



International Journal of Research in Agronomy

E-ISSN: 2618-0618

P-ISSN: 2618-060X

© Agronomy

www.agronomyjournals.com

2025; 8(2): 215-218

Received: 02-11-2024

Accepted: 08-12-2024

Avinish Kumar Thakur

Department of Agronomy, School
of Agriculture Lovely Professional
University, Phagwara, Punjab,
India

US Walia

Department of Agronomy, School
of Agriculture Lovely Professional
University, Phagwara, Punjab,
India

Growth and development of summer green gram (*Vigna radiate*) as influenced by planting patterns and weed control methods

Avinish Kumar Thakur and US Walia

DOI: <https://doi.org/10.33545/2618060X.2025.v8.i2d.2553>

Abstract

A research study was conducted during the summer season of 2024 at the experimental farm of Lovely Professional University, Phagwara, (Punjab) on “Growth and development of summer greengram (*Vigna radiate*) as influenced by planting patterns and weed control methods”. The experiment was conducted in Split Plot Design (SPD) with 4 planting techniques viz. flat sowing, bed sowing (three rows/bed), ridge sowing (two rows on slope), ridge sowing (two rows - one on top and one in furrow) in main plots and four weed control treatment viz. pendimethalin 30EC 0.75 kg/ha, pendimethalin 30EC 0.45 kg/ha with straw mulching, one hand weeding and unweeded (control) in sub plots. SML 1827 is a variety of summer green gram was sown on 19 March 2024. Three replications were kept in the experiment. Significantly higher seed yield of summer greengram was obtained in two rows on slope of the ridge than other planting patterns. Among sub plot treatments, pre-emergence application of pendimethalin 0.75 kg/ha and pendimethalin 0.45 kg/ha followed by straw mulch recorded significantly higher seed yield than one hand weeding and unweeded (control) treatment.

Keywords: Growth, planting pattern, weeds, green gram

1. Introduction

Green gram (*Vigna radiate*) is a warm season legume that is widely cultivated in tropical and subtropical regions of India. It is valuable source of proteins, vitamins, and minerals and it also plays an important role in nitrogen fixation, which improves the soil fertility. The growth and development of green gram is influenced by a variety of environmental factors, including temperature, light, water and nutrients (Chaudhary *et al.* 2018) [1]. Nutritive value of greengram is very high as it contains 24.3% protein, 124 mg/100 g calcium, 1.3% fat, 326 mg/100 g phosphorus, 3.5% minerals, 7.3 mg/100 gm iron, 4.1% fiber, 56% carbohydrate, 10% moisture with calorific value of 334 kcal/100 gm (Hirani *et al.* 2024) [2]. Shriram Osari *et al.* (2019) [10] observed that in green gram, productivity was reduced upto 56.7 percent due to weeds. Yield loss due to grasses and sedges combination was 46.05%, yield loss due to broad leaves and sedges was 24.46% and yield loss due to broad leaves and grasses was 45.21% (Udhaya *et al.* 2023) [14]. It shows when grasses are present alone or with other weeds, there is a cumulative effect which reduces the crop yield significantly. Yield losses in greengram due to weed interference varied between 74 and 92% depend on the prevailing conditions. Nutrient (N, P and K) losses due to crop weed competition were 38.8, 9.2 and 23.3 kg ha⁻¹ respectively (Kumara *et al.* 2021) [5].

Mechanical control is traditional method of weed control which is most popular method for controlling weeds in mung bean. One to two weedings depending upon weed intensity should be given to keep the crop free from harmful weeds. First weeding should be done 15-20 DAS and second 30-35 DAS depending upon weed density and climatic conditions (Suryavanshi *et al.* 2018) [13]. However, timely and adequate amount of labour is not available and also this method is sometimes not practically possible due to continuous rains. Weeds can be controlled with chemical, cultural, biological, integrated weed control methods (Udhaya *et al.* 2023) [14]. Chemical weed control is efficient, economical and sure as compared to other methods.

Corresponding Author:

Avinish Kumar Thakur

Department of Agronomy, School
of Agriculture Lovely Professional
University, Phagwara, Punjab,
India

Mechanical weed control is mainly associated with tillage, hand hoeing, mowing interculture etc. In organic farming, a 1–2-year period of grass-clover or alfalfa in the crop rotation is more or less required to suppress weeds including perennials such as *Cirsium arvense* (Indra *et al.* 2024) [3].

The major method of green gram sowing is still broadcasting, which is considered as the major yield and growth-limiting factor in this crop. For higher production line sowing in rows of green gram is documented as the best strategy. Raised bed planting method in green gram efficiently reduces weed population and maximizes weed control efficiency (Hirani *et al.* 2024) [2]. Bed planting is very safe technique for crop cultivation especially under heavy textured soils and with more rainfall areas. Bed planting method results in 25-30 percent saving in irrigation water. Other than bed sowing, cross sowing is also followed in the green gram for optimum yield (Indra *et al.* 2024) [3]. Growth attributes such as plant height, dry matter accumulation and number of branches per plant and yield attributes like pods/plant, seeds/plant, stover and seed yield are significantly affected by different planting patterns (Singh *et al.* 2020) [11]. The present study evaluated the growth and yield of summer green gram crop as influenced by planting patterns and weed control methods.

2. Materials and Methods

The field experiment on summer green gram variety SML1827 was conducted on research farm of Lovely Professional University, Phagwara, Punjab during Summer 2024. The trial was conducted on clay loan soil with pH 7.0 and available nitrogen content was 376 kg/ha. The trial was conducted in SPD (Split Plot Design) with four planting techniques in main plots and four weed competition treatments in sub plots with 4 replications. The 4 planting patterns i.e., M₁ – Flat sowing, M₂ – Bed sowing (three rows/bed of 67.5 cm), M₃– Ridge sowing (two rows on slope of ridge), M₄- Ridge sowing (two rows per ridge - one on top and one in furrow) were kept in main plots and 4 weed control treatment i.e., T₁- pendimethalin 30EC 0.75 kg/ha, T₂- pendimethalin 30EC 0.45 kg/ha followed by straw mulching, T₃- One hand weeding (20 DAS), T₄- Unweeded (control) were retained in sub plots. The field was prepared with discing (one) and cultivators (twice) and sowing was done with kera method on 19 March 2024. The sub plot size was 5m × 2.2m. The size of the bed was 67.5 cm with bed top 37.5 cm and furrow 30cm. Ridges were prepared at spacing of 45 cm. The spray of pendimethalin was done as pre-emergence on same day

of sowing. The full dose of N was applied at sowing. The 1st irrigation was applied after 10 days after sowing (DAS) and subsequent irrigations were applied depending upon the climatic conditions and nature of soil. The spray of Imidacloprid 17.8& SL @ 30 ml, Emamectin Benzoate 5% SG 80 gm were made to keep the crop free from insects and pests. The crop was harvested with sickle on 3rd June, 2024 when 85% of pods got matured. Two square meters of net plot were taken from the middle of each plot. After being harvested, the plants were tied up with rope and left in the sun to dry completely. After that, the crop was struck with sticks, the seeds were cleaned, and an electronic balance was used to weigh each plot individually. The analysis was completed by OPSTAT.

3. Results and Discussion

The results obtained are being discussed under the following sub heads.

1. Weed intensity (weed count, dry matter of weeds)
2. Crop growth parameters
3. Yield of crop

3.1 Weed intensity

Count of weeds were significantly higher in ridge sowing (1 on top and 1 in furrow) and ridge sowing (2 rows on slope) due to increased surface area as compared to flat planting patterns. (Table 1). Similarly, weed count was significantly less in flat sowing than bed sowing, ridge sowing (2 rows on slope) and ridge sowing (1 on top and 1 on furrow). The dry matter accumulation by weeds was significantly less in flat sowing and bed planting method than ridge sowing (2 rows on slope) and ridge sowing (1 on top and 1 on furrow) when observations were recorded at harvest. Ridge sowing (1 on top and 1 in furrow) noticed significantly higher dry matter of weeds than other methods which may be due to more growth of weeds in the former technique. Raj *et al.* (2010) [8] examined similar results. Among weed competition treatments, significantly less weed population and weed dry matter of weeds was recorded at harvest in pendimethalin 0.45 kg/ha followed by straw mulch which was significantly better than other weed competition treatments. (Table 1) Weed control efficiency (WCE) (percentage) was more in flat sowing (58.7%) than other planting patterns techniques viz. bed sowing (57.90), ridge sowing – (2 rows on slope of ridge) (43.90%) and ridge sowing – (1 on top and 1 in furrow) (38.90%). Rajib *et al.* (2014) [9] examined similar results.

Table 1: Weed count (sq/m), weed dry matter (q/ha) and WCE (%) in green gram as influenced by planting patterns and weed competition

Treatments	Weed count At harvest (sq./m.)	Dry matter of weeds (q/ha) At harvest	WCE %
Main Plots (Planting patterns)			
Flat sowing	13.10	12.01	58.7
Bed sowing	16.20	12.30	57.9
Ridge sowing - 2 rows on slope of ridge	17.10	16.30	43.9
Ridge sowing - 1 on top and 1 on furrow	18.70	17.80	38.9
S.E(m)	0.79	0.14	
C.D. at 5%	2.79	0.5	
Subplots (Weed control treatments)			
Pendimethalin 30EC- 0.75 kg/ha (pre-emergence)	15.00	8.20	71.9
Pendimethalin 30 EC- 0.45 kg/ha pre-emergence followed by straw mulch	12.30	7.00	76.1
One hand weeding 20 DAS	14.2	14.20	51.4
Unweeded control	23.5	29.10	
S.E(m)	0.53	0.34	
C.D. at 5%	1.57	1.02	
C.D. for interaction at 5%	NS	NS	NS

3.2 Crop growth parameters

Plant height (cm) is important growth factor. The height of plants increased significantly in ridge sowing (2-rows on slope), bed sowing and ridge sowing (1- on top 1 in furrow) methods as compared to flat sowing when recorded at harvest. (Table 2) The plant height in ridge sowing (2- rows on slope) was significantly more among all planting patterns which may be due to better growth of crop in this method. Chhodavadia reported same results. Significantly more dry matter accumulation by crop plant was observed at harvest in ridge sowing (1 on top 1 in furrow) than all other planting patterns. The number of nodules and other rooting traits of green gram are important for determining its overall productivity. The nodules per plants were significantly higher in bed sowing than flat sowing, ridge sowing (2- rows on slope) and ridge sowing (1 on top and 1 on furrow) recorded statistically at par no. of nodules/ plant as compared to bed sowing. One-hand weeding resulted in a much higher plant height at harvest than other weed competition

treatments because fewer weeds grew there (Table-2). Plant height in pendimethalin 0.45 kg/ha followed by straw mulch was significantly more than pendimethalin 0.75 kg/ha and unweeded (control) treatments. Also significantly less plant dry matter accumulation was recorded in unweeded (control) as compared to all weed control treatments which may be due to more weeds competition resulting in less growth of crop in control treatments. The dry matter accumulation by crop was significantly more in all weed control treatments than unweeded (control) treatment. The dry matter/plant in pendimethalin 0.45 kg/ha followed by straw mulch was found at par with one hand weeding and both these treatments recorded significantly less dry matter than pre-emergence application of pendimethalin at 0.75 kg/ha. The nodules per plant at harvest were found numerically higher in one hand weeding treatments but the differences around weed control treatments were non-significant. Similar results were estimated by Jaswal *et al.* (2022)^[4].

Table 2: Plant height (cm), dry matter accumulation of plant (q/ha) and no. of nodules at harvest as influenced by planting patterns and weed competition

Treatments	Plant height (cm)	Plant dry matter (q/ha)	No. of nodules/plant
Main plot (Planting patterns)			
Flat sowing	49.70	11.60	11.10
Bed sowing	51.80	12.90	15.50
Ridge sowing- 2 rows on slope of ridge	53.40	11.20	12.20
Ridge sowing 1 on top and 1 on furrow	51.00	14.01	13.90
S.E(m)	0.33	0.13	0.74
C.D. at 5%	1.18	0.46	2.62
Subplots (Weed control treatments)			
Pendimethalin 30EC-0.75 kg/ha (pre-emergence)	49.60	15.10	13.00
Pendimethalin 30EC-0.45 kg/ha pre-emergence followed by straw mulch	52.2	13.0	13.00
One hand weeding 20 DAS	53.9	12.40	14.40
Unweeded (control)	50.20	9.3	12.4
S.E(m)	0.32	0.29	0.55
C.D. at 5%	0.95	0.86	NS
C.D. for interaction at 5%	NS	NS	NS

3.3 Crop yield

Planting technique and weed control treatments significantly influenced the seed yield of summer green gram. (Table 3). The seed yield (q/ha) in ridge sowing of two rows on slope and was found to be significantly more than bed sowing, ridge sowing one on top and one in furrow and flat sowing. (Table 3) The highest seed yield was noticed in ridge sowing two rows on slope of ridge (15.26 q/ha) and bed sowing (13.27 q/ha) which was followed by ridge sowing one row on top and one in furrow (12.05 q/ha) and flat sowing (10.01 q/ha). The seed yield of bed sowing and ridge sowing (one on top and one in furrow) was found to be at par. The planting pattern of ridge sowing two rows on slope, bed sowing and ridge sowing one on top and one in furrow recorded 52.44%, 32.56% and 20.37% more grain yield than flat sowing. The biological yield and straw yield was significantly better in both ridge sowing methods i.e., two rows

on slope and one on top and one in furrow than bed sowing method. Similar results were reported by Parihar *et al.* (2024)^[6]. Among weed control treatments, the seed, straw and biological yield was significantly higher in all weed control treatment than unweeded (control). (Table 3) Significantly more seed yield was recorded in pendimethalin 30EC 0.75 kg/ha (15.28 q/ha), pendimethalin 30EC 0.45 kg/ha followed by straw mulch (14.49 q/ha), one hand weeding 20 DAS (13.32 q/ha) as compared to unweeded control. (7.95 q/ha) and all former treatments were found at par. Pre-emergence application of pendimethalin 0.75 kg/ha, pendimethalin 0.45 kg/ha followed by straw mulch and one hand weeding increased seed yield by 92.20%, 82.26, and 67.54% percent than unweeded (control) treatment. Also all weed control treatments significantly increased biological and straw yield than unweeded (control). Similar results were reported by Singh *et al.* (2023)^[12].

Table 3: Grain yield (q/ha), biological yield (q/ha), straw yield (q/ha) of summer greengram as influenced by planting patterns and weed competition

Treatments	Seed yield (q/ha)	Biological yield (q/ha)	Stover yield (q/ha)
Main plot (Planting patterns)			
Flat sowing	10.01	76.76	66.75
Bed sowing	13.27	75.20	61.93
Ridge sowing- 2 rows on slope of ridge	15.26	88.87	73.61
Ridge sowing 1 on top and 1 on furrow	12.05	87.16	75.11
S.E(m)	0.34	2.83	2.64
C.D. at 5%	1.21	10.01	9.34

Subplots (Weed control treatments)			
Pendimethalin 30EC-0.75 kg/ha (pre-emergence)	15.28	85.52	70.24
Pendimethalin 30EC-0.45 kg/ha followed by straw mulch	14.49	86.48	71.99
One hand weeding 20 DAS	13.32	95.37	82.05
Unweeded control	7.95	61.07	53.12
S.E(m)	0.31	1.36	1.32
C.D. at 5%	0.93	4	3.88
C.D. for interaction at 5%	NS	NS	NS

4. Conclusion

Among main plots, more seed yield (15.26 q/ha) and (13.27q/ha) was obtained in ridge sowing (two rows on slope) and bed sowing, as compared to ridge sowing (one on top and one in furrow) and flat sowing pattern. The increase in seed yield in planting pattern of ridge sowing (two rows on slope), bed sowing and ridge sowing (one on top and one in furrow) was 52.44%, 32.56% and 20.37% respectively than flat sowing. Among weed competition treatments, seed yield was significantly more in pendimethalin 0.75 kg/ha and pendimethalin 0.45 kg/ha followed by straw mulch than other weed control treatments. There were 92.20%, 82.26%, 67.54% increase in seed yield in pendimethalin 0.75 kg/ha, pendimethalin 0.45 kg/ha followed by straw mulch and one hand weeding as compared to control (unweeded) treatment.

5. References

- Chaudhary KM, Raj AD, Jinjala VR. Effect of different row spacing and weed management practices on growth and yield of summer greengram (*Vigna radiata* L.) under South Gujarat condition. *Res J Agric Sci*. 2018;9(1):54-58.
- Hirani AK, Korav S, Rajanna GA, Elansary HO, Mahmoud EA. Determination of critical crop-weed competition period: Impact on growth, nutrient dynamics and productivity of green gram (*Vigna radiata*). *Heliyon*. 2024;10(17).
- Indra S, Innazent A, Joseph PA, Kumar PD. Effect of tillage and weed management practices on growth and yield of green gram [*Vigna radiata* (L.) Wilczek]. *Int J Environ Clim Change*. 2024;14(4):62-68.
- Jaswal A, Singh A, Sarkar S, Singh M. Influence of weed management practices on weed density, growth and yield of greengram (*Vigna radiata*). *Ann Biol*. 2022;38(2):193-198.
- Kumara P, Pakeerathan K, Deepani LP. Assessment of yield loss in green gram (*Vigna radiata* (L.) R. Wilczek) cultivation and estimation of weed-free period for eco-friendly weed management. *Biol Life Sci Forum*. 2021;3(1):22.
- Parihar C, Kushwah SS, Parmar B, Verma B, Chauhan APS. Effect of planting methods and weed control treatments on weed dynamics, yield and economics of green gram (*Vigna radiata* L.). *J Exp Agric Int*. 2024;46(7):325-335.
- Patel DB, Patel TU, Patel HH, Patel DD, Patel HM, Zinzala MJ. Irrigation scheduling and weed management in rabi greengram (*Vigna radiata*). *Int J Chem Stud*. 2020;8(3):204-210.
- Raj VC, Patel DD, Thanki JD, Arvadia MK. Effect of integrated weed management on weed control and productivity of greengram (*Vigna radiata* L.). *Bioinfolet*. 2012;9(3):392-396.
- Das R, Patra BC, Mandal MK, Pathak A. Integrated weed management in blackgram (*Vigna mungo* L.) and its effect on soil microflora under sandy loam soil of West Bengal. *The Bioscan*. 2014;9(4):1593-1596.
- Osari S, Marskole J, Jatav SK, Bhadauria SS. Efficacy of herbicides on weed flora and productivity of green gram. *Int J Chem Stud*. 2019;7(6):396-400.
- Singh G, Virk HK, Khanna V. Effect of land configuration and weed management on productivity of greengram (*Vigna radiata*). *Indian J Agric Sci*. 2020;90(5):947-951.
- Singh P, Singh P, Ujjawal A, Rastogi M, Srivastava M. Yield and nutrient uptake of green gram (*Vigna radiata* L.) and weeds as influenced by different integrated weed management practices in Western Uttar Pradesh. *Indones J Agric Environ Anal*. 2023;2(2):69-86.
- Suryavanshi T, Sharma AR, Nandeha KL, Lal S, Porte SS. Effect of tillage, residue and weed management on soil properties, and crop productivity in greengram (*Vigna radiata* L.) under conservation agriculture. *J Pharmacogn Phytochem*. 2018;7(1):2022-2026.
- Udhaya A, Rathika S, Ramesh T, Janaki D, Jagadeesan R. Physiological parameters and yield of green gram as influenced by weed management practices. *Int J Plant Soil Sci*. 2023;35(16):100-106.