http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

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

Pakistan Journal of Biological Sciences, 1 (4): 329-331, 1998 Research Article

Effect of Cutting Chickpea at Different Level on Green Fodder and Seed Yield under Rainfed Condition

Rahmat Ullah Khan, Abdul Rashid and Ahmed Khan
Arid Zone Research Institute, Pakistan Agricultural Research Council, Ratta Kulachi, Dera Ismail Khan, Pakistan

Abstract

Field experimets were conducted during 1993-94 and 1994-95 to determine the effect of removing the top growth at different level on green fodder and seed yield of chickpea c.v. NIFA-88. Seed yield was significantly reduced by cutting the top growth while production of green fodder obtained according to the cutting level produced a maximum green fodder but lowest seed yield. The green fodder yield was maximum during 1994-95 as compared to the fodder yield obtained during 1993-94. It may be the result of uniform rainfall distribution during the crop growth season and bumper vegetative growth of the crop during 1994-95. The maximum grain yield of 2483 and 2263 kg ha^{-1} were obtained from the uncut/ungrazed crop during 1993-94 and 1994-95 respectively.

Also plant height, number of pods per plant were reduced and the maturity was delayed by cutting as compared to solid crop apart from seed weight.

Key words: Chickpea, cutting level, green fodder, yield and yield components

Introduction

Chickpea or Gram (*Cicer arietinum* L.), is the most important winter pulse crop growth in Pakistan. It is grown on an area of 1118.9 thousand hectare with an annual production of 679.6 thousand tonnes in Pakistan (Anonymous, 1996). It is used both for food and feed in Pakistan. Because of considerable high protein contents, it is given the name as "poor man meat" (Khan *et al*., 1993). After cutting/topping, the regrowth or ratoon may be grown to maturity and harvested for seed. It produces enough green fodder for livestock at early stage especially when the green grasses are not available in autumn (December and January) and seed yield at maturity. Most of the rainfed area farmers graze the chickpea crop with the concept that yield is improved but there is no yield data available to prove it.

However, livestock is the main stay of the barani farmers. They face acute shortage of fodder in winter as well as in summer. They face acute shortage of fodder in winter as well as in summer. During winter the unavailability of fodder leaves the farmer with no option but to feed their animals the green crop of chickpea. To overcome the problem of green fodder shortage, various measurements are planned and undertaken in rainfed area of Pakistan. Zahid *et al*. (1997) concluded that improved production technology produced 34516 kg ha^{-1} green fodder as compared to local production technology (17321 kg ha^{-1}) which resulted an additional income of Rs.2557/-per hectare to the farmer. 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. 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 yield being obtained by defoliation at the beginning of stem elongation. Chickpea crop giving fodder and grains to farmer, also provide an opportunity to improve livestock production through increasing fodder quality and quantity in rainfed areas. Therefore, this study was undertaken to determine the effect of cutting top growth at different level on seed and forage production as well as on yield components and maturity of the crop.

Materials and Methods

The field experiments were conducted at Arid Zone Research Sub-Station, D.I. Khan during 1993-94 and 1994-95. 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 fertilizer level 20-50-O NPK kg ha^{-1} was broadcast and incrporated into the soil, using a rotavator for incorporation. The chickpea varity NIFA-88 was planted by a manually operated signal row drill in the first week of October both the year respectively. The site received 110 mm in 1994 and 244 mm rain in 1995 prior to planting in the month of June to September. Meteorological data are reported in Table 2a and b.

The experiment was laid out in randomized complete block design, with 4 replication and a plot size of 1.8×5 m (6 rows/plot). The chickpea crop was cut in the middle of December (56 days after sowing) at different levels, using the treatments as follows:

Treatment:

Cutting level:

1. Control (check)
2. 2/3 cutting of plant
3. 1/2 cutting of plant
4. Ground level

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).

Table 1: Soil chemical and physical status of trial sites used in study.

	1993-94	1994-95
OM (%)	0.63	0.66
pH	7.60	8.40
NH_4N (ppm)	0.03	0.03
P (ppm)	6.00	5.80
K (ppm)	-	-
Texture	Silty clay	Silty clay

Table 2(a): Meterological data of the trial sites used in study.

Months	1993-94	1994-95	Five year average* (1990-91-1994-95)
Oct	-	-	3.80
Nov.	-	20	7.10
Dec.	-	-	5.10
Jan.	-	-	6.50
Feb.	20	-	19.30
Mar.	16	40	35.30
April	15	38	39.80
Total	51	98	117.00

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

Table 2(b): Monthly mean temperature (°C).

	1993-94			1994-95		
Months	1	2	3	1	2	3
October	33	17	25	30	16	23
November	28	12	20	26	13	19
December	22	5	13	20	6	13
January	20	5	12	19	4	11
February	20	6	13	22	7	14
March	28	12	20	26	12	19
April	31	16	23	29	15	22

1 = Mean maximum; 2 = Mean minimum; 3 = Mean

Results and Discussion

Green Fodder Yield: Data showed that green fodder yield was significantly increased with ground level cutting of crop during 1993-94 whereas during 1994-95, the increase in green fodder obtained with ground level cutting was statistically at per with 2/3 cutting level. However yield component and seed yield was reduced and maturity was delayed by cutting which may have been the results of physiological factor (Table 3). The increase in fodder yield during 1994-95 may have been the result of proper rain distribution during growing season which ultimately affected the vegetative growth of the plant positivity (Table 2a).

Sees yield: Data presented in Table 4 shows significant results during both years. By comparing the means with one another, it was found that all the cutting treatments reduced seed yield significantly than the check plots both the year respectively but cutting at ground level produced the lowest seed yield followed by other cutting treatments. This is in agreement with Raut and Ali (1986) who found in mustard India that defoliation of 50 percent of the lower leaves, partial detopping of 50 percent top growth 45 and 60 days after sowing, or complete detopping to ground level at 45 days after sowing, all decreased seed yield considerably.

Table 3: Effect of cutting chickpea at different level on green fodder during rabi 1993-94 and 1994-95.

Treatment cutting level	Green fodder yield (kg ha^{-1}) 1993-94	Green fodder yield (kg ha^{-1}) 1993-94
Check	-	-
2/3 cutting	2620b	5100ab
1/2cutting	2500b	3950b
Ground level	3933a	6200a
$LSD_{(0.05)}$	1127	1330

Figure followed by the similar word do not differ significantly

Table 4: Effect of cutting chickpea at different level nn yield component and seed yield during rabi 1993-94 and 1994-95.

		Treat cutting level				LSD
		1	2	3	4	(0.05)
Plant height	1993 94	88	78	73	61	NS
(cm)	1994-95	68a	41b	45b	36b	12
Pods/plant	1993-94	40	28	29	23	NS
	1994-95	22a	175	18b	14c	2.6
Days to	1993-94	164	170	167	170	4
maturity	1994-95	161b	176a	176a	178a	3
1000-seed	1993-94	182	179	171	182	NS
weight (g)	1994-95	175	181	169	187	NS
Seed yield	1993-94	2483a	1897b	1897b	1218c	352
(kg ha^{-1})	1994 95	2263a	1552c	1787b	1380c	187

Figures followed by the similar word do not differ significantly

The data showed that maturity of the crop was delayed by cutting the top growth as compared to solid crops. The results are in line with Khan *et al.* (1993), found that maturity was delayed in rapeseed ranging from 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.

Plant height and number of pods/plant also reduced while the crop appeared approximately one week behind the check plot in maturity. Seed weight did not differ significantly among the treatments.

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.

References

Anonymous, 1996. Agriculture Statistics of Pakistan, 1995-96. Government of Pakistan, Ministry of Food, Agriculture and Livestock, Agriculture Wing, Islamabad, Pakistan, pp: 43.

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., H.H. Muendel and M.F. Chaudhry, 1993. Effect of tropping and ratooning on seed yield and fodder production of rape seed (*Brassica napus* L.). Agronomy. 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.

Zahid M.S., M.U. Mufti, S. Khan and M.B. Bhatti, 1997. Impact of improved varieties and production technology in improving the existing fodder production systems under the medium rainfall areas of FatehJang (Attock district). Sarhad J. Agric., 13: 517-525.