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Residual effect of weed control methods on growth parameters of succeeding chickpea (*Cicer arietinum* L.) Crop

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Abstract

A field experiment was conducted in kharif and rabi season during 2018-19 and 2019-20 under irrigated condition (drip) at cotton research scheme farm, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S) to study the residual effect of weed control methods on growth parameters on succeeding chickpea crop. The experiment was laid out in a randomized block design with seven treatments in three replications. After harvesting of Cotton, Chickpea was sown on the same field without practicing any weed control methods in field. It revealed that weed free treatment recorded the maximum plant height (39.4 cm and 43.0 cm), mean leaf area (20.2 dm² and 10.4 dm²) and dry weight plant⁻¹ (19.2 g and 18.7 g). Among herbicides treatment POE pyriithiobac sodium @ 62.5 g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS recorded the maximum plant height (cm), mean leaf area (dm²) and dry weight plant⁻¹ during both the years of study.

Keywords: Residual effect, growth parameters, chickpea, plant height, mean leaf area, dry weight

Introduction

Chickpea (*Cicer arietinum* L.) is one of the oldest pulses known and cultivated from ancient times in Asia and Europe. It is an important pulse crop being cultivated in arid and semi-arid regions of India occupying third place among pulses. Chickpea are also known by names like garbanzo or garbanzo bean and Egyptian pea. It is a rich source of protein (18-22 per cent), carbohydrate (62 per cent), B-group vitamins and certain minerals viz., Ca, Fe etc. and vitamin C in green stage. It is an annual legume of the family Fabaceae. It plays an important role in improving soil fertility by fixing atmospheric nitrogen. Chickpea meets 80% of its nitrogen requirement from symbiotic fixation and can fix up to 140 kg ha⁻¹ from air. It leaves substantial amount of residual nitrogen for subsequent crop. Chickpea being a stature crop suffers severely by infestation of weeds. The productivity of chickpea is low in spite of high yielding varieties and new agronomic practices. One of the causes of poor productivity is infestation of weeds in the field of chickpea. It is a poor competitor of weeds because of slow growth rate and limited leaf area development at early stages. Crop yield losses due to weeds have been estimated to range from 54.7 per cent (Poonia and Pithia, 2013).

Materials and Methods

A field experiment entitled "Effect of weed control methods on productivity of Bt cotton (*Gossypium hirsutum* L.) – chickpea (*Cicer arietinum* L.) cropping sequence" was conducted during 2018-19 and 2019-20 at experimental farm of Cotton Research Scheme, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.). The soil of experimental site was clayey in texture, slightly alkaline in reaction (pH: 8.14 and 8.16 in *kharif* and *rabi* plots, respectively) and non-saline (EC: 0.39 and 0.46 dS m⁻¹) low in organic carbon (0.57 and 0.61%, available nitrogen (199.6 and 202.4 kg ha⁻¹) and available phosphorus (17.52 and 18.32 kg P₂O₅ ha⁻¹) and medium in available potassium (588.5 and 596.18 kg K₂O ha⁻¹) in 2018-19 and 2019-20, respectively.

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Table 1: Weed control Treatments for Bt cotton

T1	PE pendimethalin @ 0.75 kg ai/ha followed by one hand weeding at 60 DAS
T2	PE pyriithiobac sodium @ 62.5 g ai/ha followed by one hand weeding at 60 DAS
T3	PE pyriithiobac sodium @ 62.5 g ai/ha followed by quizalofopethyl @ 50 g ai/ha at 60 DAS
T4	POE pyriithiobac sodium @ 62.5 g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS
T5	POE paraquat dichloride (directed spray) 24% SL @ 0.5 kg ai/ha at 30 DAS followed by one hand weeding at 60 DAS
T6	Weed free (hand weeding at 30,60 and 90 DAS)
T7	Weedy check

Crop	Cotton	Chickpea
Variety	Superb	Akash
Spacing	150 cm x 30 cm	45 cm x 15 cm
Plot size		
Gross	7.5 m x 6.0 m	7.5 m x 6.0 m
Net	6.0 m x 5.1 m	6.0 m x 5.1 m
Design	Randomized Block Design	
Replications	3	

Parbhani is geographically located at 19.27⁰ North Latitude and 76.78⁰ East Longitude and at an altitude of 347m from sea level. It comes under semi -arid region receiving maximum rainfall from south west monsoon and under assured rainfall zone. It experiences the knockout of south-west monsoon in 23rd week. During first year 2018-19, rains started from 23th MW and continued till 39th MW with total quantity of 781.4 mm. Total numbers of rainy days were 26. Chickpea was sown on 29 Nov 2018 during 48th meteorological week. The crop was irrigated with the same drip irrigation system used for cotton. The mean relative humidity of morning and evening hours ranged between 51 to 92 per cent and 15 to 80 per cent, respectively during experimental period. The mean wind velocity varies during the growing season between 2.5 and 8.1 Km h⁻¹, whereas, the evaporation ranged between 2.4 to 9.00 mm day⁻¹. During second year 2019- 20, rains started from 23rd MW and continued till 13th MW with total quantity of 1029.10 mm. Total numbers of rainy days were 62 whereas evaporation ranged between 2.1 to 10.4 mm day⁻¹. Chickpea was sown on 1st Dec 2019 during 48th week meteorological week. The fertilizers were applied as recommended dose *i.e.*, 25:50:00 (N: P: K) kg ha⁻¹. As chickpea is a leguminous crop, full dose of fertilizer was applied as basal dose. Three irrigation at pre-sowing, flowering and pod development stage were given. Chickpea crop was harvested (28.3.2019 and 27.3.2020) when plants started drying to pale colour, leaves started shedding and pods turned yellowish dark brown and dried. The harvested produce was sundried for 2 to 3 days and then it was threshed treatment wise separately. The treatment wise weight of biomass and seeds per plot after threshing were recorded.

Results and Discussion

Plant height

The mean plant height (cm) increased continuously up to harvest (Table 2). It was rapid during 20-40 DAS. The mean maximum plant height (cm) of 35.9 and 42.2 was recorded at harvest during 2018-19 and 2019-20 respectively. All weed control treatments proved effective in influencing the plant height (cm) over weedy check at all dates of observation. At 20 DAS, the chickpea plant height (cm) was not significantly

influenced by residual effect of weed management practices during 2018-19 and 2019-20 respectively. At 40 DAS, the chickpea plant height (cm) was significantly influenced by residual effect of weed management practices. Maximum plant height (cm) of (20.6 and 21.6) was obtained with weed free treatment which was at par with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS, PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS, PE pyriithiobac sodium @ 62.5 g ai/ha followed by one hand weeding at 60 DAS and POE paraquat dichloride (directed spray) 24% SL @ 0.5 Kg ai/ha at 30 DAS followed by one hand weeding at 60 DAS and significantly superior over PE pyriithiobac sodium @ 62.5 g ai/ha followed by quizalofopethyl @ 50 g ai/ha at 60 DAS and weedy check during both the years. At 60 DAS, the chickpea plant height (cm) was significantly influenced by residual effect of weed management practices. Maximum plant height (cm) of 33.5 and 35.1 was attained with weed free treatment which was at par with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS and PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS and significantly superior over other weed management practices during 2018-19 and 2019-20 respectively. At harvest, the chickpea plant height (cm) was significantly influenced by residual effect of weed management practices. Maximum plant height (cm) of (39.4 and 43.0) was attained with weed free treatment which was at par with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS, PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS and PE pyriithiobac sodium @ 62.5 g ai/ha followed by one hand weeding at 60 DAS and significantly superior PE pyriithiobac sodium @ 62.5 g ai/ha followed by quizalofopethyl @ 50 g ai/ha at 60 DAS, POE paraquat dichloride (directed spray) 24% SL @ 0.5 Kg ai/ha at 30 DAS followed by one hand weeding at 60 DAS and weedy check during 2018-19 and 2019-20 respectively. Weedy check recorded the lowest plant height of 32.4 and 39.2 during 2018-19 and 2019-20 respectively.

Table 2: Residual effect of weed management practices on plant height (cm) at various growth stages of chickpea during 2018-19, 2019-20.

Treatment	Plant height (cm)							
	2018-19				2019-20			
	20 DAS	40 DAS	60 DAS	At Harvest	20 DAS	40 DAS	60 DAS	At Harvest
T1	9.7	20.1	30.3	37.3	9.8	20.7	33.8	42.0
T2	9.4	19.7	29.3	36.3	9.6	20.4	33.3	41.5
T3	9.2	19.2	27.6	33.4	9.0	19.5	31.4	39.5
T4	9.9	20.3	31.6	38.6	10.1	21.2	34.5	42.4
T5	9.3	19.5	28.1	34.4	9.4	20.0	32.4	40.2
T6	10.3	20.6	33.5	39.4	11.1	21.6	35.1	43.0
T7	9.1	18.7	27.2	32.4	9.2	19.1	31.6	39.2
S.E.(m)+	0.41	0.21	0.84	1.13	0.51	0.66	0.73	1.13
C.D. at 5%	N.S.	0.61	2.5	3.4	N.S.	2.03	2.26	2.00
General Mean	9.5	19.7	29.6	35.9	9.76	20.3	33.1	42.2

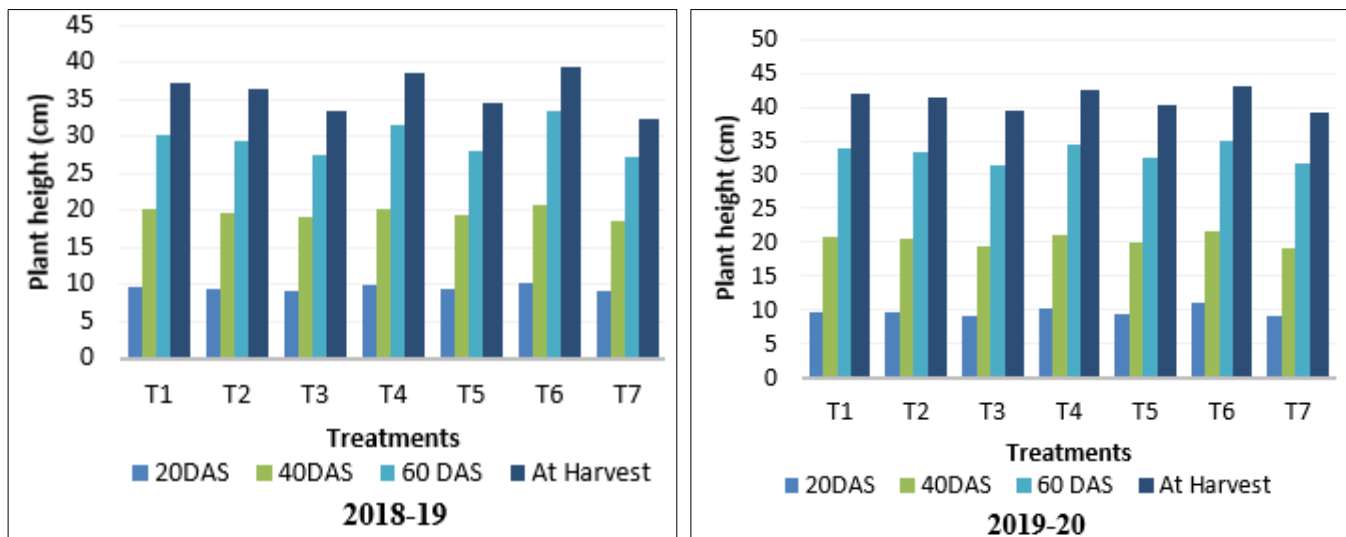


Fig 1: Residual effect of weed management practices on plant height (cm) at various growth stages of chickpea during 2018-19 and 2019-20

Leaf area

The mean leaf area (dm²) increased continuously up to 80 DAS and decreased thereafter at harvest of crop due to leaf senescence (Table 3). Data pertaining to leaf area (dm²) indicated that the treatment differences due to weed management practices were significant throughout the growth stages of crop except at 20 and 40 DAS during both the years. The mean maximum leaf area (dm²) of 18.7 and 19.7 was recorded at 80 DAS during 2018-19 and 2019-20 respectively. At 20 DAS and 40 DAS, the chickpea leaf area (dm²) was not significantly influenced by residual effect of weed management practices in 2018-19 and 2019-20. At 60 DAS and 80 DAS, the chickpea leaf area (dm²) was significantly influenced by residual effect of weed management practices. Maximum leaf area (dm²) of (15.4 and 16.6) and (20.2 and 21.7) was attained with weed free

treatment (T6) which was at par with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS and PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS and significantly superior over other treatments during 2018-19 and 2019-20 respectively. At harvest, the chickpea leaf area (dm²) was significantly influenced by residual effect of weed management practices. Maximum leaf area (dm²) (9.7 and 10.9) was attained with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS which was at par with weed free treatment and PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS and significantly higher over other treatments during 2018-19 and 2019-20 respectively.

Table 3: Residual effect of weed management practices on leaf area (dm²) at various growth stages of chickpea in 2018-19 and 2019-20

Treatment	Leaf area (dm ²)									
	2018-19					2019-20				
	20 DAS	40 DAS	60 DAS	80 DAS	At Harvest	20 DAS	40 DAS	60 DAS	80 DAS	At Harvest
T1	4.15	11.5	14.2	19.4	9.1	4.9	12.8	15.6	20.1	10.3
T2	3.86	11.1	13.8	18.8	8.3	4.8	12.3	15.2	19.5	9.5
T3	3.44	10.3	12.9	17.7	7.2	4.1	11.4	14.2	18.8	9.1
T4	4.87	12.8	14.7	19.8	9.7	5.2	13.5	16.2	20.8	10.9
T5	3.53	10.6	13.2	18.1	8.1	4.4	11.8	14.5	19.2	9.1
T6	5.29	13.0	15.4	20.2	9.2	5.4	13.7	16.6	21.7	10.4
T7	3.34	10.1	12.2	17.1	8.9	4.0	11.2	13.6	18.2	9.4
S.E.(m)+	0.17	0.49	0.5	0.57	0.32	0.28	0.56	0.60	0.52	0.39

C.D. at 5%	NS	NS	1.5	1.7	1.00	NS	NS	1.8	1.6	1.20
General Mean	4.0	11.3	13.7	18.7	8.6	4.6	12.4	15.1	19.7	9.8

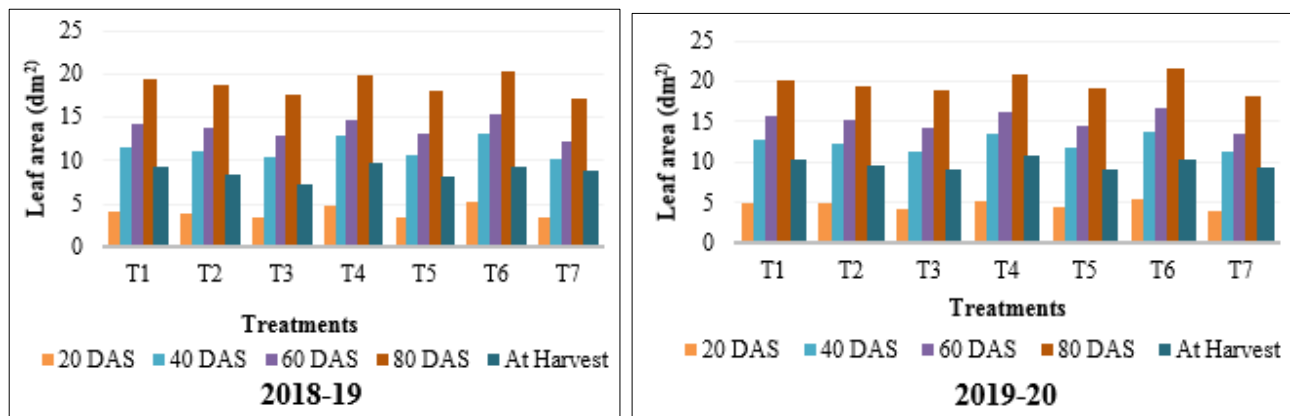


Fig 2: Residual effect of weed management practices on leaf area (dm²) at various growth stages of chickpea during 2018-19 and 2019-20

Dry weight

The mean dry weight (g) increased continuously up to harvest (Table 4). The increase in dry weight (g) was observed from initial stage up to harvest. It was rapid during 40-60 DAS. The mean maximum dry weight (g) of 17.3 and 19.3 was recorded at harvest during 2018-19 and 2019-20 respectively. All weed control treatments proved effective in influencing the dry weight (g) over weedy check at all dates of observation. At 20 DAS, the chickpea dry weight (g) was significantly influenced by residual effect of weed management practices. Maximum dry weight (g) of (3.4 and 3.9) was obtained with (T6) weed free treatment which was at par with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS, PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS and PE pyriithiobac sodium @ 62.5 g ai/ha followed by one hand weeding at 60 DAS and significantly superior over rest of the treatments during 2018-19 and 2019-20 respectively. At 40 DAS, the chickpea dry weight (g) was significantly influenced by residual effect of weed management practices. Maximum dry weight (g) of (6.5 and 7.1) was obtained with weed free treatment which was at par with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS and PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS during 2018-19 and POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS, PE pendimethalin @ 0.75 Kg ai/ha followed by one hand

weeding at 60 DAS, PE pyriithiobac sodium @ 62.5 g ai/ha followed by one hand weeding at 60 DAS and POE paraquat dichloride (directed spray) 24% SL @ 0.5 Kg ai/ha at 30 DAS followed by one hand weeding at 60 DAS during 2019-20 and significantly superior over rest of the treatments during both the years of study. At 60 DAS, the chickpea dry weight (g) was significantly influenced by residual effect of weed management practices. Maximum dry weight (g) of (13.0 and 14.4) was attained with weed free treatment which was at par with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS, PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS, PE pyriithiobac sodium @ 62.5 g ai/ha followed by one hand weeding at 60 DAS and POE paraquat dichloride (directed spray) 24% SL @ 0.5 Kg ai/ha at 30 DAS followed by one hand weeding at 60 DAS during 2018-19 and on par with all weed control treatments during 2019-20. At harvest, the chickpea dry weight (g) was significantly influenced by residual effect of weed management practices. Maximum dry weight (g) of 19.2 and 18.7 was attained with weed free treatment which was on par with POE pyriithiobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS and PE pendimethalin @ 0.75 Kg ai/ha followed by one hand weeding at 60 DAS and significantly higher as compared to other weed management treatments during 2018-19 whereas it was on par with all treatments except weed check during 2019-20. Weedy check recorded the lowest dry weight plant⁻¹ (16.1 and 17.4) during 2018-19 and 2019-20 respectively.

Table 4: Residual effect of weed management practices on dry weight plant⁻¹ (g) at various growth stages of chickpea during 2018-19 and 2019-20.

Treatment	Chickpea dry weight (g) plant ⁻¹							
	2018-19				2019-20			
	20 DAS	40 DAS	60 DAS	At Harvest	20 DAS	40 DAS	60 DAS	At Harvest
T1	3.3	5.5	12.0	17.8	3.6	6.6	13.5	18.5
T2	3.2	5.3	11.8	16.8	3.4	6.3	13.3	18.2
T3	2.7	4.5	10.7	16.3	3.1	5.8	12.8	17.7
T4	3.3	6.1	12.7	18.4	3.7	6.8	13.9	18.5
T5	2.9	5.1	11.4	16.6	3.3	6.2	13.1	17.9
T6	3.4	6.5	13.0	19.2	3.9	7.1	14.4	18.7
T7	2.6	4.1	10.2	16.1	3.0	5.6	12.6	17.4
S.E.(m)+	0.23	0.39	0.59	0.63	0.25	0.36	0.67	0.57
C.D. at 5%	.72	1.21	1.8	1.94	.75	1.11	2.05	1.75
General Mean	3.0	5.3	11.6	17.3	3.4	6.3	13.3	19.3

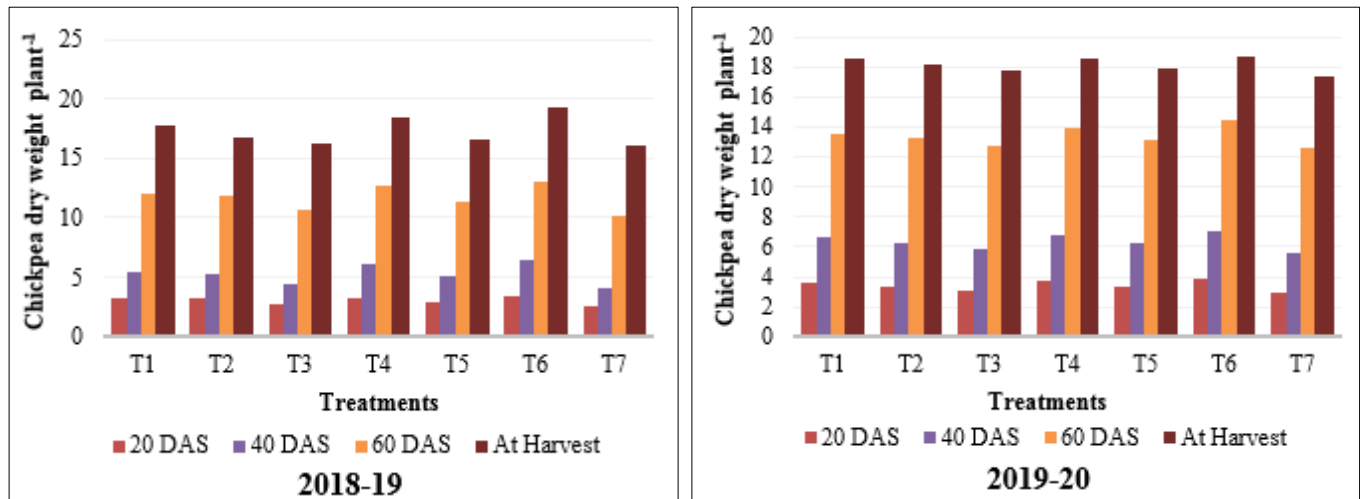


Fig 3: Residual effect of weed management practices on dry weight plant⁻¹ (g) at various growth stages of chickpea during 2018-19 and 2019-20

Based on two years of investigation, it is concluded that weed free treatment recorded maximum growth attributes *viz* plant height, leaf area and dry weight plant⁻¹. Among herbicides treatment, POE pyriothobac sodium @ 62.5g ai/ha + quizalofopethyl @ 50 g ai/ha at 30 DAS followed by one hand weeding at 60 DAS recorded maximum growth attributes followed by PE pendimethalin @ 0.75 kg ai/ha followed by one hand weeding at 60 DAS as residual effect of weed control methods on succeeding chickpea crop.

References

- Bhalla CS, Kurchania SP, Paradkar NR. Herbicidal weed control in chickpea (*Cicer arietinum* L.). *World weeds* 1998;5(1-2):121-124
- Bulti, M, Nano A. Integrated weed management in chickpea (*Cicer arietinum* L.). *Cogent Food & Agriculture* 2019;5(1):1620152.
- Buttar GS, Navneet Aggarwal, Singh, Sudeep. Efficacy of different herbicides in Chickpea (*Cicer arietinum* L.) under irrigated conditions of Punjab. *Indian J Weed Sci* 2008;40(3 & 4):169-171.
- Chaudhary BM, Patel JJ, Delvadia DR. Effect of weed management practices and seed rates on weeds and yield of Chickpea., *Indian J Weed Sci* 2005;37(3 & 4):270-272.
- Chopra N, Singh HP, Chopra NK. Effect of herbicides and weeding on weeds in chickpea. *Indian Journal of Weed Science* 2001;33(3&4):194-197.
- Chopra N, Chopra NK, Singh HP. Loss in seed yield and quality due to weed stress in chickpea (*Cicer arietinum* L.). *Indian Journal of Agricultural Science* 2003;73(6):350-351.
- Dubey SK, Arun K, Durgesh S, Tej P, Asheesh C. Effect of different weed control measures on performance of chickpea under irrigated condition. *International Journal of Current Microbiology and Applied Sciences* 2018;7(5):3103-3111.
- Kaur T, Walia US. Bio efficacy of potassium salt of glyphosate in Bt cotton and its residual effect on succeeding crops. *Indian Journal of Weed Science* 2014;46(4):358-360.
- Kaushik SS, Rai AK, Sirothia P, Sharma AK, Shukla AK. Growth, yield and economics of rainfed chickpea (*Cicer arietinum* L.) as influenced by integrated weed management. *Indian Journal of Natural Products and Resources* 2014;5(3):282-285.
- Moorthy BTS, Dubey RP. Production potential of chickpea (*Cicer arietinum*)-based intercropping systems under irrigated conditions. *Indian J Weed Sci* 2004;36:274-75.
- Muehlbauer FJ, Sarker A. Economic importance of chickpea: Production, value, and world trade. In: Varshney R., Thudi M., Muehlbauer F. (Eds) *The chickpea genome 2017*, pp5-12. Cham: Springer.doi:10.1007/978-3-319-66117-9_2.
- Ratnam M, Rao AS, Reddy TY. Integrated weed management in chickpea (*Cicer arietinum* L.). *Indian Journal of Weed Science* 2011;43(1):70-72.