International Journal of Agriculture Innovations and Research
Volume 9, Issue 3, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy):
Received: 22/02/2019 | Accepted on: 25/10/2020 | Published: 25/11/2020

Studies on the Effect of Weed Control and Fertility Levels on the Growth and Yield of Chickpea (*Cicer arietinum* L.)

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Abstract **– The trial was conducted to evaluation the effect of weed control and fertility levels on growth and yield of chickpea, field experiments was carried out in 2018-19 growing seasons. Experimental units were arranged in *Factorial Randomized Block Design* (RBD) with three replications. The highest growth parameters were observed with the application of pendimethalin and 30:40:20 ratio of fertility level N : P : K. Significantly highest plant height at 90 DAS 68.16 cm was measured with the application of pendimethalin followed by check application and application of fluchloralin. Fertility level also affected the growth and yield of chickpea plant, highest plant height 66.22 cm was measured with the application of 30 : 40 : 20 application of N : P : K.**

Keywords **– Weed Control, Herbicide, Fertility Levels, Chickpea.**

I. INTRODUCTION

India is the largest producer of pulses in the world with an annual production of 112.29 lakh tonne obtained from 105.61 lakh ha area and the mean productivity was recorded 1063 kg/ha. Pulses account roughly one fifth part to the total area under food grain crop and contribute about one twelve to the total food grain crop and about one twelve to the total food grain production in country. India occupies about 29 percent of the world area under pulses, contributing 19 percent to the world production. However, the mean productivity of pulses is only about 885 kg per hectare, which is significantly low as compared to that of the cereal crops and low yield potential, cultivation in marginal lands with little monetary input and low research and management efforts can be considered as the factors responsible for this low productivity of pulses crops. Chickpea (*Cicer arietinum* L.) also known as Bengal gram is the most important pulse crop in India and occupies more than one third of the total cultivated area and contributes to half of the total production of pulses in the country. The matured seed of this crop has high protein quality 21-22% and is extensively used as pulse or dry fast food. The seed flour either prepared from raw seed (Besan) or from fried seed (Sattu) is used in various dietary foods and are also base for many processed high value food preparation, the leaves and immature seeds, which are high value food items for rural people and consumers, contains blood purifying property.

Among many factors responsible for low production weeds occupy dominant position hence weed control measures reduced plant nutrients and ultimately more plant nutrients available to the crop (Pandey et al. 2000).

II. MATERIALS AND METHOD

The experiment was conducted at the Brahmanand Mahavidyalaya, Agricultural Research Farm, Post-Rath, District Hamirpur, State-Uttar Pradesh (India) during the winter (rabi) season of 2018-19. The soil of experimental field was 'parwa' (A category of red soil) with slightly alkaline in reaction (pH 7.6) which was low in available nitrogen (200.83 N_2O kg ha^{-1}), medium in available phosphorus (29.28 P_2O_5 kg ha^{-1}) and high in available potassium (474.16 K_2O kg ha^{-1}) and ranging 0.56% organic carbon content. The trial was laid out in

factorial randomized block design with three replications having 16 treatment combinations of four weed control methods i.e. control (W0), weed free check (W1), application of fluchloralin @ 1.0 litre per hectare (W2) and pendimethalin @ 1.5 litre per hectare (W3) and four fertility levels of N : P : K i.e. control (F1), 10 : 20 : 30 (F2), 20 : 30 : 20 (F3) and 30 : 40 : 20 (F4).

III. Results and Discussion

Data embodied in table 1 shows that the growth characters viz. plant height (cm), Fresh weight and dry weight (g) per plant, were recorded maximum to W3 (Pendimethalin) treatment plot followed by W1, W2, W0 weed control. The growth characters were found to increase with different weed control over control plot (W0). The herbicides like pendimethalin and fluchloralin played a very important role in controlling weeds. The pendimethalin and Fluchloralin inhibits oxidative phosphorylation which ultimately obstructed several metabolic reactions of weeds. It is also played a great role for improper root and shoot development of weed during growth stages. The similar results were given by, Saxena et al. (1976), Beres et al. (1999) and Bhalla et al. (2001).

Table 1. Plant height at, fresh weight and dry weight of chickpea plant influenced by different treatments at 90 DAS.

Treatments	Plant Height (cm)	Fresh Weight (g)	Dry weight (g)
Weed Control Methods			
Control (W0)	51.93	27.17	21.93
Weed free check (W1)	64.43	35.59	27.12
Fluchloralin (W2)	60.96	31.89	25.74
Pendimethalin (W3)	68.16	35.67	28.82
SE (d) ±	1.12	0.65	0.63
C.D. at 5%	2.28	1.33	1.29
Fertility levels			
F0 (Control)	56.55	29.59	23.90
F1 (10:20:20)	59.55	31.16	25.15
F2 (20:30:20)	63.16	32.92	26.58
F3 (30:40:20)	66.22	34.65	27.98
SE (d) ±	1.12	0.65	0.63
C.D. at 5%	2.28	1.33	1.29

Reference to the table 2 and 3 indicate that number of pods per plant, weight of seeds per plant (g), test weight (g), biomass yield (q/ha), grain yield (q/ha) and straw yield (q/ha) were recorded maximum with W3 (Pendimethalin) followed by W1 mechanical, W2 Fluchlorolin and W0 (Control) except biomass yield in which W1 was found maximum. The yield attributes were increased due to proper growth of plant by using herbicide like pendimethalin and fluchloralin as well as mechanical weed control. The yields have the ultimate results of growth and yield attributing characters. The similar results have been show by kolar et al. (1989), Masanta et al. (1992), Beres et al. (1999), Mukharji (2000).

Data showing in table 1 indicated that growth characters viz. plant height (cm), fresh weight and dry weight (g) per plant were recorded maximum to F3 fertility levels followed by F2, F1 and F0. The fertilizers play a great role as a plant nutrient for proper root development and proliferation, rapid multiplication of tissues, photosynthesis and maintenance of hydration which ultimately increase the growth of plant. The similar results were given by Chaudhary et al. (1975) and Prabhakar and Sareef (1991), Gurjar and Pandey (2003), Singh and Pandey (2004).

Data showing in table 2 and 3 envisages that yield attributing characters viz. number of pods per plant, weight of seeds per plant (g), test weight (g), biomass yield (q/ha), grain yield (q/ha), straw yield (q/ha) were recorded maximum with W3 (Pendimethalin) followed by W1 mechanical, W2 fluchloralin and W0 (Control) except biomass yield in which W1 was found maximum. The yield attributes were increased due to growth of plant by using proper amount of fertilizers which helps to form good photosynthesis and also involved in protein synthesis. Increase in yield was the final results of growth of plant and yield attributes. The similar finding have reported by Chaudhary et al. (1975), Singh and Singh (1980), Yadav and Singh (1981), Prabhakar and Sareef (1991), Singh and Pandey (2004).

Table 2. Plant height at, fresh weight and dry weight of chickpea plant influenced by different treatments at 90 DAS.

Treatments	Number of Pods Per Plant	Weight of Seeds Per Plant	Test Weight
Weed Control Methods			
Control (W0)	55.31	14.15	22.56
Weed free check (W1)	68.35	17.49	22.67
Fluchloralin (W2)	64.93	16.61	21.88
Pendimethalin (W3)	72.59	18.57	22.62
SE (d) ±	0.99	0.48	0.20
C.D. at 5%	2.02	0.97	0.40
Fertility Levels			
F0 (Control)	60.23	15.41	22.06
F1 (10:20:20)	63.42	16.23	22.27
F2 (20:30:20)	66.99	17.14	22.52
F3 (30:40:20)	70.53	18.05	22.88
SE (d) ±	0.99	0.48	0.20
C.D. at 5%	0.02	0.97	0.40

Table 3. Plant height at, fresh weight and dry weight of chickpea plant influenced by different treatments at 90 DAS.

Treatments	Biological Yield (q/ha)	Seed Yield (q/ha)	Straw Yield (q/ha)
Weed Control Methods			
Control (W0)	38.79	18.40	20.39
Weed free check (W1)	52.67	22.74	29.94
Fluchloralin (W2)	46.01	21.60	24.41

Treatments	Biological Yield (q/ha)	Seed Yield (q/ha)	Straw Yield (q/ha)
Weed Control Methods			
Pendimethalin (W3)	50.05	24.12	26.16
SE (d) ±	0.96	0.54	0.64
C.D. at 5%	1.97	1.09	1.32
Fertility Levels			
F0 (Control)	43.31	20.04	23.28
F1 (10:20:20)	45.76	21.10	24.66
F2 (20:30:20)	47.91	22.29	25.89
F3 (30:40:20)	50.54	23.46	27.08
SE (d) ±	0.96	0.54	0.64
C.D. at 5%	1.97	1.09	1.32

Agriculture is consider as a business now a days in which economics have great importance to judge a best combination of inputs for obtaining maximum economic out-put keeping economic of different treatments are highly important. The economic of different treatment calculated and data depicted in table 4 shows that the maximum net profit calculated with W3 (78894.00 Rs/ha) and F3 (753278.13 Rs/ha) treatment, respectively. The minimum was computed with W0 (52203.51 Rs/ha) and F0 (62987.41 Rs/ha), respectively. The benefit cost ratio were also obtained highest by W3 (1.68) weed control and F3 (1.57) fertility Levels. While, the minimum benefit cost ratio was computed with W0 (1.20) weed control and F1 (1.44) fertility levels.

Table 4. Effect of different treatment on cost of cultivation (Rs/ha), gross income (Rs/ha), Net profit (Rs/ha) and benefit cost ratio.

Treatments	Total Cost of Cultivation	Gross Income (Rs/ha)	Net Income (Rs/ha)	Benefit: Cost Ratio
Weed Control Methods				
Control (W0)	43287.18	95990.50	52203.51	1.20
Weed free check (W1)	46139.52	121512.88	75373.36	1.63
Fluchloralin (W2)	45391.50	113218.88	67827.38	1.50
Pendimethalin (W3)	47068.38	125962.38	78894.00	1.68
Fertility Levels				
F0 (Control)	42156.66	105143.88	62987.41	1.49
F1 (10:20:20)	45189.67	111046.38	130713.41	1.44
F2 (20:30:20)	46579.38	117206.38	70627.00	1.51
F3 (30:40:20)	47960.87	123288.00	75327.13	1.57

IV. CONCLUSION

On the basis of the experiment conducted at the research farm of Brahmanand Post Graduate College, Rath (Hamirpur) during the Rabi season of 2018-2019 the following main conclusion can be drawn.

1. The W3 (Pendimethalin) weed control was found most suitable for chickpea crop under existing condition of Bundelkhand region in Uttar Pradesh.

2. The F3 (30 : 40 : 20) fertility level was found most suitable for chickpea crop.

3. The W3 (Pendimethalin) weed control and F3 (30 : 40 : 20) fertility level were found most suitable and economically best combination for chickpea under the existing condition of Bundelkahnd region in Uttar Pradesh.

REFERENCES

[1] Beres, I.J. Ivancsis, J. Nyeki, (1999). IB Retamales (ed) CL- Moggia, (ed) MP Banados (ed) C- Torres JP – Zoffoli.
[2] Bhalla, S.S.P. Kurchania, N.R. Prabhakar (1998). Herbicidal weed control in chickpea, world weeds 5, 1-2, 121-124, 2 ref.
[3] Chaudhary et al. (1975). Effect of phosphorus, nitrogen and inoculation on root nodulation and yield of lentil varieties Indian Jounral of Agron. 20 (3): 290-291.
[4] Gurjar, S.S. and Pandey B.K. (2003). Studies on the impact of fertilizers and weed control methods in chickpea M.Sc. Thesis, submitted in B.N.V. D/C Rath (Hamirpur) U.P.
[5] Khokar, R.K. and Warsi A.S. (1987). Fertilizer response studies in gram. Indian Journal of Agronomy. 32 (4:362-364.)
[6] Kolar S.S. and Shandhu, K.S. (1989). Weed management in pulses crop, Indian Fmg. 34 (60:1718).
[7] Masanta D. Singh, J.N. and Singh G. (1992). Weed management studies in chickpea Abstract papers annual weed Sci. P 53, (27): 74.
[8] Mukherjee, A.K., S.R. Manda, Mandal Udita, Umandal (2000). Comparative effect of different weed control measures on growth and forage yield of jowar, environment and ecology, 18:2, 320-322, 4 ref.
[9] Mukhopadhyaya, S.S. Hussain and Mondal D.C. (1992). Integrated weed management in chickpea abstracts of papers. Annual weed Sci. Conf.
[10] Prabhakar M. and Saref L.S. (1991). Influenced of irrigation and phosphorus on growth yield and water use efficiency of chickpea genotypes Indian J Agron. 36 (3): 357-362 (Sept. 1991).
[11] Saxena M.C. and Yava B.L. (1976). Some agronomic consideration of pegion pea and chickpea. Proc. Int. workshop on grain legume 13-16 June 31-61 ICRISAT Hyderabad.
[12] Singh, B.P. and Pandey B.K. (2004). Studies on the performance of weed control methods and fertilizers on growth and yield of chickpea (*Cicer arietinum* L.) M.Sc. Thesis submitted in B.N.V. D/C, Rath (Hamirpur) U.P.
[13] Singh G and Singh D (1980). Weed control studies in gram abstracts of papers annual conf. of ISWSHAU Hissar, pp. 23.
[14] Singh, H.P., Saxena M.C., Sahu J.P. (1987). Mechanical and herbicidal weed control in chickpea. Abstracts Indian Journal of agronomy weed Sci., 19: 1, 25, 31, 3 ref.
[15] Singh V.K. ; Singh, R.P.; Rai, K.N. (2014) Effect of nitrogen, Rhizobium and PSB on chickpea (*Cicer arietinum*) growth and nodulation. Society for Advancement of Science and Rural Development Kalyanpur, India, Trends in Biosciences, 7, 5: 361-363.
[16] Yadav O.S. and Singh A. (1981). Effect of P2O5 N2O and K2O fertilization on yield of gram under rainfed condition ICAR, Pulses crops newspaper 1 (2): 42.

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