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EFFECT OF DIFFERENT METHODS OF WEED CONTROL ON THE YIELD AND YIELD COMPONENTS OF WHEAT

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ABSTRACT

Experiments were conducted to study the effect of different methods (Hand weeding, Narrow spacing, Hand hoeing, chemical weeds control with Buctril super + Puma super and unweeded check) of weed control on wheat. The experiments were laid out in randomized complete block design at ARI Tarnab, Peshawar with four replications during 2003-04 and 2004-05. Experiments were planted on well-prepared seedbed on 7th and 20th November during 2003-04 and 2004-05, respectively. The fertilizer was applied @120-90-60 kg NPK ha^{-1} by applying full dose of single super phosphate and sulphate of potash and half dose of urea before sowing and remaining dose of urea with the first irrigation. The data indicated that there were non significant differences among various weed control methods during 2003-04, for all the parameters recorded. However, highest numerical yield was obtained with planting wheat in narrow spacing. There were significant differences among weed control methods for number of weeds and tillers m^{-2} and grain yield during 2004-05. Chemical weed control outyielded rest of the treatments except hand weeding. Highest grain yield of 3804 kg ha^{-1} was recorded with chemical Weed control and hand hoeing 3696 kg ha^{-1}. The yield gain of 28.51% over the unweeded check was realized in the tank mixed Buctril super + Puma super. Narrow row spacing suppressed weeds, hence it is suggested that narrow row planting may be integrated with herbicide mixture to effectively control weeds and increase the grain yield of wheat.

Key words: Integrated weed management, Buctril super, Puma super, row spacing, wheat.

INTRODUCTION

Weeds are unwanted plants, which are harmful for normal crops. Weed must be removed for economic, social and aesthetic reasons. In crop production, weeds are one of the major factors reducing crop yield. The losses caused by weeds have been estimated to be much higher than those caused by insect pest and diseases together. Generally the yield of wheat crop is reduced by 25 –30 % due to weeds infestation and that of maize is reduced by 20-45 %. Hence weed control is the most important factor in order to increase the wheat yield and meet wheat food grain requirements in the country.

Wheat is a major food grain crop in Pakistan. It is essentially better from nutritional point of view than most cereals and other food staples. Wheat cultures both in NWFP and the country is the backbone of the whole agricultural system. The total cultivated area and production under wheat crop in NWFP during 2003-04 was 842.2 thousand ha with a production of 1163.4 thousand tons (Anonymous 2004).

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In Pakistan, the researchers as well as the progressive farmers have obtained wheat yield of 6500 kg ha^{-1}. However, our average provincial and national production is limited to 1300 and 2500 kg ha^{-1}, respectively. This production is indicative of the vast potential gap, which can be bridged up, if available measure were adopted. The population of NWFP as well as whole country is increasing at an unprecedented pace.

Losses in wheat yield due to weeds amount more than 28 billions at national level and 2 billion in NWFP (Hassan and Marwat, 2001). In addition to crop losses in quality, weeds keep on surviving and thus steal considerable amount of nutrients, water, oxygen, and light from the crop consequently having a drastic effect on crop yield. Decrease in yield of crops due to weed infestation has been well documented (Saeed *et al.* 1977 and Mehmood, 1987).

Both grassy and broad leaf weeds pose a severe threat to wheat production in NWFP. Grassy weeds are difficult to be identified in early stages of their development because of their similarities to wheat and their control is also difficult. In comparison, broad leaf weeds can be identified easily and their control is easy except of some perennial weeds such as field bindweed, canada thistle and prickly dock. The problem weeds among grasses are wild oat, canary grass and annual bluegrass infesting wheat crop. However, wild oat has been the most prevalent and noxious weed in NWFP like elsewhere in the country.

In case of broadleaf group, there are scores of them prevalent in wheat crop, however, field bindweed, common lambsquarters, sun spurge, common medic, Indian clover, fumitory, canada thistle, *Ammi visnaga*, wild mustard and wild carrot are the most widespread species (Hassan *et al.* 2003). However, because of more competitive abilities and difficulty in control wild oats, canada thistle, field bindweed, broad leaf dock, medic, sun spurge and pricky dock have become major problem in wheat cultivation in NWFP. Hence, studies were carried out at ARI, Tarnab, Peshawar, Pakistan with the objectives to compare different weed control methods in order to synthesize the most appropriate weed control strategy for controlling weeds in wheat.

MATERIALS AND METHODS

The experiments were carried out at Agricultural Research Institute, Tarnab, Peshawar, Pakistan during 2003-04 and 2004-05 in RCBD design with four replications. The experiment was planted on well-prepared seedbed on 7th November 2003 and 20th November 2004, respectively. The treatments employed in experiments included hand weeding, narrow spacing (Row to row distance 15cm), hand hoeing with *khurpa* and hand hoe, chemical weed control with Buctril super + Puma super) after first irrigation and the unweeded check. In hand weeding treatment weeds were removed or pulled by hand. In close spacing treatment the weeds were controlled by narrow spacing. In hand hoeing treatment weeds were removed with *khurpa* and hand hoe and chemical weed control was done by tank mixed postemergence application of Buctril super + Puma super after first irrigation when soil was in moist condition.

The wheat variety Saleem 2000 was used in both year studies. The fertilizer was applied @120-90-60 NPK kg ha^{-1}. The full dose of phosphorus and potash in the form of SSP and SOP and half dose of nitrogen was applied at the time of land preparation, while remaining half dose of nitrogenous fertilizer was applied at the first irrigation. Four irrigations were applied during 2003-04 and two irrigations were given in 2004-05 due to high rainfall during the season. During the course of studies data were recorded on No. of tillers $plant^{-1}$, plant height (cm), 1000 grain weight (g), and grain yield (kg ha^{-1}), while in addition the data on density of weeds m^{-2} were also recorded during the second year of

studies. For recording grain yield, four central rows (net plot area 6 m^2) were harvested and data were recorded after threshing. The data were analyzed by using MSTATC computer programme.

RESULTS AND DISCUSSION

The analysis of variance revealed non-significant differences among the various treatments (Table-1). The data indicate that during 2003-04, the highest plant height (95 cm) and 1000 grain weight (34 g) were recorded in Chemical control (Tank mixed application of Buctril super + Puma super). Whereas, No. of tillers m^{-2}(638), grain yield (6008 kg ha^{-1}) and yield gain (28.51%) were recorded in Narrow row spacing (15 cm). All the treated plots outyielded the unweeded check in grain yield to the tune of 7.21% in hand weeding to 28.51% in the Narrow rows. However, the yield gain in all the treatments other than the Narrow rows was comparable to one another (Table-1).

Effect of different methods of weed control on yield and yield components of wheat during 2004-05, indicate that chemical weed control with Buctril super + Puma super had the least No. of weeds m^{-2} (7). It was however, closely followed by hand hoeing (11). The weedy check had 9 times higher weed infestation than top scoring chemical weed control (Table-2). The data presented in Table-2 further indicate that the treatments did not differ from one another statistically for plant height and 100-grain weight. The highest numerical plant height (89 cm each) was recorded in hand weeding and the unweeded check. Other treatments also possessed a very closer height (Table-2). No. of tillers m^{-2} varied statistically among the treatments. All the treatments surpassed the unweeded check except hand hoeing (Table-2). Effect of different weed control methods on 1000 grain were non significant statistically (Table-2). All the treatments attained bolder grains numerically than the unweeded check. The highest grain weight (35 g) was witnessed in the hand weeding. The data (Table-2) show that grain yield differed statistically. Chemical control by producing 3804 kg ha^{-1} outyielded rest of the treatments included in the studies during second year (Table-2). However, it was statistically at par with hand hoeing (3696 kg ha^{-1}). The other treatments non-significant among one another possessed the statistically higher yield as compared to the unweeded check (3461 kg ha^{-1}). The yield gain as compared to the unweeded check ranged from 2.62% in hand weeding to 9.91% in chemical weed control (Table-2). Hand hoeing needs a lot of labor, hence it could not be considered an economical method to control weeds in wheat. Narrow spacing works in some places as more yield was obtained through zero tillage technology or narrow spacing (Mann *et a.*, 2002), which not only saves the cost of land preparation but also ensures good crop stand. The study during 2003-4 (Table- 1) indicated that with narrow spacing more yield was obtained. It seems when stand of wheat crop is excellent, narrow spacing shows good results. In this study during 2004-5 narrow spacing did not work well most probably because of low stand of the wheat crop in the experiment. Other methods of weed control including narrow spacing sometimes give good results depending on location, soil, weed density in wheat crop and climate etc. but chemical method is more economical and convenient to use weed control in wheat (Awan *et al.* 1986). Our findings are also in agreement with Marwat *et al.* (2002), Marwat, *et al.* (2003a) and Marwat, *et al.* (2003b), who integrated various strategies in managing weeds in wheat. From our studies, it is recommended that proper control of weeds by using chemicals in proper quantity and integration with narrow row spacing could be an effective strategy to control weeds in wheat crop.

Table-1. Effects of weed control methods on yield of wheat kg ha^{-1} and other traits during 2003-4.

S. No	Method of weed Control	Plant Height cm	No of tillers m^2	1000 Grain Weight g	Grain Yield kg ha^{-1}	Yield gain over check%
1	Hand weeding	93	579	33	5016	7.29
2	Narrow pacing	91	638	30	6008	28.51
3	Hand hoeing	88	503	33	5033	7.66
4	Chemical weed Control	95	492	34	5054	8.11
5	Unweeded Check	91	535	33	4675	--
	L S $D_{0.05}$	N.S	N.S	N.S	N.S	

Table-2. **Effect of various weed control methods on number of weeds m^{-2}, plant height and yield and yield components of wheat during 2004-5.**

S. No	Method of weed control	No of Weeds m^{-2}	Plant Height cm	No of tillers m^{-2}	1000 Grain weight	Grain yield kg ha^{-1}	Yield gain over check%
1	Hand weeding	14c	89	349 a	39	3621 bc	4.62
2	Narrow pacing	27b	85	366 a	37	3554 bc	2.69
3	Hand hoeing	11d	86	328ab	38	3696 ab	6.79
4	Chemical weed Control	7e	86	357 a	38	3804 a	9.91
5	Unweeded Check	63a	89	290 b	35	3461 c	--
	$LSD_{0.05}$	1.041	N.S	95.30	N.S	174.6	

N.S = Non-significant

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