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PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Effect of Cutting Chickpea at Different Dates on Green Fodder and Seed Yield Under Rainfed Condition

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Abstract

Field experiments were conducted during 1994-95 and 1995-96 to determine the effect of removing (cutting) the top growth of the crop at different interval on green fodder and seed yield of chickpea c.v. NIFA-88. Date of cutting included i.e. Nov 29, Dec 14, Dec 29, Jan 13 and Jan 28 including control both the year respectively. All the cutting treatments reduced the seed yield significantly with the production of green fodder as compared to un-cut check crop. Cutting at ground level produced maximum green fodder but lowest seed yield. Also plant height, number of pods per plant were gradually reduced and the maturity was delayed by cutting as compared to control (un-cut) crop. It has been concluded from the results obtained that cutting reduced the yield components, seed yield and delayed the maturity of chickpea crop by effecting its physiological growth of the plant under arid condition of D.I.Khan.

Introduction

Chickpea or Gram (*Cicer arietinum* L.), is one of the the most important crop all over the world with the respect to area and production. In Pakistan, it is grown on an area of 1100.2 thousand hectares with an average yield of 594.4 thousand tones (Anonymous, 1997). It is used both for food and feed in Pakistan. It ranks second to among the legume crops in the country. After cutting/ grazing, the regrowth of the plant may be grown to maturity and harvested for seed. It produces enough green fodder for livestock during fall (December and January) when the other green grasses are not available in autumn in barani areas and seed yield at maturity. The farmers of the barani belts of Dera Ismail Khan usually graze their chickpea crop with the concept that yield is improved but there is no yield data available to prove it. Harper and Compton (1980) found in *Brassica* crops used as a forage for autumn grazing provided an acceptable feed of high nutritive value at relatively low cost compared to conserved grass.

Khan *et al.* (1998) reported that seed components and seed yield was reduced by cutting apart from seed weight. Evan and Wahab (1983) found in winter oil seed rape in the U.K that leaf removal at various stages resulted in significant seed yield reductions with lowest yields being obtained by defoliation at the beginning of stem elongation. Therefore this study was undertaken to determine the effect of cutting (top growth) the plants of chickpea at different dates to determine the best cutting time for seed and forage production, as well as on yield components and maturity.

Materials and Methods

The field experiments were conducted at Arid Zone Research Station, D.I. Khan during 1994-95 and 1995-96. 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. The

Table 1: Soil chemical and physical status of trial sites used in study. Arid Zone Research Sub-Station, Dera Ismail Khan

Year	O.M (%)	pH	NH ₄ N ppm	P ppm	K ppm	Texture
1994-95	0.66	8.4	0.03	5.8	-	Silty clay
1995-96	0.72	8.4	0.07	5.7	-	Silty clay

Table 2: Meteorological data of the trial sites used in study.

(a) Mean monthly and long-term average precipitation (mm)

Year	Months							Total
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
1994-95	-	20.0	-	-	-	40.0	38.0	98
1995-96	29.0	-	-	8.0	19.0	28.0	-	85
5 year average *(1990-91-1994-95)	3.8	7.1	5.1	6.5	19.3	35.3	39.8	117

(b) Monthly mean temperature (C)

Month	1994-95			1995-96		
	Mean Maxi:	Mean Mini:	Mean	Mean Maxi:	Mean Mini:	Mean
Oct	30	16	23.0	32	18	25.0
Nov	26	13	19.5	27	9	18.0
Dec	20	6	13.0	21	6	13.5
Jan	19	4	11.5	19	4	11.5
Feb	22	7	14.5	23	8	15.5
Mar	26	12	19.0	27	14	20.5
Apr	29	15	22.0	35	19	27.0

fertilizer at 20-50-0 NPK kg/ha was broadcast and incorporated into the soil, using a rotavator for incorporation. The chickpea variety NIFA-88 was planted by a manually operated single row drill on October 12 and 26 both the years respectively. The site received 244 mm and 256 mm rain prior to planting in the month of June to September. Meteorological data are reported in Table 2 a,b. The experiment was laid out in Randomized Complete Block

Khan *et al.*: Chickpea, cutting dates, green fodder and seed yield

Design, with 4 replication and a plot size of 1.8 x 5 m (6 rows/plot), The chickpea crop was cut at different dates, using the treatments as follows:

Treatment:

Cutting date:

1. Control (check).
2. November 29, 1994
3. December 14, 1994
4. December 29, 1994
5. January 13, 1995
6. January 28, 1995

Data for green fodder, plant height, pods/plant, maturity, 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

Green fodder and seed yield: During 1994-95 and 1995-96, the data indicated that the early cutting on 29-11-94 gave minimum fodder yield of 397 and 617 kg/ha as compared to late cutting on 28-1-95 produced 1183 and 4533 kg ha⁻¹ respectively according to the plant growth both the year respectively (Table 3). As for as yield is concerned during 1994-95, the check (un-grazed) crop produced significantly the maximum grain yield whereas yield gradually reduced with the delay in cutting period. Maturity was delayed and plant height and pods/plant were also reduced gradually with the delaying in cutting period while seed weight did not differ significantly among the treatments (Table 4 and 5).

During 1995-96, the fodder yield gradually increased as the cutting interval delayed, the plant developed better growth with the passage of time (Table 3). The increase in fodder yield trend in both the years may have been affected due to different seasonal conditions and experimental location (Table 1 and 2 a,b).

The maximum grain yield was obtained from check (un-grazed) crop whereas yield gradually reduced with the delay in cutting period. Maturity of the cut crop was delayed significantly but the cutting interval did not show

any significant effect on seed weight among the other treatments except last cutting treatment (Table 4). This reduction in yield component and seed yield may have been the result of limiting moisture availability in the soil which adversely affected the plant growth accordingly.

Comparing both years seed yield data, it can be concluded that cutting or grazing in chickpea crop effect this physiology of the plant growth condition which is not recovered under low moisture condition in addition to reduced duration and ultimately low yield component and seed yield is obtained as compared to uncut chickpea crop.

This is in agreement with the finding of Raut and Ali (1986) who found in mustard that defoliation of 50% of the lower leaves, partial detopping of 50 percent top growth 45 and 60 days after sowing, or complete detopping to groundlevel at 45 days after sowing, all decreased seed yield considerably. Khan *et al.* (1993), found that maturity was delayed in rapeseed ranging freer 2-5 days for pre-bud topping, 5-19 days for bud stages topping and 6-21 days for topping at first flower, need to be considered in view of cropping sequence demands on the fields.

Chand *et al.* (1975), Chowdhry and Khan (1974), Khan and Chaudhry, 1975 and Katiyar *et al.* (1977) reported that seed yield was significantly and positively correlated with its components, secondary branches and number of pods per plant were the two main components of seed yield as reported by Katiyar *et al.* (1977) and Singh *et al.* (1973) through path analysis in gram.

Table 3: Effect of cutting chickpea at different time o green fodder and seed yield during rabi 1994-95

Treat cutting date	Green fodder yield (kg/ha)		Seed yield (kg/ha)	
	1994-95	1995-96	1994-95	1995-96
Check	-	-	2065 a	1973 a
29-11-94	397.0 ci	617 d	1226 b	1633 c
14-12-94	457.0 d	1667 c	783c d	1779 b
29-12-94	648.0 c	3333 h	681 d	1476 d
13-01-95	950.0 b	4333 a	877 c	861 e
28-01-95	1183.0 a	4533 a	451 e	430 f
LSD (0.05)	187.0	538	173	132

Figure followed by the similar word do not differ significantly

Table 4: Effect of cutting chickpea at different time on yield component and seed yield during Rabi 1994-95

Treat cutting date	Plant height (cm)	Pods/plant	Days to maturity	1000 seed wt. (gr)	Seed yield (kg/ha)
Check	58.27 a	20.00 a	156 e	199.3	2065.0 a
29-11-94	28.67 be	12.00 abc	167 c	175.7	1226.0 b
14-12-94	25.73 bcd	10.00 be	169 b	188.3	783.0 cd
29-12-94	22.73 cd	11.00 be	164 d	181.0	681.0 d
13-01-95	32.4.7 b	13.00 ab	174 a	195.0	877.0 c
28-01-95	18.40 d	4.00 c	174 a	192.0ab	451.0 e
LSD (0.05)	8.73	8.89	1	NS	173.0

Figure followed by the similar word do not differ significantly

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Table 5: Effect of cutting chickpea at different time on yield component and seed yield during Rabi 1994-95

Treat cutting date	Plant height (cm)	Pods/plant	Days to maturity	1000-seed weight (gms)	Seed yield (kg/ha)
Check	51.67a	33.67a	149c	184.3a	1973a
29-11-94	44.27ab	22.67abc	152bc	192.0a	1633c
14-12-94	45.40ab	28.67ab	157abc	189.0a	1779b
29-12-94	39.07abc	20.67abc	161a	191.3a	1476d
13-01-95	26.40bc	14.67bc	160a	190.0a	861e
28-01-95	19.53c	6.33c	158ab	146.3b	430f
LSD (0.05)	20.90	16.67	8	11.8	132

Figure followed by the similar word do not differ significantly

References

- Anonymous, 1997. Agricultural statistics of Pakistan, 1996-97. Government of Pakistan, Ministry of Food, Agriculture and Livestock, Economic Wing, Islamabad, pp: 46-47.
- Chand, H., E.S. Srivastawa and K.B. Trehan, 1975. Estimates of genetic parameters, correlation coefficients and path-coefficient analysis in gram (*Cicer arietinum* L.). Madras Agric. J., 62: 178-181.
- Chowdhry, M.A. and M.A. Khan, 1974. Correlation studies in gram (*Cicer arietinum* L.). Pak. J. Agric. Sci., 11: 184-186.
- Evan, E.J. and A.G. Wahab, 1983. Effect of leaf removal on the growth of winter oil seed rape (*Brassica napus* L.). Proceedings of the 6th International Rapeseed Congress, May 17-19, 1983, Paris, France, pp: 104-109.
- Harper, F. and I.J. Compton, 1980. Sowing date, harvest date and the yield of forage brassica crops. Grass Forage Sci., 35: 147-157.
- Katiyar, R.P., J. Prasad, A.B. Singh and K. Ram, 1977. Association analysis of grain yield and its components in segregating populations of chickpea. Indian J. Agric. Sci., 47: 325-327.
- Khan, M.A. and M.A. Chaudhry, 1975. Inter relationship between yield and other plant characters in gram (*C. arietinum* L.). J. Agric. Res., 13: 589-592.
- Khan, R.U., A. Rashid and A. Khan, 1998. Effect of cutting chickpea at different level on green fodder and seed yield under rainfed condition. Pak. J. Biol. Sci., 1: 329-331.
- Khan, R.U., H.H. Muendel and M.F. Chaudhry, 1993. Effect of topping and ratooning on seed yield and fodder production of rape seed (*Brassica napus* L.). Agron. Trend Agric. Sci., 1: 17-23.
- Raut, M.S. and M. Ali, 1986. Studies on defoliation and detopping in mustard under rain-fed conditions. Indian J. Agron., 31: 252-255.
- Singh, L., G.S. Tomar and P.K. Mishra, 1973. Variability, interrelationships and path coefficients for some quantitative characters in Bengal gram. Sabroa Newslett., 5: 23-28.
- Steel, R.G.D. and J.H. Torrie, 1980. Principles and Procedures of Statistics: A Biometrical Approach. 2nd Edn., McGraw Hill Book Co., New York, USA., ISBN-13: 9780070609266, Pages: 633.