohammad. 1985. Effect of different densities and nitrogen levels on the yield of two wheat genotypes. Pak. J. Agric. Res. 6(3):150-152.
- Anonymous, 2001. Agricultural statistics of Pakistan. Ministry of food, Agriculture and livestock, Government of Pakistan, Islamabad.

- Awan, I. U, F. Khan, G. Abbasi, S. N. Hussain and A. Nawaz. 1986. Chemical versus manual weed control in wheat crop. Gomal University J.Res.6(2):15-19.
- Azhar, M. 1969. Effect of different seed rates and nitrogen levels on the yield of Mexican wheat under Lyallpur conditions. Res. Studies, Uni. Agric. Faisalabad, (1):15-16.
- Farsar, J. and C. T. Dougherty. 1977. The effect of sowing rates and nitrogen fertilizer on tillering in Karamu and Kopera wheat. N. Z. J. Agric. Sci: 7: 81-87.
- kassan, G.B. Faiz, K. B. Marwat and M. Khan.2003. Effects of planting methods and Tank mixed herbicides on controlling grassy and broad leaf weeds and their effects on wheat cv. Fakhr-e-Sarhad. Pak. J. Weed Sci. Res. 9:1-11.
- Hassan, G. and K. B. Marwat. 2001. Integrated Weed Management in Agricultural crops. Proc. National Workshop on Technologies for Sustainable Agriculture, Sep.24-26, 2001 NIAB, Faisalabad, Pakistan, pp.27-34 (ISBN 969-8038-09-4).
- Hayee, M. A. and Amanullah. 1972. Effect of high levels of nitrogen and phosphorous on the yield of wheat. Pak. J. Agric. Sci. 9(1-4): 139.
- Heyne E. G.1987.Wheat and wheat improvement. 2nd edition. Madison, Wisconsin, USA.
- Khan, M.A., M. Zahoor, I. Ahmad. G. Hassan and M.S. Baloch.1999 Efficacy of different herbicides for controlling broad leaf weeds in wheat (*Triticum aestivum* L.). Pak. J. Biol. Sci. 2(3): 732-734.
- Khan, M. I., G. Hassan, I. A. Khan and I. Khan. 2004. Studies on chemical weed control in wheat (*Triticum aestivum* L.).Pak.J. Weed Sci. Res. 10 (3-4): 113-118.
- Khan, M.S. and M. I. Makhdom. 1998 Maximizing wheat grain yield by adopting optimum seed rate in the southern Punjab. Pak. J. Agric. Res. 9(1):16-18.
- Khan, S.R.A. 2001. Crop Management in Pakistan. Focus on soil and water. Agric. Deptt, Govt.of Punjab, Lahore Pakistan.
- Mehmood, T.Z. 1987. Role of weed management in agriculture. Progr. Farming:36-41.
- Mohibullah and A. Ali. 1974. Efficacy of different herbicides in controlling weeds and their effect on wheat yield. Front. J. Agric. Res. 1(1): 41-45.
- Piech, M., A. Slabonski and S. Lobiedz. 1977. Effect of nitrogen levels and sowing rate on the yield of winter wheat, CV. Zeszyty Naukowe Akademii, Polmiezej. W. Szezeane. Rolietive 61:271-278.
- Saeed, S. A., M. Saddiq and N. A. Ahmad. 1977. Decrease in yield of crops due to weed infestation. Biology of farm weeds. Proj.Rep.PP.1-76.University of Agriculture Faisalabad.
- Shah, N.H., G.Hassan, S. Rahman, N. Ahmad and F. Subhan. 2004. Weed Management in wheat on farmers' fields of DASP Command area. Pak. J. Weed Sci. Res. 10(1-2):25-32.
- Steel, R.G.D. and J.H. Torrie. 1980. Principles and procedures of statistics, a biological approach, 2nd ed. McGraw Hill, Inc. New York, Toronto, London.