Asian Journal of Plant Sciences

ISSN 1682-3974

science alert

ANSInet
an open access publisher
http://ansinet.com

Asian Journal of Plant Sciences
Volume 1 Number 3: 216-217, 2002

Effect of Various Planting Patterns on Weed Population and Yield of Wheat

[1]Qazi Mehmood Ali and [2]Shamsudin Tunio
[1]Arid Zone Research Center, P. O. Box # 63, Brewery Road Quetta, Pakistan
[2]Department of Agronomy, Sindh Agriculture University, Tandojam, Pakistan

Abstract: Seven weed management treatments viz., Isolated planting patterns, combined treatments (planting pattern + Buctril-M) and weedy check for full season were tested for their effect on weed population of wheat All the treatments had highly significant effects on plant height, tillers, 1000 grains wt and grain yield, except number of grains/ear that was significantly affected by weed management practices. Combined treatment with cross row sowing + Buctril- M @ 1.0 lit ha^{-1} produced highest grain yield (3820.95kg ha^{-1}). While that with skip row sowing produced lowest (2486.65 kg ha^{-1}). Weeds were controlled highest in skip row + Buctril-M @ 1.0 lit ha^{-1} (67%) and lowest in close row sowing + Buctril-M @ 1.0 lit ha-1(48.61%). Weed population in planting pattern alone were increased but their weed biomass was decreased as compared to weedy check. The highest weed biomass was decreased in cross row sowing. Combined treatment was the best for the control of various weeds of wheat crop and to harvest maximum crop yield.

Key words: Isolated planting pattern, combined planting pattern, broad leaved weeds, narrow leaved weeds, skip row sowing, cross row sowing, weed biomass, herbicide

Introduction

Wheat products are the principal cereal foods of an over whelming majority of the world inhabitants. At present prosperity of many countries largely depends upon wheat production. In Pakistan it is planted on 8.1 million hectares with production of 17.0 million tons, and the average yield of the crop is 2081 kg ha^{-1}. Pakistan has a low yield of wheat as compared with advanced growing countries of the world. The crop productivity could be raised by two possible ways, by increasing area under cultivation and by increasing per acre yield by adopting improved technologies such as use of improved seed of high yielding varieties, responsive doses of fertilizers, irrigation water, proper weed management, plant protection measures and other cultural practices (Khadeja *et al.*, 1993).

There are many reasons of low production of wheat, but one of the most serious but less addressed cause of the low yield is the presence of weeds. Weeds compete with crops for nutrients, water, light, space etc. causing reduction in wheat vigor, tillering, head size and kernel weight (Zimdahl, 1980). Wheat yield can be increased up to 50% by controlling weeds (Makhdoom and shah, 1976). Weeds may reduce yield as much as 100% depending upon weed species present and their density (Majid, 1985). Weeds have serious negative effect on crop production and results in markedly great loss in crop yield despite the use of costly inputs. However, the input cost increased upon their control increase the cost of cultivation resulting in low returns. Very little information is available about integrated weed management in Pakistan. Agricultural yields could not be increased with out integrated weed management system(Frisen and kanwar, 1980).

This study was under taken to determine the effect of various planting patterns on weed population and wheat yield.

Materials and Methods

The study was conducted at Plant Physiology Section, Agriculture Research Institute, Tandojam, during the year 1997-98. It lies 25 to 26o N and 68 to 69°E. The experiment was conducted on silt loam soil following RCBD. The plot size was 82.44 m^2. Seven treatments were used such as close row sowing + Buctril- M @ 1.0 lit ha^{-1}, cross row sowing + Buctril- M @ 1.0 lit ha^{-1}, close row sowing + Buctril- M @ 1.0 lit ha^{-1}, close row sowing (15cm apart), skip row sowing (after every 4th row one row was missing), cross row sowing (normal i.e., 22.5 cm, both way East-West and North-South) and weedy check for full season. The experimental land was prepared with two dry ploughings followed by planking and levelling to achieve fine seed bed. The wheat variety TJ.83 was sown on December 11th, 1997 with single coulter hand drill @ 125 kg ha^{-1}. Fertilizers in the form of Urea and DAP with 120- 5 kg ha^{-1} were applied. Full dose of DAP and half dose of Urea was applied as basal and remaining half of Urea was applied at 1st irrigation and wheat crop was irrigated 4 times. The herbicide Buctril-M was applied at 2-3 leaf stage i.e., about 20-25 days after sowing by knap sack sprayer. The weeds were counted two times during the study. The first count was done before herbicide application and second one week after the herbicide application. herbicide was applied after first irrigation when soil came in condition. Weeds were counted in a quadrate of 1m^2 from each treatment at random. Weed density m^{-2} was measured and intensity of weeds was also calculated as percentage. The whole experimental area was harvested on April 25th, 1998, by sickles. The whole harvested material was kept in bundles and left to dry up under sun. The data were recorded for growth, and yield components on five randomly selected plants from each plot, where as yield ha^{-1} was recorded from each plot separately. The statistical analysis was made using test of significance Gomez and Gomez (1984).

Results and Discussion

Weeds found in experimental area were *Chenopodium album, Convolvulus arvensis, Melilotus alba, Anagalis arvensis, Rumex accusus, Phalaris minor, Cynodon dactylon, Avena fetua, Cyperus rotandus* and *Asphodelus tenuifolius*. The results for weeds present before and after application (Table 1) revealed that weeds were controlled from (-48.61 to-67.00%) in planting pattern + Buctril-M @ 1.00 lit ha^{-1}. Whilst in planting patterns alone the weed population was increased from (7.71 to 13.38%), but their weed biomass was decreased as compared to weedy check and highest weed biomass was decreased in cross row sowing treatment. These findings are in accordance with Bhan *et al.* (1982), who reported that cross row sowing reduces the dry weight of weeds. The lowest (-48.61%) weed control was recorded in close row sowing combined with herbicide used Buctril-M. The highest (-67.00%) weed control was obtained in the skip row sowing combined with herbicide. The highest weed population (74.25) was recorded in skip row sowing combined with herbicide, the results are not in accordance with findings of (Sharma *et al.*, 1985) who reported that less weed competition is occurred in cross row sowing and close row sowing. In planting pattern alone highest weed population was increased in skip row sowing (+13.38%) and lowest increase was recorded in cross row sowing (+7.71%). This highest weed population and their control in skip row sowing is due to widre space, because in skip row sowing one row was missing after every fourth row and weed density was high in the space, where their was no sowing and herbicide sprayed in that area worked properly.

Therefore, weeds were highly controlled in skip row sowing combined with herbicide. Data for plant height (Table 2) were highly significant and it increased in all treatments from (4.32%) in skip row sowing alone to (13.10%) in cross row sowing combined with Buctril-M as compared to weedy check. The highest (82.40cm) mean plant height was recorded in cross row sowing combined with herbicide Buctril-M, these results are not in accordance with (Muhammad, 1980), who reported that plant height was increased in wide row spacing (45cm). All the treatments except weedy check behave alike. The lowest (72.85 cm) mean plant height was recorded under weedy check for full season. The data for number of tillers m^{-2} were highly significant and revealed that mean number of tillers m^{-2} ranged from (202.00 to 238.75). The lowest (202.00) mean number of tillers m^{-2} was recorded in weedy check and the highest (238.75) mean number of tillers m^{-2} was obtained in cross row sowing combined with Buctril-M, which is in contrast to (Bajwa, 1977) who reported that increased row spacing increases the no of tillers. The mean number of tillers m^{-2} was increased in all

Table1: Effect of various planting patterns on weed control in wheat

Treatments	Weeds before application	Weeds after application	Decrease/ Increase weeds %
Close row sowing + Buctril-M @ 1.0 lit ha^{-1}.	65.25	27.75	-48.61
Cross row sowing + Buctril-M @ 1.0 lit ha^{-1}	71.50	25.50	-64.33
Skip row sowing + Buctril-M @ 1.0 lit ha^{-1}.	74.25	24.50	-67.00
Close row sowing	70.75	76.75	+8.48
Skip row sowing	71.00	80.50	+13.38
Cross row sowing	71.25	76.75	+7.71
Weedy check for full season	80.50	95.75	---

Table 2: Effect of various planting patterns on growth characters of wheat.

Treatments	Plant height(cm)	Tillers m^{-2}
Close row sowing + Buctril-M @ l.0 lit ha^{-1}.	79.65	233.25
Cross row sowing + Buctril-M @ l.0 lit ha^{-1} .	82.40	238.75
Skip row sowing + Buctril-M @ l.0 lit ha^{-1} .	78.90	226.75
Close row sowing	77.55	217.75
Skip row sowing	76.00	207.25
Cross row sowing	78.85	222.50
Weedy check for full season	72.85	202.00
S.E Mean	0.50	2.76
LSD 1	1.48	8.07
LSD 2	2.01	10.93

Table 3: Effect of various Planting patterns on yield and yield components of wheat.

Treatments	Grains ear^{-1}	1000 grain wt.	Yield (kg ha^{-1})
Close row sowing + Buctril-M @ 1.0 lit ha^{-1}	54.30	43.76	3457.05
Cross row sowing + Buctril- M @ 1.0 lit ha^{-1}	54.75	48.54	3820.95
Skip row sowing + Buctril- M @ 1.0 lit ha^{-1}	51.50	41.32	3184.25
Close row sowing	51.00	39.90	2698.92
Skip row sowing	50.25	39.50	2486.65
cross row sowing	51.40	40.51	3062.82
Weedy check for full season	50.10	37.22	2365.35
S.E Mean	1.38	0.431	14.37
LSD1	14.04	11.27	1333.85
LSD 2	5.45	21.70	2452.38

treatments from (2.59%) in skip row sowing alone to (18.19%) in cross row sowing combined with Buctril-M, as compared to weedy check (Table 2) The yield and yield contributing parameters showed significance for number of grains ear^{-1} and highly significant for 1000 grains wt and grain yield ha^{-1} (Table 3). Mean number of grains ear^{-1} increased in all treatments from (0.29%) in skip row sowing alone to (9.28%) in cross row sowing combined with Buctril-M. The highest (54.75) mean number of grains per ear was recorded in cross row sowing combined with Buctril-M. This finding is contradicting the results of (Thakar *et al.*, 1974), who reported that the no: of grains spike^{-1} of wheat was not affected when sown at different row spacing and (Bajwa, 1977), who reported that increased row spacing increases the no of grains ear^{-1}. Where as, lowest (50.25) mean number of grains was obtained in skip row sowing alone as compared to weedy check. The combined application of planting patterns with herbicide Buctril-M treatment were better than their isolated applications.

The results for 1000 grain wt showed that the maximum (48.54g) 1000 grain wt was recorded in cross row sowing combined with Buctril-M, these results are against the results of (Thakar, 1974) and (Mohammed, 1980), who reported that highest 1000 grain wt was obtained in normal row sowing i.e., 22.5 cm. where as, lowest (39.50g) was recorded in skip row sowing alone. The highest increase was recorded (30.41%) in cross row sowing combined with herbicide Buctril-M and the lowest was recorded (6.12%) in skip row sowing alone as compared to weedy check. The data for grains yield kg ha^{-1} revealed that cross row sowing combined with Buctril-M had highest (3820.95 kg ha^{-1}) grain yield, these findings are according to (Bhan, 1982) and (Sharma, 1985) who reported that cross row sowing increases grain yield ha^{-1} and against the (Gill, 1985) who reported that maximum grain yield is obtained in skip row sowing. The skip row sowing alone recorded the lowest (2486.65 kg ha^{-1}) grain yield with an increase of (5.12%) in skip row sowing to (61.53%) in cross row sowing combined with Buctril-M as compared to weedy heck (Table 3).

The results concluded that weed management in wheat is necessary to adopt at proper time and proper amount of herbicide to control weeds and increase the per acre yield. Along with this planting pattern(row spacing) also plays an important role in obtaining high yields, the cross row sowing with row spacing of 22.5 cm produced highest grain yield because of appropriate plant to plant distance.

References

Bajwa, M.A., J.S. Sawhney and M. Sabeta, 1977. The effect of row and plant spacing on yield components. Libyan. J. Agric., 6: 91-95.

Bhan, V.M., R.S. Pawar and R.K. Malik, 1982. Studies on cultural practices for weed management in wheat. In abstract of papers, Annual conference of India society of weed science. Department of Agronomy. Haryana university, Hissar, India.

Frisen, G.H. and G.R. kanwar, 1980. Weed management for dry land crops. Annual conference of Indian society of weed sciences. Bhubneshwar, India.

Gill, H.S., 1985. Integrated control of "Phalaris minor" and "Avena ludoviciana" in wheat: Seventh annual report on weed control, Punjab Agriculture University, Ludhina, Punjab. India, pp: 14.

Gomez, K.A. and A.A. Gomez, 1984. Statistical procedures of agricultural research.

Khadeja, K., M. Akbar., E. Rasul and A. N. Ahmed, 1993. Physiological response of N,P and k on growth and yield of heat. Pak. J. Agric. Res., 14: 126-130.

Majid, A., T. Z. Mehmood and S.A. Niaz, 1985. impact of chemical weed control on wheat production under rainfed conditions. Pak. J. Agri. Res., 6: 78-81.

Makhdoom, M.U. and K. Shah, 1976. Annual report, plant physiology section. A.R.I. Tandojam, pp: 39-47.

Mohammed, S.S., A.K. Mansab, A. Ghazanfer and S.N. Mohammed, 1980. Growth and yield of three wheat cultivars as influenced by different row spacing. Pak. J. Agric. Res., 6: 146-149.

Sharma, K.K., S.P. Verma and C.M. Singh, 1985. Cultural and chemical manipulation for weed management in wheat with reference to grassy weeds. Tropical Weed Management, 31: 133-138.

Thakar, B.S., S.P. Singh and K.P. Gupta, 1974.Response of dwarf wheat to two spacing in black cotton soils of Madhya Pardesh. J. Kvv. Res., 28: 65.

Zimdahl, R.L., 1980. Weed crop competition. A review. International plant protection center. Oregan state university, corvallis, pp: 183.