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Effect of Improved Practices on the Seed Yield of Chickpea under Rainfed Condition

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Abstract: Field experiments were conducted during 1999-2000 and 2000-2001 to assess the effect of improved Vs traditional practices on the seed yield of improved chickpea cvs NIFA-88 and local.(Desi). Yield components i.e pods per plant, 1000 seed weight and seed yield obtained with improved cv. NIFA-88 and practices was significantly higher than local variety with traditional practices booth the years respectively. Although plant height and branches per plant did not differ significantly but generally increased occurred with improved practices. The yield increase over traditional practices appeared 7 to 27% both the years which may have been results of the joint impact of the improved practices thus, the use of improved chickpea cv. "NIFA-88" with proper managed practices i.e one deep-plough before moon soon rain and then disc harrowing after rain before sowing of crop, using a fertilizer @ (20-50 NP kg ha^{-1}) broadcast and incorporated with rotavator and seed rate of 75 kg ha^{-1} treated with vitavax-200 @ 2 gm kg^{-1} proved to be the recommended technology for obtaining maximum seed yield under the Rodh-kohi condition.

Key words: Improved vs traditional practices, chickpea, yield components, seed yield and rodh kohi condition

Introduction

In Pakistan, major agriculture area lie under arid and semi-arid climate which contributes a substantial amount to the economy of agriculture. It has a great potential but have not been explored efficiently due to mismanagement and traditional ways of farming.

Gram (*Cicer arietinum* L.), is the most important crop grown all over the world with respect to area and production. In Pakistan, it is grown an area of 1.10 m ha with an annual production of 0.77 mt. (Anonymous, 1997). Like all other field crops, our chickpea production is also less than the potential production in this area. The lower productivity is mainly due to un-awareness and improper use of improved practices by the area farmers. 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 NP 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. Nizami (1990) reported that significant increases in crop yield of rainfed land can be obtained with the use of improved seed fertilizers and adoption of soil management practices.

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. Amin (1989) found 48% yield increase in line sown crop of chickpea over flat sown due to increase moisture conservation in furrows. Khan *et al.* (1990) found significant increase in grain yield of wheat with deep ploughing as compared to traditional cultivator.

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 crop yield significantly.

Therefore the present study was planned to evaluate the impact of improved practices on the yield of chickpea production.

Materials and Methods

The field experiments were conducted during 1999-2000 and 2000-2001 under the Rodh Kohi condition at locations: Shero-Kona 45 and at Kot-Musa 75 kilometers away towards South from District D.I.Khan. The improved practices consisted of deep ploughing before moon-soon

Table 1: Chemical and Physical status of the soil, where field trial was conducted

Year	Location	O.M (%)	pH	NH 4 N 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 (C°) and monthly precipitation during 1999-2000 and 2000-2001

	1999-2000				2000-2001			
Month	Mean Max	Mean Min.	Mean	Precip: (mm)	Mean	Mean Max.	Mean Min.	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
* Source: AZRI, Farm		Total:	20					59.5

Table 3: Effect of Improved vs traditional technology on the seed yield of chickpea 1999-2000

Treatment	Plant ht (cm)	No. of branches $plant^{-1}$	Pods $plant^{-1}$	Days to maturity	1000 seed weight (gm)	Seed yield (kg ha^{-1})
Local	70.7	4	25b	159a	156b	1987b
NIFA-88	73.7	5	47a	155b	203a	2525a
LSD (0.05)	NS	NS	13	1.5	18	346

Table 4: Effect of Improved vs traditional technology on the seed yield of chickpea 2000-01

Treatment	Plant ht. (cm)	No. of branches	Pods $plant^{-1}$	Days to maturity	1000 seed weight (gm)	Seed yield (kg ha^{-1})
Local	38.0b	3	13	181a	132b	919b
NIFA-88	41.7a	4	20	179b	198a	985a
LSD (0.05)	1.5	NS	3	1.8	2.1	NS

rain to conserve maximum moisture. Soil was disc harrowed, the fertilizer level 20-50-0 NPK kg ha^{-1} was broadcast and incorporated into the soil, using a rotavator for incorporation and a seed rate of 75 kg ha^{-1} with variety NIFA-88 treated with vitavax-200 @ 2 gm kg^{-1} while traditional practices included zero tillage, local variety without inputs. Prior to seeding, soil samples were taken from the experimental sites for analysis. Results of the physical and chemical analysis of the soils are presented in Table 1. Trials were planted by a manually operated single row drill on October 17 and 18, both the years respectively. Meteorological data are reported in Table 2.

The experiments were laid out in Randomized Complete Block Design with 3 replications and net plot size of 1.8 x 5 m (6 rows $plot^{-1}$).

Data for plant height, pods $plant^{-1}$, maturity, 1000 seed weight and seed yield from all treatments were collected on the four central rows in each plot. Data were analyzed using the Analysis of Variance (ANOVA) procedure and LSD ($P< 0.05$) values were calculated for comparisons among means (Steel and Torrie, 1980).

Results and Discussion

Data collected on yield components and seed yield of chickpea revealed that improved practices i.e., proper land preparation, improved chickpea variety, optimum seed rate treated with vitavax-200 before sowing, recommended rate of fertilizer and weed control resulted considerable increase in the chickpea production. The plant height, branches/plant and pods per plant were increased with improved practices as compared to traditional ones. Improved practice had a positive effect on 1000 seed weight and pods/plant. This increase appeared 88 and 30% in pods per plant and in 1000 seed weight during 1999-2000 and 54 and 50% in 2000-2001 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 2525 and 985 kg ha^{-1} were obtained with improved practices as compared to local practices yields ranged from 1987 and 919 kg ha^{-1} during both the years respectively (Table 3 and 4). This increase in seed yield of chickpea obtained with improved practices was 27 and 7% more as compared to the traditional practices which can be attributed to the collective impact of improved practices on the production of chickpea but slight increase in yield during 2000-2001 may have been the result of high soil pH (8.4) which affected the plant growth/height. (Table 1 and 3). Wadud and Bashir (1986) reported that yield of crops can be increased 2-3 time by adapting improved varieties and practices in comparison to the existing average yield.

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 chickpea variety with optimum level of inputs can boost the chickpea production under rainfed condition. The results obtained are an agreement with those of Majeed *et al.* (1986) and Subhan and Khan (1991).

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