Pak. J. Weed Sci. Res. 19(1): 89-99, 2013

PERCEPTION OF FARMING COMMUNITY REGARGDING EFFECT OF VARIOUS WEED CONTROL PRACTICES ON YIELD AND YIELD COMPONENTS OF WHEAT

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ABSTRACT

The study was conducted in 2011 in order to check perception of farming community regarding effect of various weed control practices on yield and yield components of wheat crop in the six union councils of district Swabi, Khyber Pakhtunkhwa, Pakistan. The six union councils included Anbar, Lahore, Manki, Tordher, Jalbai and Jehangira. Data were collected by a survey method from 120 respondents, having randomly selected 20 farmers from each of the union councils. The information was gathered from farmers regarding manual weed control and use of herbicides included Puma Super (fenoxaprop-P-ethyl) using @ 500 ml acre^{-1}, clodinafop-propargyl 15%WP @ 140 g acre^{-1}, Buctril super (bromoxnil-octanovate + heptanovate ester) @ 300 ml acre^{-1}, Affinity 50WP (carfentrazone ethyle + isoproturon) @ 700 g acre^{-1}, and Eagle (bromoxynil + MCPA) @ 500 m acre^{-1}. Common weeds in wheat crop were Phalaris minor, Convolvulus arvensis, Euphorbia helioscopia, Malva parviflora, Cyperus rotundus, Coronopus didymus, Avena fatua, Rumex dentatus, Melilotus indica, Medicago denticulata, and Chenopodium album. Analysis of the data showed that weeds were controlled manually and through application of herbicides. However, overwhelming majority (91.67%) of the farming community perceived that weeds in wheat crop were most effectively controlled by manual weeding followed by application of herbicides named Puma super (fenoxaprop-P-ethyl) @ 500 ml acre^{-1} as perceived by 85% of the respondents. The study concludes that all parameters including density of weeds per square meter, average plant height (cm), tillers per square meter, grains per spike and grain yield (kg/ha) were significantly affected by manual weeding and application of herbicides, especially by Puma super (fenoxaprop-P-ethyl) 6.57% using @ 500 ml acre^{-1}. The study recommends that manual weeding or use of Puma super (fenoxaprop-P-ethyl) @ 500 ml acre^{-1} may be used for effective control of weeds and thus get higher yields of wheat crop.

Key words: Herbicide, survey, weeds, weed management, wheat.

INTRODUCTION

According to an estimate the population of Pakistan has reached to 180 million by 2012 where most of the people like bread of

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wheat to eat. Therefore, wheat (*Triticum aestivum* L.) occupies a central position in the formulation of agricultural policies in Pakistan because it is the leading food grain and source of staple diet of the people. It contributes 14.4% to the value added in agriculture and 3.1% to GDP (Govt. of Pakistan, 2009-2010). Wheat is widely grown in almost all the regions of the Khyber Pakhtunkhwa province, covering an irrigated and un-irrigated area of 10157 and 823 ha, with production of 170629 and 10624 tons, respectively (Govt. of Khyber Pakhtunkhwa, 2010-2011). However, production of all crops in Pakistan is low as compared to the world's averages (Khan, 2004).

Among various reasons responsible for low yield of crops, weeds infestation is the most important one which may be controlled by manual weeding and applying rational doses of herbicides (Khatam *et al.*, 2012). Likewise, (Ahmad, 1992) reported that there exists a yield gap (50-60%) between potential and actual yield which is attributed to several agronomic constraints among which improper method of sowing and poor weeds control practices are thought to be the most important ones. He added that in Pakistan, it is estimated that annual losses caused by weeds may be more than 10 billion rupees.

Results of analogous importance were obtained by Khan (1982) who concluded that on one hand weeds reduce yield and on the other hand affect the quality of crops. Khan *et al*. (1998) concluded from their results that weeds reduce yield because these compete with major crop for nutrients, water and light. Their results confirmed that weeds also hinder with harvesting of crops and so boost up the cost of production. Weeds control is therefore vital to get productive crops. Weeds can be controlled by cultural, mechanical, biological and chemical measures. It is far sure that cultural weed control methods are still helpful but these require more laborers, take more time and that is why these are expensive.

Due to all these constraints, chemical weed control measure is the most important option. Khan and Haq (2004) stated that method of chemical weed control is very successful if employed appropriately. A range of herbicides are available in the market but their accurate amount, time and technique of employment are still needed to be explored for varied situations.

Keeping in view the above facts and figures, the present study was planned to examine the perception of farming community regarding effect of various weeds control practices on yield and yield components of wheat crop in Khyber Pakhtunkhwa as well as give away policy recommendations for effective control of weeds through manual control or application of appropriate weedicides on the basis of the research findings.

MATERIALS AND METHODS

The population for the study consisted of the farmers of 6 union councils in district Swabi of the Khyber Pakhtunkhwa Province, Pakistan. These union councils included Anbar, Lahor, Manki, Tordher, Jalbai and Jehangira. Collecting data from all farmers of the six union councils was not possible due to time and financial constraints. Therefore, on the basis of Fitzgibbon and Lynn (1987), 20 farmers from each of the 6 union councils were selected at random from the list of the contact growers provided by the Agriculture (Extension) Department of district Swabi, thereby making a total of 120 farmer respondents.

The data collection was accomplished through survey technique. For this purpose a questionnaire was developed which was pre-tested for its validity through experts of the Agriculture (Extension) Department, Khyber Pakhtunkhwa and Agriculture University, Peshawar. Similarly, for the purpose of testing reliability, three respondents from each of the 6 union councils were interviewed making a total of 18 respondents. Data on perception of respondents regarding effect of various weeds control practices including weeds density per square meter, average plant height (cm), tillers per square meter, grains per spike and grain yield (kg/ha) were recorded. The data were tabulated, analyzed and the results drawn are given in the following tables.

RESULTS AN DISCUSSION

To analyze the data, descriptive methods of statistics were used. Frequencies and their percentages were computed for different variables and the results drawn are given in the Table-1 and Table-2.

Table-1. Distribution of respondents according to their perception about the effect of various weeds control practices in wheat crop.

Treatments	Frequencies	Percentage
Manual weed control	110	91.67
Puma super 6.57% (fenoxaprop-P-ethyl) @ 500 mL acre^{-1}	102	85.00
Topik 15% WP (clodinafop-propargyl) @ 140 g acre^{-1}	94	78.34
Buctril Super 60 EC (bromoxynil-octanovate + heptanovate ester) @ 300 mL acre^{-1}	89	74.17
Affinity 50 WP (carfentrazone Ethyle and isoproturon) @ 700 g acre^{-1}	86	71.67
Eagle 10% (bromoxynil + MCPA) @ 500 mL acre^{-1}	71	59.17

Source: Field data n=120

Table-1 shows that overwhelming majority (91.67%) of the farmer respondents perceived that weeds were superbly controlled by manual weeding and ranked first followed by controlling weeds with Puma Super (fenoxaprop-P-ethyl) using @ 500 mL acre^{-1}, with (85%) and ranked second in order of precedence. About 78.34% of the farmers perceived that using clodinafop-propargyl 15% WP @ 140 g acre^{-1}, 74.17% of the them reported Buctril super (bromoxynil-octanovate + heptanovate ester) @ 300 mL acre^{-1} and 71.67% revealed Affinity 50 WP (carfentrazone ethyle + isoproturon) @ 700 g acre^{-1} that controlled weeds effectively but lower than manual weeds control measure. However, a simple majority (59.17%) of the farmer respondents favoured weeds control by using Eagle (Bromoxynil + MCPA) @ 500 ml acre^{-1} in the study area. The findings of the survey are supported with those of Usman *et al*. (2010) who concluded that herbicides controlled weeds to a varying level and significantly affected all parameters of yield and yield components of wheat crop. Zubair *et al*. (2009) reported that hand weeding and application of herbicides significantly reduced weeds per square meter in the experimental area. Jan *et al.* (2006) pointed out that weeds were to be controlled with the use of proper chemicals whenever needed. Similarly Porwal, (2000) and Toloraya *et al*. (2001) stated that weeds were drastically controlled in the treatments with hoeing and herbicides' application. Similar results were obtained by Johnson *et al*. (2002) and Janjic *et al*. (2004), who stated that weeds were effectively controlled by using herbicides in the crop.

Table-2. Distribution of respondents according to their perception about the effect of various weeds control practices on yield and yield components of wheat crop.

Treatments	Perception of respondents and their percentages regarding									
	Weed density m^{-2}	%	Plant height (cm)	%	Tillers (m^{-2})	%	Grains spike^{-1}	%	Grain yield (kg ha^{-1})	%
Manual weeds control	114	95.0	109	90.83	111	92.50	112	93.33	113	94.17
Puma Super @ 500 mL acre^{-1}	103	85.83	101	84.17	105	87.50	109	90.83	106	88.33
Topik 15 WP @ 140 g acre^{-1}	96	80.0	92	76.67	104	86.66	101	84.17	103	85.83
Buctril Super 60 EC @ 300 mL acre^{-1}	89	74.17	85	70.83	91	75.83	95	79.16	94	78.33
Affinity 50 WP @ 700 g acre^{-1}	81	67.5	78	65.0	85	70.83	88	73.33	78	65.00
Eagle on 10% basis @ 500 mL acre^{-1}	79	65.83	76	63.33	73	60.83	77	64.17	71	59.16

Source: Field data n=120

Density of weeds m^{-2}

Overwhelming majority (95%) of the farmer respondents perceived that weeds were excellently controlled by manual weeding and ranked 1st as shown in Table-2 followed Puma Super (fenoxaprop-P-ethyl) used @ 500 mL ac^{-1} and clodinafop-propargyl WP used @ 140 g ac^{-1} as perceived by 85.83 and 80% of the respondents and stood second and third in the view of farmers in the study area. However, application of Buctril Super (bromoxynil-octanovate + heptanovate Easter) @ 300 mL ac^{-1}, Affinity 50 WP (carfentrazone ethyl + isoproturon) @ 700 g ac^{-1} and Eagle on 10% basis (bromoxynil + MCPA) @ 500 mL ac^{-1} also effectively controlled weeds as reported by a large majority i.e. 74.17, 67.5, and 65.83% of the respondents, respectively. The results showed that Puma Super (fenoxaprop-P-ethyl) 6.57% using @ 500 mL/acre was the best herbicides option for weeds control in the study area.

The findings of these results are partially supported with those of Usman *et al*. (2010) who reported maximum (75.5) weeds density per square in weedy check followed by 51.8 in 2,4-D and 34.8 in the treatments sprayed with Puma super. Khan *et al*. (2004) reported that Affinity proved to be the best for controlling weeds compared to other herbicidal treatments when applied as under post emergence conditions. They reported that herbicidal treatments significantly reduced weed density as herbicides are time saving and economical in comparison to manual weeding or cultural methods of weeds control.

Mann *et al*. (2004) and Mehla *et al*. (2000) concluded that increase in productivity was primarily due to increased fertilizer and water use efficiency and to a significant reduction in weeds population. Similar results were obtained by Chhokar *et al*. (2007) reported that zero tillage in combination with herbicides drastically reduced *Phalaris minor* population and economically more preferable than traditional tillage practices.

Average plant height (cm)

Overwhelming majority (90.83%) of the farmer respondents perceived that weeds were remarkably controlled by manual weed control measure and ranked 1st followed by a large majority (84.17 and 76.67%) of the farmer respondents who reported that plant height of wheat crop was significantly affected in the fields sprayed with Puma Super (fenoxaprop-P-ethyl) used @ 500 mL ac^{-1} and clodinafop propargyl WP used @ 140 g ac^{-1} as shown in the Table-2. However, the highest plant height was obtained in the plot sprayed with Puma Super (fenoxaprop-P-ethyl) used @ 500 mL ac^{-1} and it was statistically similar with that of clodinafop-Propargyl WP used @ 140 g ac^{-1} whereas the lowest plant height was obtained in the plot sprayed with

eagle on 10% basis (bromoxynil + MCPA) @ 500 mL ac^{-1} as reported by 63.33% of the farmer respondents.

These findings are supported with those of Soltani *et al*. (2006) who reported that plant height was affected by post emergence herbicides. Arif *et al*. (2004) reported a significant effect of herbicides on plant height and maximum plant height was obtained with mixture of Buctril M 40 EC and Puma super 75 EW. Stefanovic *et al*. (2004) concluded from their results that use of herbicides not only controlled weeds but also increased plant height in maize crop.

Number of tillers per square meter

Overwhelming majority (92.5%) of the farmer respondents perceived that number of tillers per square meter was significantly affected by manual weed control method and ranked first as shown in Table-2 followed Puma Super (Phenoxaprop-P-Ethyl) used @ 500 mL ac^{-1} and clodinafop propargyl WP used @ 140 g ac^{-1} as perceived by 87.50 and 86.66% of the respondents which stood 2^{nd} and 3^{rd} in order of priority by the farmer respondents. However, application of Buctril Super (bromoxynil-octanovate + heptanovate ester) @ 300 mL ac^{-1}, Affinity 50 WP (carfentrazone-ethyl + isoproturon) @ 700 g ac^{-1} and Eagle on 10% basis (bromoxynil + MCPA) @ 500 mL ac^{-1} also effectively increased number of tillers m^{-2} as reported by a large majority (75.83, 70.83, and 60.83%) of the respondents in the study area.

The findings of these results are supported with those of Usman *et al*. (2010) concluded that herbicides and number of years significantly affected tillers m^{-2}. They also added that number of tillers m^{-2} increased with the application of herbicides in comparison to that of weeds check in the experimental area.

Number of grains per spike

A gigantic majority (93.33%) of the farmer respondents perceived that considerably increased number of grains was produced in the plots where weeds were controlled manually. However, application of Puma Super (fenoxaprop-P-ethyl) used @ 500 mL ac^{-1} and clodinafop-propargyl WP used @ 140 g ac^{-1} also significantly increased number of grains $spike^{-1}$ as evidenced by 90.83 and 84.17% farmer respondents, respectively. However, results of Buctril Super (Bromoxynil-octanovate + heptanovate ester) @ 300 mL ac^{-1}, Affinity 50 WP (carfentrazone-ethyl and isoproturon) @ 700 g ac^{-1} and Eagle on 10% basis (bromoxynil + MCPA) @ 500 mL ac^{-1} was also appreciable as reported by majority (79.16, 73.33 and 64.17% of the farmer respondents. The findings of these results are supported with those of Khan *et al*. (2004) who concluded that the number of weeds per square meter reduced in herbicides treated plots increased the number of grains $spike^{-1}$.

Grain yield

Exceptional majority (94.17%) of the respondents (Table-2) perceived that the highest grain yield (kg ha^{-1}) was obtained from the plot where weeds were manually controlled followed by the yields in the plots where weeds were controlled through application of Puma Super (fenoxaprop-P-ethyl) @ 500 mL ac^{-1}, clodinafop-propargyl WP @ 140 g ac^{-1} and Buctril Super (bromoxynil-octanovate + heptanovate ester) @ 300 mL ac^{-1} as reported by 88.33, 85.83 and 78.33% of the respondents. However, the majority (60, and 59.16%) of the respondents perceived weeds control by applying Affinity 50 WP (carfentrazone-ethyl + isoproturon) @ 700 g ac^{-1} Eagle on 10% basis (Bromoxynil + MCPA) @ 500 mL ac^{-1} in wheat crop. The findings of these results are supported with those of Cheema and Akhtar (2005), Arif *et al*. (2004), Zand *et al.* (2007), Baghestani *et al*. (2008), and Chhokar *et al*. (2008) who reported that the use of herbicides significantly increased the grain yield in wheat corresponding to their weed control spectrum.

CONCLUSIONS

It can be concluded from the perceptional study that various herbicides controlled weeds to a varied level and remarkably affected all strictures including density of weeds per square meter, average plant height (cm), number of tillers per square meter, number of grains per spike and grain yield (kg ha^{-1}). Manual weeds control methods stood out among all the treatments but this method is most laborious as compared to the use of herbicides and thus not affordable by the farming community especially for those farmers who cultivate large lands. Among herbicides, Puma super (fenoxaprop-P-ethyl) @ 500 mL ac^{-1} perceived to be the most effective broad-spectrum herbicide closely followed by clodinafop-propargyl WP @ 140 g ac^{-1} which were used for controlling both the grassy as well as weeds with narrow leaves that ultimately gave the maximum grain yield and thus the highest net return to the farming community. However, lower perception of the respondents regarding weeds control through Buctril Super (Bromoxynil-octanovate + heptanovate ester) @ 300 mL ac^{-1}, Affinity 50 WP (carfentrazone-ethyl and isoproturon) @ 700 g ac^{-1} and Eagle on 10% basis (Bromoxynil + MCPA) @ 500 mL ac^{-1} may be due to the improper doses and inappropriate timings of application. Therefore, effect of these herbicides may further be investigated in the respective areas so that monopoly of specific herbicides' companies may be avoided and thus the prices of herbicides may be kept in the reach of the farming community and consequently their frequent use will control weeds and increase farmers' income.

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