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Comparative Effect of Improved Methods and Traditional Practices of Wheat under Rainfed Condition

Rahmat Ullah Khan, [1]Abdur Rashid and [2]Taj Naseeb Khan
Arid Zone Research Institute, Bahawalpur, [1]Pakistan Agricultural Research Council, Islamabad, Pakistan
[2]Arid Zone Research Institute, Bahawalpur, Pakistan

Abstract: The field experiments were conducted at Arid Zone Research Institute, D.I. Khan during 1999-2000 and 2000-2001. The objectives of the experiments were to evaluate the effect of improved practices versus local practices on the seed yield of wheat . Yield components i.e; plant height, spike length and grains spike^{-1} were affected significantly except tillers plant^{-1} and 1000 seed weight with approved practices. Also grain yield of wheat obtained with improved practices was significantly great than the yield obtained from the local practices both the year respectively. This increase of wheat over the local practices was reported 22 and 33 % both the years which may have been the results of collective impact of improved practices. Thus, the use of improved wheat variety "Inqilab-91" with proper management practices i.e., two ploughing for land preparation before sowing of crop using a seed rate of 110 kg ha^{-1}, fertilizer rate (60-40-0 N-P kg ha^{-1}) and seed treatment with vitavax-200 @ 2.0 g kg^{-1} seed can be recommended to obtain maximum wheat yield under Rod-Kohi condition.

Key words: *Triticum aestivum*, improved variety, fertilizer, seed rate, crop management, seed yield, rainfed, Pakistan

Introduction

In Pakistan, dry land farming contributes a substantial amount to the economy of agriculture. The rainfed areas, being a potential resource, have not been explored efficiently due to mismanagement and traditional ways of farming. Wheat being a single largest crop of the rainfed areas contributes 12.5% to the national wheat production (Alvi and Sharif, 1995) which is far less than the other wheat growing countries e.g; in India drylands contributes 45% of the food grains produced annually. The lower productivity is mainly due to un-awareness and improper use of improved practices by the farmer's community. The gap between actual and potential production of rainfed areas can be minimized with the adoption of advanced technologies. Subhan and Khan (1991) investigated the impact of improved production technology on wheat yield and found that recommended level of fertilizer (136-84-0 N P kg ha^{-1}), weed control and seed rate (100 kg ha^{-1}) increased wheat yield by 37 and 29% respectively. They concluded that inadequate use of inputs were the main constraints towards increasing wheat yields on farmer's field and significant increase was obtained with the adoption of recommended technology. Several factors like proper land preparation, crop variety, fertilizer use, weed control and many other inputs effect the crop production but most of these factors have either been studied alone or in combination with one or two. Limited work has been done to study the comparison of improved package versus traditional practices. However, research findings revealed that the judicious use of all these inputs can improve wheat yield significantly. Hanif *et al.* (1986) observed that yield of wheat increased from 2.22 to 4.90 t ha^{-1} with improved management practices involving fertilizer, irrigation and sowing methodology. Similarly, Kumar and Singh (1985) reported that recommended package of cultural practices resulted an increase in seed yield of mustard to the extent of 48.15% in Karante and 37.04% in krishna over farmer's practices in western region of Uttar pardesh. Majeed *et al.* (1986) obtained the maximum yield of maize with improved package of technology, registering an increase of 95% over the traditional method of maize cultivation.

Khan *et al.* (1990) found significant increase in grain yield of wheat with deep ploughing as compared to traditional cultivator. Hayee and Aman ullah, 1972 and Azhar, 1969 indicted that use of balanced fertilizer and appropriate plant population influenced the yield and yield components of high potential wheat varieties.

The present study was planned to evaluate the impact of improved practices on the yield of wheat production.

Materials and Methods

The investigations were carried out on farmer's field (Rainfed) in Dhaman area of D.I. Khan during 1999-2000 to 2000-2001. The experiments were laid out to investigate the impact of improved practices versus traditional

Table 1: Physico-chemical characteristics of soil from the experimental area (Farmer's Field) at D. I. Khan

Year	Location	O.M (%)	pH	NH 4N ppm	P ppm	K ppm	Texture
1999-2000	Shero-kona	0.70	7.8	0.04	4.6	-	Clay loam
2000-2001	Kot-Musa	0.72	8.4	0.06	7.0	-	Silty Clay loam

Table 2: Mean monthly temperature and monthly precipitation during 1999-2000 and 2000-2001. at D.I.Khan

	1999-2000				2000-2001			
Month	Mean Maxi	Mean Mini.	Mean	Precip: (mm)	Mean Maxi.	Mean Mini.	Mean	Precip: (mm)
October	34	18	26.0	--	34	17	25.5	--
November	29	12	20.5	--	27	10	18.5	--
December	24	4	14.0	--	23	5	14.0	29
January	19	4	10.5	7	19	4	11.5	--
February	21	6	13.5	8	21	6	13.5	--
March	27	11	19.0	5	27	11	19.0	1.5
April	36	18	27.0	--	35	18	26.5	29.0
			Total:	20				59.5

practices on the production of wheat. Improved practices included two ploughing for land preparation before sowing, improved wheat variety "Inqilab-91", optimum seed rate (110 kg ha^{-1}), seed dressing with vitavax-200 @ 2 g kg^{-1} wheat seed, recommended rate of fertilizer (60-40-0 N P kg ha^{-1}) and plant protection measures like eradication of weeds while traditional practices included zero tillage, local variety without inputs usually practiced by the farmers in the rainfed area. Sowing was done on 8th and 12th November both the years by single row drill. Soil samples were collected before sowing the crop and laboratory analysis presented in Table 1. Meteorological data is reported in Table 2.

The experiments were laid out in randomized Complete Block design with 3 replications and net plot size of 5m x 1.2 m (4 rows $plot^{-1}$) was maintained for yield data. At maturity, data on plant height, number of tillers $plant^{-1}$, spike length, grains $spike^{-1}$, thousand grain weight and grain yield were collected. Data were statistically analyzed according to the methods described by Steel and Torrie (1980).

Results and Discussion

Data collected on yield components and grain yield of wheat revealed that improved practices i.e; proper land preparation, improved wheat variety, optimum seed rate treated with vitavax-200 before sowing, recommended rate of fertilizer and weed control resulted considerable increase in the wheat production. The plant height, spike length, grains per spike were increased significantly except tillers per plant with improved practices as compared to traditional ones. Improved practice had a positive effect on 1000 seed weight. This increase appeared 65 and 16% in spike length and 100 and 68% in grains per spike with improved practices over the local practices during both the years, respectively (Table 3 and 4).

It is evident from the seed yield data that the maximum yield of 2631 and 3368 kg ha^{-1} were obtained with improved practices as compared to local practices yields ranged from 2156 kg ha^{-1} and 2538 kg ha^{-1} during study years in 1999-2000 and 2000-2001, respectively (Table 3 and 4). This increase in grain yield of wheat obtained with improved practices was 22 and 33% more as compared to the traditional practices which can be attributed to the collective impact of improved practices on the production of wheat. Wadud and Bashir (1990) reported that yield of crops can be increased 2-3 time by adapting improved varieties and practices in comparison to the existing average yield. The year wise yield differences may have been the results of temperature and rainfall distribution occurred during the growing season (Table 2).

Agricultural production of the dry-land areas entirely depend on weather conditions and in particular on incident rainfall, which is uncertain and erratic. Generally, farmers keep their lands unploughed from the time of harvesting of first crop till the sowing of next one which not only affect the infiltration rate of rainwater but also lose the available moisture for conservation. Larson (1962) stated that rough tillage of land could have a potential storage of 50-75 mm of rain as compared with 25 mm or less under smooth soil surface condition.

In addition to land preparation and sowing of improved varieties, farmers usually avoid the use of fertilizers, pesticides and weedicides. This all contributed considerably to the crop production. The study conducted confirmed that land preparation before sowing and use of improved wheat variety with optimum level of inputs can boost the wheat production giving 22 to 33% increase in grain yield of wheat under rainfed condition.

Table 3: Effect of improved Vs traditional technology on the seed yield of wheat under Rain-fed condition during 1999-2000

Treat	Plant heigh (cm)	No.of tiller pt^{-1}	Spike length (cm)	No.of grains $spike^{-1}$	Days to maturity	1000 seed wt.(gm)	Seed yield ($kg\ ha^{-1}$)
Improved	80.0b	1	10.77a	54a	158b	38.0	2631a
Local	113.0a	1	6.53b	27b	167a	37.3	2156a
LSD (0.05)	3	NS	1.54	22	1	NS	317

Table 4: Effect of improved Vs traditional technology on the seed yield of wheat under Rain-fed condition, 2000-2001

Treat	Plant heigh (cm)	No.of tiller pt^{-1}	Spike length(cm)	No.of grains $spike^{-1}$	Days to Maturity	1000 seed wt.(gm)	Seed yield ($kg\ ha^{-1}$)
Improved	89.7A	1	9.3A	47A	155B	37.0	3368A
Local	130.0A	1	8.0B	28B	167A	37.3	2538A
LSD (0.05)	1.5	NS	1.8	2	1	NS	8.0

The results obtained are an agreement with those of Majeed *et al.* (1986) and Subhan and Khan (1991).

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