The Pharma Innovation Journal 2022; 11(12): 2552-2554

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(12): 2552-2554

www.thepharmajournal.com
Received: 19-09-2022
Accepted: 26-10-2022

Madhu
M.Sc. (Ag.) Scholar, Section of Agronomy, DKS CARS, Bhatapara, Chhattisgarh, India

Angad Singh Rajput
Associate professor (Agronomy), DKS CARS, Bhatapara, Chhattisgarh, India

Panch Ram Mirjha
Assistant professor (Agronomy), DKS CARS, Bhatapara, Chhattisgarh, India

Sukriti
M.Sc. (Ag.) Section of Soil Science and Agricultural Chemistry, Raipur, Chhattisgarh, India

Corresponding Author:
Madhu
M.Sc. (Ag.) Scholar, Section of Agronomy, DKS CARS, Bhatapara, Chhattisgarh, India

Effect of planting geometry and weed management practices on yield and economics of cluster bean (*Cyamopsis tetragonoloba*) in *vertisols.*

Madhu, Angad Singh Rajput, Panch Ram Mirjha and Sukriti

Abstract
A field experiment was conducted during *kharif* season 2021-22, at Instructional farm DKS College of Agriculture and Research Station Bhatapara to study the effect of planting geometry and weed management practices on growth and yield characters on cluster bean. Among levels of spacing, 40 cm × 10 cm (S2) was found best in number of pods plant^{-1}, number of seeds pod-1, 1000 seeds weight However, 30 cm × 10 cm (S1) level of spacing gave maximum seed yield kg ha^{-1}, Stover yield, biological yield, Weed management practices in weedy check, showed maximum plant height plant-1, number of leave, number of branches at 60 and 90 DAS, number of pods plant-1, number of seeds pods-1, respectively. The treatment combination 30cm × 10cm (S1) + weedy check followed by (W3)-Pendimethalin 35 EC @ 0.75 kg A.I. ha-1 as (PE) FB HW at 20 DAS showed significantly maximum number of pods plant-1, number of seeds pod-1. This treatment also recorded higher yield attributes and seed and Stover yield (1206 and 2219q ha-1) and gave maximum net returns and B:C ratio (₹ 86639 ha-1) and 2.1 respectively).

Keywords: Cluster bean, planting geometry, weed management, yield, yield attributes and economics.

Introduction
Cluster bean (*Cyamopsis tetragonoloba* L. Taub) is a major *kharif* legume and is well known in India as "Guar." The chromosomal number 2n=14 is commonly referred to as guar, Chavli, Kayi, Guari, and Khutti. It is a self-pollinated crop belong to Fabaceae family. It is mostly suited arid and semi-arid climates, and it's used for green vegetable, dry pods, green manure, and fodder is cluster bean drought resistance because to its deep tap root structure, which allows it to better utilize available moisture and allows it to thrive in rainy conditions. This crop can flower and fruit even when there is a water shortage for a short period of time. It is one of the best crop whose rain fed condition due to its strong capacity to recover from water stress (Kherawat *et al*., 2013) [4]. Primary cluster bean producing state in India are Rajasthan, Haryana, Punjab, Gujarat, and to a lesser extent Uttar Pradesh and Madhya Pradesh Rajasthan is the country's most productive state, ranking first in terms of both average (47.87 lakh ha^{-1}) and production (27.48 lakh tonnes), with an average productivity of 465 kg ha-1 (Anonymous, 2016) [1]. Weed management is an important aspect of any crop production system. Weeds diminish productivity by competing for water, nutrients, and light with crops. Weed can also diminish earnings directly by obstructing harvesting operations, reducing crop quality, and creating compounds that are damaging to crop plants. Crop losses due to weeds are estimated to be Write in Rs.7.5 billion per year. Hand weeding is a classic and effective weed control approach; a manual/mechanical weeding is normally advised 15-30 days after sowing (Jain *et al*., 2000) [3] Pre-emergence herbicides such as pendimethalin have been proven to be successful in controlling weeds in the early stages, although late flushes and escaped/regenerated weeds in the later stages can also reduce crop production (Dayal *et al*., 2004) [2].

Material and Method
The experiment was conducted during the *kharif* season of the 2021-22 at the Research Cum Instructional DKS college of Agriculture and Research Station Bhatapara (C.G). The Soil texture of experimental field was clay loamy (*Vertisols*). The experimental site was low in available N2 (112.8 kg ha^{-1}) medium in available phasphoras (12.74 kg ha^{-1}) and high in available potassium (385 kg ha^{-1}).

Based dose of 50 kg N, 50 kg P2O5, and 30 kg K2O was given in the farm of Urea, DAP and MoP. The experiments consisting of 12 treatments combination with 3 replication was under taken in split plot Design which included two factor namely, Factor one is Spacing 30cm × 10cm (S1) and 40cm × 10 cm (S2) and second factor is different weed management treatment W1- Weed free, W2- Weed check, W3-Pendimethalin 30EC @ 0.75 kg ha-1(PE) followed by hand weeding at 20 days after sowing, W4 - Pendimethalin 30 EC followed by Imazathapyr @ 1.0 kg ha-1 at 20 days after sowing, W5 - Imazethapyr 35 EC + Imazemox 35 WG (Ready mix) (PoE) @ 1.0 kg ha-1 at 40 -45 days after sowing, W6- Imazethapyr 35 EC + Imazemox 35 WG @ 80 g A.I. ha^{-1} (Ready mix) (PoE) followed by hand weeding at 40 - 45 DAS, applied with their respective doses as per treatments. Spraying was done with flat fen nozzle with knapsack sprayer using 500 liter ha-1. Weed population and dry weight of weeds were taken using quadrate of 0.25 m-2 size at 30 and 60 days after sowing and at harvest. Weed data were subjected to square root transformation before statistical analysis. Growth and yield attribute characters, seed and Stover yield recorded and economics were also calculated.

Result and Discussion

Effect on yield attributes

The data pertaining to yield attributes are presented in Table 1. A perusal of the data revealed that the plant height was significantly influenced by various row spacing treatments and weed management practices there was a gradual increase in number of pods plant^{-1}, number of seeds pod^{-1}, 1000 seed weight with the increase in of row spacing 30cm × 10cm highest (6.28) were recorded under 40cm × 10cm spacing is lowest (5.33) Similar results were also observed by and Patel *et al*., (2002) in gaur. The height of plant was found to show significant variations among the different levels of planting geometry 30cm × 10cm (S1) accommodated 33.33 plants per m2 Imazemox 35 WG @ 80 gm A.I ha^{-1} (Ready mix) (PoE) FB HW at 40-45 days after sowing, and weedy check (4.33), (23.17), (18.96) were also recorded under lowest yield parameters. This results are in close conformity with the finding of Singh *et al.* (2014) [9], Saras *et al.* (2016) [8], Sharma *et al.* (2017) [10].

Effect on yield

The highest seed yield, Stover yield, biological yield, harvest index (%) were recorded with planting geometry 30cm × 10cm (S1) and also recorded in 40cm × 10cm (S2) of lowest yield. All weed management treatment significantly increased seed yield of cluster bean (1206 area and 25 plants per m2 area in 40cm × kg ha^{-1}) and Stover yield (2219 kg ha^{-1} 10cm (S2). There was highest average biological yield (3425 kg ha) yields were plant height with the highest density as compared to the lowest density of plants positioned at wider planting geometry. This might be attributes to taller plant lengthy in search of sunlight when the population was crowded, whereas, the plants under lower density would have not competed for light and grew normally.

Maximum number of pods plant^{-1} (7.33), number of seeds pod^{-1} (50.00), 1000 seeds weight (28.96 g) (Table 4.1.2) was observed in weed free check (W1) this was mainly due the reason that, the regular weeding at emergence of weeds made sure that the weeds were practically absent in this treatment. However, it was found at par to treatment (W3) Pendimethalin 35 EC @ 0.75 kg A.I. ha^{-1} as (PE) FB HW at 20 days after sowing (6.67), (33.67), (22.78), and followed by (W4**)** - Pendimethalin 30 EC FB Imazethapyr @ 1.0 kg ha-1, (W5) Imazethapyr 35 EC + Imazemox 35 WG (Ready mix), (PoE) @ 1.0 kg ha^{-1} at 40 – 45 DAS, (W6) Imazethapyr 35 EC + crecorded under treatment W1 (weed free) being at par with treatment (W3) Pendimethalin 35 EC @ 0.75 kg A.I. ha-1 as (PE) followed by hand weeding at 20 days after sowing. The increased seed and haulm yields and thereby biological yield were obviously the results of better weed management which rendered favourable conditions like increased availability of nutrients, moisture, light and other factors to the crop and resulted in higher yield of cluster bean, and followed by (W4**)** Pendimethalin 30 EC followed by Imazethapyr @ 1.0 kg ha^{-1}, (W5) Imazethapyr 35 EC + Imazemox 35 WG (Ready mix)(PoE) @ 1.0 kg ha-1 at 40 – 45 DAS, (W6) Imazethapyr 35 EC + Imazemox 35 WG @ 80 gm A.I. ha-1 (Readymix) (PoE) followed by hand weeding at 40 - 45 days after sowing, and whereas lowest values of seed yield (401 kg ha^{-1}), Stover yield (1212 kg ha^{-1}) and biological yield (1613 kg ha^{-1}) were noted under treatment W2 (weedy check^{-1}) Findings these corroborate with (Rao *et al*., 2015) [6].

Net returns and benefit: cost ratio

Data (Table 2) pertaining to net returns under the influence of weed management treatments indicate that all treatment the weed management practices were found significant in achieving net returns compared to weedy check. Data further clarify that pendimethalin 30 EC @ 0.75 kg ha^{-1} followed by hand weeding with maximum net returns of (₹ 51289 ha^{-1}) found significantly superior over all weed management treatments, except two hand weeding. The level of planting geometry 30cm × 10cm (S1) registered (₹ 45658 ha^{-1}) per cent increase in net returns over 40cm × 10cm (S2) and control, respectively. Maximum B:C ratio (2.6) was obtained through pendamethalin followed by hand weeding, which was significantly greater than rest of the treatments. On an average, B:C ratio obtained through spacing 30 × 10 cm (2.1) was significantly higher over 40 × 10 cm (1.6), The low investment under sequential application coupled with good economic yield might be the reason for higher net monetary returns and BC ratio, even pendimethaline followed by hand weeding gave maximum gross monetary returns was nullified due to higher variable cost for weed management. Similar findings were also reported by Shruthi and Salakinkop (2014) [7].

Table 1: Effect of planting geometry and weed management practices on yield attributes

Treatment	Number of pod plant^{-1}	Number of seed pod^{-1}	Test Weight (g)
Spacing			
30cm × 10cm	6.28	35.22	23.69
40cm × 10cm	5.33	28.78	20.43
S.E.M±	0.14	1.02	0.53
CD (p = 0.05)	0.86	6.23	3.24

Weed management practices			
W1 -Weed free	7.33	50.00	28.96
W2 -Weedy check	4.33	23.17	18.96
W3 - Pendimethalin 30 EC @ 0.75 kg ha-1 (PE) FB HW at 20 DAS	6.67	33.67	22.78
W4 - Pendimethalin 30 EC FB Imazathapyr @1.0 kg ha-1 at 20 DAS	6.00	30.67	21.80
W5 - Imazethapyr 35 EC +Imazemox 35WG (Ready mix), (PoE) @ 1 kg ha^{-1} at 40- 45 DAS	4.83	26.50	19.22
W6 - Imazethapyr 35 EC + Imazemox 35 WG @ 80 g A.I. ha-1 (Ready mix), (PoE) FB HW at 40 - 45 DAS	5.67	28.00	20.66
S.E.M±	0.35	1.57	0.90
CD (p = 0.05)	1.03	4.64	2.65

Table 2: Effect of planting geometry and weed management practices on yield and economics of cluster bean.

Treatment	Seed yield kg ha^{-1}	Stover yield kg ha^{-1}	Biological yield kg ha^{-1}	Harvest index (%)	Net returns ₹ ha^{-1}	B:C ratio
Spacing						
30cm × 10cm	920	1980	2900	31.00	45658	2.1
40cm × 10cm	757	1684	2441	30.50	33980	1.6
S.E.M±	25.95	48.34	74.06	0.06	1864	0.05
CD (p = 0.05)	157.89	294.16	450.67	0.39	11342	0.51
Weed management practices						
W1 -Weed free	1206	2219	3425	35.05	59617	2.1
W2 -Weedy check	401	1212	1613	24.88	10002	0.4
W3 - Pendimethalin 30 EC @ 0.75 kg ha-1 (PE) FB HW at 20DAS	983	2097	3081	31.89	51289	2.6
W4 - Pendimethalin 30 EC fb Imazathapyr @1.0 kg ha^{-1} at 20 DAS	868	1941	2810	30.63	43358	2.2
W5 - Imazethapyr 35 EC+Imazemox 35WG (Ready mix), (PoE) @ 1 kg ha^{-1} at 40-45 DAS	722	1723	2445	29.52	32877	1.6
W6 - Imazethapyr 35 EC + Imazemox 35 WG @ 80 g A.I. ha^{-1} (Ready mix), (PoE) FB HW at 40 - 45 DAS	850	1800	2651	32.53	41620	2.1
S.E.M±	62.09	84.33	104.14	1.90	4346	0.22
CD (p = 0.05)	183.17	248.77	307.21	5.59	12821	0.64

Conclusion

From this experiment and by considering the statistical analysis we can conclude that, in light of the results obtained in the present investigation, it inferred that growth and yield of cluster bean can be increased by maintaining spacing of 30 cm × 10 cm for effective control of weeds and for securing higher seed yield of cluster bean as well as economical returns, interculturing followed by hand weeding at 20 days after sowing and in weed management approach application of pendimethalin 30 EC @ 0.75 kg ha^{-1} (pre-emergence) followed by hand weeding at 20 days after sowing better.

References

1. Anonymous. Agricultural Statistics at a Glance, Directorate of Economics & Statistics, Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India; c2016.
2. Dayal D. Weed management in groundnut. (In) Groundnut Research in India; c2004. p. 248-259.
3. Jain PC, Tomar SS. Crop-weed in cluster bean (*Cyamopsis tetragonoloba* under rainfed condition. Indian Journal of Agronomy. 2000;45:737-7391.
4. Kherawat BS, Lal M, Agarwal M, Yadav HK, Kumar S. Effect of applied potassium and manganese on yield and uptake of nutrients by cluster bean (*Cyamopsis tetragonoloba*). Journal of Agricultural Physics. 2013;13(1):22-26.
5. Patel PL, Pathak AR, Patel KM. Correlated response in cluster bean (*Cyamopsis tetragonoloba* L Taub). Program Agriculture. 2002;2(2):189-190.
6. Rao PV, Reddy SA, Rao KY. Effect of integrated weed management practices on growth and yield of pigeonpea (*Cajanus cajan* L Millsp.) International Journal of Plant and Environmental Science. 2015;3:24-27.
7. Shruthi GK, Salakinkop SR. Efficacy of sequential application of pre and post-emergent herbicides in *kharif* greengram (*Vigna radiata* L.). Karnataka Journal of Agriculture Sciences. 2015;28(2):155-159.
8. Saras P, Patel BD, Parmar SK. Weed management by cultural and chemical practices and their effect on phytotoxicity and growth, quality and yield parameters of cluster bean (*Cyamopsis tetragonoloba* (L.) Taub). Trends in biosciences. 2014;7(24):4196-4199.
9. Singh SP, Yadav RS, Sharma V. Weed control in cluster bean through post-emergence herbicides. Indian Journal of Weed Science. 2016;48(2):20-205.
10. Sharma K, Rawat GS, Gaur D, Sharma Anju. Effect of post-emergence herbicides on weed control, growth and yield of cluster bean [*Cyamopsis Tetragonoloba* (L.) Taub.] In Madhya Pradesh Agricultural Science Digest - A Research Journal. 2017 Sep 1;37(3):179-184.