

## GROWTH BEHAVIOUR OF WHEAT AS AFFECTED BY VARIOUS SEED RATES AND HERBICIDES

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### ABSTRACT

An experiment to study the growth behaviour of wheat crop as affected by various seed rates and herbicides was laid out in the Research Farm of the Department of Agronomy, Faculty of Agriculture, Gomal University, Dera Ismail Khan, Pakistan. The results revealed that seeding rates had significant effect on plant height. However, the higher plant height was recorded in those plots where 120 kg ha<sup>-1</sup> seed rate was used. The results further revealed that the seeding rates did not show significant effects on total number of tillers plant<sup>-1</sup>. The maximum seed rate (140 kg ha<sup>-1</sup>) produced the highest biological yield (14620 kg ha<sup>-1</sup>) due to higher plant population. The lowest biological yield in 100 kg seed rate was merely due to low plant population. The data further revealed that herbicides significantly affected the plant height and biological yield (kg ha<sup>-1</sup>) over woody check. Interaction between seed rates and herbicides had also significant effect on plant height, while number of tillers plant<sup>-1</sup> and biological yield were non-significant statistically.

**Key words:** Wheat seed rates herbicides biological yield plant height.

### INTRODUCTION

Wheat is a major cereal crop and contributes a lot in human nutrition. Major reasons for low yield of the crop are improper seed rate and limited use of herbicides. Ali and Shah (1983) studied the effect of seeding rates i.e. 70, 90, 110, and 150 kg ha<sup>-1</sup> on the yield and other traits of wheat variety Pak-81. Emergence, plant height, and grains per spike increased while 1000-grain weight and days to flowering decreased with increase in the rate of seeding. The highest grain yield was produced from the plot seeded at the rate of 150 kg ha<sup>-1</sup>. Kovac (1978) found that increase in seeding rate increased the number of plants m<sup>-2</sup> and increased the number of ears per plant. Whereas number of tillers per plant and dry matter accumulation, number of grains spike<sup>-1</sup> and 1000-grain weight were decreased. Velva (1982) observed that Dicuran MA 60WP (chlortoluran) @ 3.5 kg ha<sup>-1</sup> was found most effective herbicide which decreased weed population by 32% and increased the yield by 10.5%. Besides, stimulated tillering and increased the number and weight of grains spike<sup>-1</sup>. Khattak (1985) reported that weeds were most effectively controlled by Dicuran MA 60WP, Tribunal and Arelon WP @ 2.5, 3 and 2 kg ha<sup>-1</sup>, respectively. However, plant height, number of spikelets spike<sup>-1</sup>, number of tillers (productive and unproductive) and 1000-grain weight were not affected by herbicides. Awan *et al.* (1986) reported that hand weeding and herbicides significantly increased the number of tillers per unit area, spike length, plant height, spikelets per spike, grain yield and straw yield kg ha<sup>-1</sup> by significantly decreasing the weed population. Ahmad *et al.* (1995) reported that seed rate significantly affected most of the characters. The number of spikes increased from 214 to 371 m<sup>-2</sup> and the number of grains per spike decreased from 59 to 43 respectively as these rates increased from 40 to 120 kg per

hectare. Harvest index decreased from 42.96% to 35.12% and 1000 grain weight decreased from 40.50 g to 39.69 g with increase in seed rate from 40 to 120 kg ha<sup>-1</sup>. The highest grain yield of 3563 kg ha<sup>-1</sup> and straw yield of 6597 kg ha<sup>-1</sup> were obtained from plots seeded @ 120 kg ha<sup>-1</sup>.

## MATERIALS AND METHODS

The experiment was carried out at the Agronomic Research Wing, Faculty of Agriculture, Gomal University, Dera Ismail Khan. The experiment was laid out according to factorial in randomized complete block (RCB) design by keeping the plot size of 2×4 m<sup>2</sup>.

The following treatments were used:

### A. Seed rates (kg ha<sup>-1</sup>)

S<sub>1</sub> = 100

S<sub>2</sub> = 120

S<sub>3</sub> = 140

### B. Herbicides

H<sub>1</sub> = Weedy Check

H<sub>2</sub> = Buctril-M 40EC @ 1.25 L ha<sup>-1</sup>

H<sub>3</sub> = Assert @ 1.50 L ha<sup>-1</sup>

H<sub>4</sub> = Affinity @ 1.50 L ha<sup>-1</sup>

Wheat cultivar Ghaznavi-98 was sown in the mid of November 1999. Fertilizer was used at the rate of 120:80 NP kg ha<sup>-1</sup>. Urea and triple super phosphate were used as a source of nitrogen and phosphorus, respectively. All the phosphorus was applied at sowing time. However, nitrogen was applied in two split doses; half at the time of sowing and remaining half dose was applied with second irrigation. However, All the other agronomic practices were kept same for all the treatments except the parameters under study. The herbicides were applied at post-emergence stage. The crop was finally harvested at the time of maturity and the data were recorded on plant height (cm), number of tillers plant<sup>-1</sup> and biological yield. The data obtained were statistically analyzed and LSD test was used to compare the mean differences according to Steel and Torrie, 1984.

## RESULTS AND DISCUSSION

### Plant height (cm)

Data revealed that plant height was significantly affected by seed rates (Table-1). It is evident from the results that maximum plant height of 100.7 cm was recorded in plots seeded with 120 kg ha<sup>-1</sup> seed rate. 100 kg ha<sup>-1</sup> seed rate plots closely followed it where average plant height of 99.6 cm was recorded. It is evident from the data that plant height was decreased with heavy seed rate due to an intensive intraspecific competition. Herbicides also showed significant effect on plant height. From herbicide means, it was noted that all the herbicidal treatments produced taller plants as compared to control. However, maximum plant height of 101.3 cm was obtained from Assert treated plots while minimum plant height of 92.3 cm were recorded in Weedy Check plots. Interaction between seed rates and herbicides was also significant. The maximum plant height of 104.8 cm was recorded in plots having 100 kg seed rate and sprayed with Buctril-M for weed Weedy Check. However, most of the treatments were non-significant with each other. Minimum plant height of 85.6 cm was recorded from Weedy Check plots where 140 kg ha<sup>-1</sup> seed rate were used. It is evident from the data that all Weedy Check plots with their respective seed rates decreased the plant height. The results were in

agreement with the findings of Awan *et al.* (1986) concluded that plant height was significantly affected by herbicides.

### Tillers per plant

Data given in Table-2 revealed that seed rates, herbicides, and interaction between seed rates and herbicides showed non-significant effect on number of tillers per plant. However, high seed rates of 120 and 140 kg ha<sup>-1</sup> produced non-significantly more number of tillers per plant as compared to low seed rate of 100 kg ha<sup>-1</sup>. Mean values for different herbicides showed that herbicide treated plots gave more number of tillers per plant over Weedy Check. Data pertaining to interaction between seed rates and herbicides revealed that maximum number of tillers per plant (14.3) was recorded in plots treated with Affinity having 120 kg ha<sup>-1</sup> seed rate. Weedy Check with 100 kg ha<sup>-1</sup> seed rate produced minimum number of tillers per plant. Somewhat equal number of tillers per plant was probably due to heredity character of that particular wheat variety. Khattak (1985) reported similar results that number of tillers was not affected by herbicidal treatments.

### Biological yield (kg ha<sup>-1</sup>)

Biological yield of wheat was measured in terms of its total biomass production on per unit area. Statistical analysis of data revealed that different seed rates had significant effect on biological yield. Among seed rate means, maximum biological yield of 14620 kg ha<sup>-1</sup> was recorded from plots where 140 kg ha<sup>-1</sup> seed rate was used. The lower seed rate produced lower biological yield (10170 kg ha<sup>-1</sup>). Higher biological yield in high seed rates might be due to high plant densities. These results are in conformity with the findings of Hussain and Butt (1965) who concluded that higher seeding rates produced more biological yield. Different herbicides also showed significant affect on biological yield. Maximum biological yield of 13730 kg ha<sup>-1</sup> was obtained from Buctril-M treated plots while minimum yield of 9906 kg ha<sup>-1</sup> was recorded in Weedy Check plots. Interaction between seed rates and herbicides did not affect the biological yield significantly. Within the treatments, maximum biological yield was obtained from plots where 140 kg seed rate was used with Buctril-M. Assert and Affinity treated plots with the same seed rate of 140 kg ha<sup>-1</sup> also produced more biological yield (15650 and 14510 kg ha<sup>-1</sup> respectively) as compared to other interactions. Minimum biological yield of 8678 kg ha<sup>-1</sup> was found in weedy check plots where 120 kg seed rate was used.

**Table-1. Effect of seed rates and herbicides application on plant height (cm) of wheat**

Seed rate (kg ha <sup>-1</sup> )	Weedy Check	Herbicides			Mean*
		Buctril-M	Assert	Affinity	
100	88.9 b	104.8 a	104.5 a	100.3 a	99.6 a
120	102.4 a	103.4 a	98.9 a	98.1 a	100.7 a
140	85.6 b	90.6 b	100.4 a	100.3 a	94.2 b
Mean*	92.3 b	99.6 b	101.3 a	99.6 a	

\* Mean having common letters do not differ significantly by LSD Test at 5% probability level

**Table-2. Effect of seed rates and herbicides application on number of tillers per plant of wheat**

Seed rate (kg ha <sup>-1</sup> )	Herbicides			Mean
	Weedy Check	Buctril-M	Assert	
100	10.3 <sup>NS</sup>	12.3	12.7	11.9 <sup>NS</sup>
120	12.3	13.0	12.0	12.9
140	12.0	13.0	13.3	12.6
Mean <sup>NS</sup>	11.5	12.8	12.7	12.9

NS= Non-significant.

**Table-3. Effect of seed rates and herbicides application on biological yield (kg ha<sup>-1</sup>) of wheat**

Seed rate (kg ha <sup>-1</sup> )	Herbicides			Mean*
	Weedy Check	Buctril-M	Assert	
100	9180 <sup>NS</sup>	10450	10870	10170 c
120	8678	14280	12590	12120 b
140	11860	16460	15650	14620 a
Mean*	9906 b	13730 a	13037 a	12540 a

\* Mean having common letters do not differ significantly by LSD Test at 5% probability level.

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