



International Journal of Research in Agronomy

E-ISSN: 2618-0618

P-ISSN: 2618-060X

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www.agronomyjournals.com

2021; 4(2): 195-198

Received: 26-09-2021

Accepted: 24-11-2021

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Effect of sowing dates and weed management on yield of lentil (*Lens culinaris* Medik.)

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DOI: <https://doi.org/10.33545/2618060X.2021.v4.i2a.160>

Abstract

The present study entitled “Effect of sowing dates and weed management on growth, yield and economics of lentil (*Lens culinaris* Medik.)” was carried out during *kharif* 2020-21 at instructional cum research farm, D.K.S. College of Agriculture and Research Station, Bhatapara (C.G.). The soil of the experiment side was clay- loam texture. The lentil crop was grown in treatments were replicated three times in split plot design. The experimental consists of main plot treatments *viz.* D₁: 10/11/2020, D₂: 20/11/2020, D₃: 30/11/2020 and D₄: 10/12/2020 and sub plot treatments *viz.* W₁: Weedy check, W₂: Pendimethalin 30% EC @ 1 kg a.i./ha (PE) + Imazethapyr 10% SL @ 37.5 g a.i./ha (PoE), W₃: Pendimethalin 30% EC @ 1 kg a.i./ha (PE) + Imazethapyr 35% + Imazamox 35% WG @ 70 g/ha (PoE) and W₄: Weed free. The result revealed that maximum value of observation on, yield attributes and yield of lentil recorded under main plot D₁ (10/11/2020), While lowest were recorded under treatment control treatment D₄ (10/12/2020) and maximum recorded under sub plot treatment (Pendimethalin 30% EC @ 1 kg a.i./ha (PE) + Imazethapyr 35% + Imazamox 35% WG @ 70 g/ha (PoE). While lowest were recorded under treatment control treatment W₁ (Weedy check). Among the different date of sowing, the sowing on 10th November was recorded higher values regarding yield attributes were higher in treatment W₄ (Weed free).

Keywords: Pendimethalin, Lentil, Imazamox, yield attributes, sowing dates, weed management

1. Introduction

Lentil (*Lens culinaris* Medik.) is one of the most important legume (pulses crop) all over the world. It is one of the first food crop to have been cultivated and maintained excellent socio-economic value for 8000 year. The ancient crop is now a crop of modern times in both developed and developing countries today (Brand *et al.*, 2007). It was first grown in Southwest Asia in 7,000 B.C. (Mc Vicar *et al.*, 2010). Lentil valuable human food, mostly consumed as dry seeds (whole decorticated, seed decorticated and split). In Indian sub-continent mostly consumed as ‘Dal’ by removal of other skin and separation of cotyledons, snacks and soup preparation etc. It is easy to cook and easily to digestible with high biological value, hence also referred to patient. Dry leaves, stems, empty and broken pods are used as valuable cattle feed. The nutrient value of lentil composed of 60% of carbohydrates, 26% of protein, 7.5% of iron, 2% of sugars. and animal feeding where the stubble is also very rich in many valuable components (Sharara *et al.*, 2011) [7].

Lentil are high in fiber, and compare to carbohydrates, while low in fat and calories. Straw is a valued animal feed. Its ability in nitrogen and carbon sequestration adds to soil fertility (Sarker and Erskine, 2006) [6].

Around the globe, lentil occupies an area of 0.98 million ha yielding out 1.23 million tones, having an average productivity of 856 kg/ha⁻¹. In India lentil is grown in an area of 1.36 m ha with the production of 1.23 million tones and productivity of 901 kg ha⁻¹. (Anonymous, 2020) [1]. In India lentil is predominantly grown in Uttar Pradesh, Madhya Pradesh, West Bengal, Chhattisgarh, Bihar and Jharkhand. (Anonymous, 2020) [1].

In Chhattisgarh it is grown in an area of 12,690 ha. with the production of 4.52 lakh tones and productivity of 356 kg/ha (Anonymous, 2019) [2]. Sowing time is one of the main factors affecting yield. Sowing time was selected as a key factor of lentil cultivars by many researchers around the world.

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2. Materials and Methods

The experiment was carried out at the Instructional cum Research Farm Dau Kalyan Singh College of Agriculture and Research Station, Bhatapara a constituent college (Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh). The field had an even topography and good drainage system.

In the experiment 20, 40, 40 kg N, P₂O₅ and K₂O kg per ha nutrient was applied as recommended dose of along with 5 T/ha FYM was incorporated at the time of final field preparation. Full P₂O₅, K₂O and half of N₂ at the time of basal, remaining N₂ was applied in two equal split. Foliar spray of 2% of urea at 45 DAS was applied with help of Knapsack sprayer.

Application Herbicides were applied as per scheduled time and quantity. Chlorimuron ethyl was incorporated as pre plant (PPI) a day before sowing. Pre-emergence (PE) applications of pendimethalin and ready- mixed pendimethalin + imazethapyr and Imazamox were done after two days of sowing. Imazethapyr and quizalofop ethyl were sprayed at 30 DAS as post-emergence (POE). A stock solution of chemical containing the required quantity was prepared in a bucket by dissolving in a known volume of water. For spraying each plot the stock solution was further diluted. The quantity of water used was 800 litre ha⁻¹ inclusive of stock solution. The spraying was done with flat fan nozzle. Care was taken to avoid herbicide drifting into the crop area as far as possible.

3. Results and Discussion

Data pertaining to yield attributes and yield as influenced by the different treatments is presented in Table 1.1 & 1.2.

3.1 Number of pods/plant

Data revealed that the number of pods/plant of lentil was significantly influenced due to the different date of sowing. Significantly, the highest number of pods/plant (48.30) was recorded under sowing date D₁ (10/11/2020), followed by D₂ (20/11/2020). While lowest number of pods/plant (13.34) was recorded under sowing date D₄ (10/12/2020).

Data revealed that the number of pods/plant of lentil was significantly influenced at the different stages of crop growth due to different weed management practices. Significantly, the highest number of pods/plant (36.46) was recorded under treatment W₄ (Weed free). While lowest number of pods/plant (30.56) was recorded under treatment W₁ (Weedy check).

Pod length (cm)

Data revealed that the pod length (cm) of lentil was significantly influenced due to the different date of sowing. Significantly, the highest pod length (1.85 cm) was recorded under sowing date D₁ (10/11/2020), followed by D₂ (20/11/2020). While lowest pod length (1.77 cm) was recorded under sowing date D₄ (10/12/2020).

Data revealed that the pod length (cm) of lentil was significantly influenced at the different stages of crop growth due to different weed management practices. Significantly, the highest pod length (1.95 cm) was recorded under treatment W₄ (Weed free). While lowest pod length (1.68 cm) was recorded under treatment W₁ (Weedy check).

Number of seeds/pod

Data revealed that the number of seeds/pod of lentil was significantly influenced due to the different date of sowing. Significantly, the highest number of seeds/pod (1.44) was recorded under sowing date D₁ (10/11/2020), followed by D₂ (20/11/2020). While lowest number of seeds/pod (1.03) was

recorded under sowing date D₄ (10/12/2020).

Data revealed that the number of seeds/pod of lentil was significantly influenced at the different stages of crop growth due to different weed management practices. Significantly, the highest number of seeds/pod (1.30) was recorded under treatment W₄ (Weed free). While lowest number of seeds/pod (1.17) was recorded under treatment W₁ (Weedy check).

Test weight (1000 seed weight) (g)

Data revealed that the test weight (g) of lentil was significantly influenced due to the different date of sowing. Significantly, the highest test weight (15.95 g) was recorded under sowing date D₁ (10/11/2020), followed by D₂ (20/11/2020). While lowest test weight (13.29 g) was recorded under sowing date D₄ (10/12/2020).

Data revealed that test weight (g) of lentil was significantly influenced at the different stages of crop growth due to different weed management practices. Significantly, the highest test weight (14.87

g) was recorded under treatment W₄ (Weed free). While lowest test weight (14.17 g) was recorded under treatment W₁ (Weedy check).

Seed yield (kg/ha)

Data revealed that the seed yield (kg/ha) of lentil was significantly influenced due to the different date of sowing. Significantly, the highest seed yield (990.063 kg/ha) was recorded under sowing date D₁ (10/11/2020), followed by D₂ (20/11/2020). While lowest seed yield (550.688 kg/ha) was recorded under sowing date D₄ (10/12/2020).

Data revealed that seed yield (kg/ha) of lentil was significantly influenced at the different stages of crop growth due to different weed management practices. Significantly, the highest seed yield (1076.75 kg/ha) was recorded under treatment W₄ (Weed free). While lowest seed yield (483.18 kg/ha) was recorded under treatment W₁ (Weedy check).

Straw yield (kg/ha)

Data revealed that the straw yield (kg/ha) of lentil was significantly influenced due to the different date of sowing. Significantly, the highest straw yield (1200.375 kg/ha) was recorded under sowing date D₁ (10/11/2020), followed by D₂ (20/11/2020). While lowest straw yield (500.313 kg/ha) was recorded under sowing date D₄ (10/12/2020).

Data revealed that straw yield (kg/ha) of lentil was significantly influenced at the different stages of crop growth due to different weed management practices. Significantly, the highest straw yield (1229.62 kg/ha) was recorded under treatment W₄ (Weed free). While lowest straw yield (684.93 kg/ha) was recorded under treatment W₁ (Weedy check).

Biological yield (kg/ha)

Data revealed that the biological yield (kg/ha) of lentil was significantly influenced due to the different date of sowing. Significantly, the highest biological yield (2987.52 kg/ha) was recorded under sowing date D₁ (10/11/2020), followed by D₂ (20/11/2020). While lowest biological yield (2057.63 kg/ha) was recorded under sowing date D₄ (10/12/2020).

Data revealed that biological yield (kg/ha) of lentil was significantly influenced at the different stages of crop growth due to different weed management practices. Significantly, the highest biological yield (2898.08 kg/ha) was recorded under treatment W₄ (Weed free). While lowest biological yield (2152.69 kg/ha) was recorded under treatment W₁ (Weedy

check).

Harvest Index (%)

Data revealed that the harvest index (%) of lentil was significantly influenced due to the different date of sowing. Significantly, the highest harvest index (36.80%) was recorded under sowing date D₃ (30/11/2020), followed by D₂

(20/11/2020). While lowest harvest index (31.92%) was recorded under sowing date D₄ (10/12/2020).

Data revealed that harvest index (%) of lentil was significantly influenced due to different weed management practices. Significantly, the highest harvest index (38.78%) was recorded under treatment W₄ (Weed free). While lowest harvest index (29.52%) was recorded under treatment W₁ (Weedy check).

Table 1.1: Effect of date of sowing & weed management practices on Number of pods/plant, Pod length (cm), Number of seeds/pod and Test weight (1000 seed weight) (g)

Treatment				
	Number of pods/plant	Pod length (cm)	Number of seeds/pod	Test weight (1000 seed weight) (g)
Date of sowing				
D ₁	48.30	1.85	1.44	15.95
D ₂	39.99	1.82	1.29	14.78
D ₃	33.79	1.79	1.17	14.10
D ₄	23.72	1.77	1.03	13.29
S.Em±	0.451	0.017	0.014	0.121
CD (@ 5%)	1.560	0.058	0.048	0.418
Weed Management				
W ₁	33.00	1.68	1.17	14.17
W ₂	36.45	1.76	1.22	14.42
W ₃	37.45	1.85	1.24	14.66
W ₄	38.90	1.95	1.30	14.87
S.Em±	0.451	0.010	0.014	0.109
CD (@ 5%)	1.315	0.028	0.041	0.317
Interaction (D X W)				
S.Em±	0.901	0.020	0.028	0.217
CD (@ 5%)	2.631	0.057	0.082	0.634

Table 1.2: Effect of date of sowing & weed management practices on seed yield (kg/ha), Straw yield (kg/ha), Biological yield (kg/ha) and Harvest Index (%)

Date of sowing				
	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	Harvest Index (%)
Treatment				
D ₁	1409.33	1578.19	2987.52	35.12
D ₂	1291.88	1424.63	2716.50	35.39
D ₃	1220.25	1244.06	2464.31	36.80
D ₄	893.81	1163.81	2057.63	31.92
S.Em±	3.04	3.827	5.07	0.065
CD (@ 5%)	10.5	13.243	17.55	0.224
Weed Management				
W ₁	858.75	1293.94	2152.69	29.52
W ₂	1157.43	1352.81	2510.25	34.44
W ₃	1301.06	1363.88	2664.94	36.50
W ₄	1498.01	1400.06	2898.08	38.78
S.Em±	3.05	3.827	4.81	0.069
CD (@ 5%)	8.90	11.170	14.06	0.201
Interaction (D X W)				
S.Em±	6.10	7.654	9.63	0.138
CD (@ 5%)	17.8	22.340	28.12	0.402

Conclusion

The treatment combination D₁ (10/11/2020) (Weed free) showed higher values regarding all the growth and yield attributes and lower values were recorded under treatment combination D₄ (10/12/2020) (Weedy check).

In respect of the economics, cost of cultivation, gross returns and net returns were higher in treatment W₄ (Weed free). On other hand B:C ratio was higher in treatment W₃ (Pendimethalin 30% EC @ 1 kg a.i./ha (PE) + Imazethapyr 35% + Imazamox 35% WG @ 70 g/ha (PoE) and D₁ (10/11/2020).

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