The Pharma Innovation Journal 2021; 10(7): 1711-1714

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(7): 1711-1714

www.thepharmajournal.com
Received: 13-05-2021
Accepted: 19-06-2021

Umesh Kumar
M.Sc. Scholar, Department of Agronomy and Agroforestry, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Dheer Agnihotri
M.Sc. Scholar, Department of Agronomy and Agroforestry, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Rishav Raj
M.Sc. Scholar, Department of Agronomy, Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India

SP Singh
Professor, Department of Agronomy, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Corresponding Author:
Rishav Raj
M.Sc. Scholar, Department of Agronomy, Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India

Effect of intercultural techniques on growth, yield and yield attributes of rainfed green gram (*Vigna radiata* L.) under Agri-horti system

Umesh Kumar, Dheer Agnihotri, Rishav Raj and SP Singh

Abstract
Agroforestry is the intentional planting of agricultural crops and/or animals alongside woody perennial trees on the same plot of land. Integration of trees in an agroforestry system seeks positive interaction between trees and crops. Adoption of such system improves the microclimate and soil productivity. A field experiment entitled "Influence of intercultural techniques on growth & yield of rainfed green gram (*Vigna radiate* L.) Under Agri-horti system" was carried out at Agricultural Research Farm, BHU, Barkachha, Mirzapur, (U.P.). The experiment consisting of six intercultural techniques treatments was executed in Randomized Block Design having four replications on sandy loam soil during *Kharif* season 2019. The treatments were Control (No interculture) (T_1), Rice straw mulch (2 tonnes ha^{-1}) (T_2), {T_2 + Pre-mergence herbicide (Pendimethalin @ 1.0 kg ha^{-1})} (T_3), Hoeing at 15 DAS (T_4), Hoeing at 30 DAS (T_5), Hand weeding @ 20 & 40 DAS (T_6).The Result revealed that the treatment T_6(two hand weeding @ 20 & 40 DAS) registered significantly supreme plant height (cm), no. of branches $plant^{-1}$, dry matter accumulation $plant^{-1}$, no. of pods $plant^{-1}$, pod length (cm), no of grains pod^{-1}, 1000 grain weight, higher nutrient content (%)and uptake (kg ha^{-1}) in grain & stover, grain yield (920.75 kg ha^{-1}), stover yield (1860 kg ha^{-1}), biological yield, and harvest index (33.08%).

Keywords: Intercultural techniques, Agri-horti system, hand weeding, herbicide, harvest index

Introduction
Pulses are the most cost-effective source of high-quality protein for humans. Protein deficiency is a common problem in India, where the majority of people eat a vegetarian diet. Malnutrition is well known to be caused by a lack of protein in the diet. Pulses, on average, have two to three times more protein than cereals or any other group of plants, in addition to providing micronutrients, being low in fat, having a high dietary fibre content and complex carbs. Mung, moong, mungo, golden gram, Chickasaw pea, and Oregon pea are all names for green gram. Green gram is a high-protein, low-carbohydrate food. It contains roughly 25% protein, 1.3 percent fat, 3.5 percent minerals, 4.1 percent fibre, and 56.7 percent carbohydrate, as well as riboflavin and thiamine in significant amounts. Moong is used in a variety of forms in the home, including as whole grains, sprouted form, and dal. These crops are grown in India during three main seasons: *kharif*, *Rabi* and *Zaid*. During the 2015-16 growing season, mungbean covered more than 3.0 million hectares and produced 1.60 million tons. Rajasthan had the greatest area coverage and production (29.68% & 25.51% of the total area and production). Maharashtra came in second in terms of area coverage (12.98%) and third in terms of production (11.92%). Andhra Pradesh came in third in terms of area (8.74%) and second in terms of production (12.43%). The state of Punjab had the highest yield (838 kg ha^{-1}), followed by Jharkhand (680 kg ha^{-1}) and Tamil Nadu (675 kg ha^{-1}). The average national yield was 468 kg ha^{-1}. The state of Karnataka had the lowest yield (247 kg ha^{-1}), followed by CG (269 kg ha^{-1}) and Odisha (337 kg ha^{-1}) (DES, 2015-16). The losses of moongbean yield due to weeds ranges from 65.4% to 79.0% (Dungarwal *et al.* 2003) [8]. Weeds are responsible for 65.4 percent to 79.0 percent of moongbean production losses (Dungarwal *et al*. 2003) [8]. Weeds, in addition to causing crop losses, compete for nutrients, space, and water, reducing crop production and quality, and so lowering the market value of the food, according to Arif *et al*. (2006) [2]. During the early stages of horticultural fruit trees, the Agri-horti system significantly boosts the returns per unit of land. Pulses intercropped with custard apple, guava, bael, subabool, and Karonda among other crops, are better suitable for the Agri-horti system in the Vindhyan region of Uttar Pradesh.

On a big scale, hand and mechanical control methods are used, but the cost is quite expensive, the weather and soil conditions are unfavourable, and labour is not available at the right time. With all of these considerations in mind, the current study, titled "Influence of intercultural techniques on growth and yield of rainfed greengram (*Vigna radiata* L.) under the custard apple (*Annona squamosa* L.) based Agri-hortisystem," was undertaken at the Agricultural Research Farm RGSC, BHU Barkachha, Mirzapur (U.P.).

Material and Methods

During the *kharif* season of 2019, a field experiment on green gram (*Vigna radiata* L.) was done at the Institute of Agricultural Sciences, BHU, Varanasi, Uttar Pradesh. The location of experimental site is at 25^0 $10^{'}$ N latitude and 82^0 $37^{'}$ E longitude and at an altitude of 427 meters above mean sea level. This farm is spread out over more than 1000 hectares where several types of crops are raised. The pH of the experimental soil was 6.48, and it was sandy clay loam. The soil has a low available N of 229.50 kg ha^{-1}, a medium available P of 20.40 kg ha^{-1}, and a low available K of 240.80 kg ha^{-1}. In the 0-15 cm depth, bulk density (1.42 g cm^{-3}) and particle density (2.63 g cm^{-3}) were measured. The study used a Randomized block design with six treatments and was repeated four times. The treatments were *viz.* Control (No Interculture) (T_1), Rice straw mulch (2 tonnes ha^{-1}) (T_2), (T_2 + Pre-mergence herbicide) (Pendimethalin @ 1.0 kg ha^{-1}) (T_3), Hoeing at 15 DAS (T_4), Hoeing at 30 DAS (T_5), Hand weeding @ 20 & 40 DAS (T_6). On 21 July 2019, the green gram variety 'HUM-16' was planted in a fourteen-year-old custard apple (*Annona squamosa* L.) plantation using a manual single row drill at 30 cm row spacing and 15 kg seed ha^{-1} in a 3x3 m^2 net plot size. Custard apple is a delicious and healthy fruit that can be cultivated in locations with as little as 400 mm of rainfall. It most likely arrived in Australia via British Guiana. It stands upright, with a rounded or spreading crown and a trunk that is 10 to 14 inches (25-35 cm) in diameter. The tree's height ranges from 15 to 35 feet (4.5-10 m), with a 5x5 m^2 spacing. Fertilizer was applied 15-40-15-10 NPKS kg ha^{-1} in the form of Di-ammonium phosphate, muriate of potash and gypsum. The application of total quantity of fertilizers was applied as basal 5 cm below seed line at the sowing time. Pre-emergence application of Pendimethalin 30 EC was applied in respective treatment combinations with the help of flat fan nozzle attached to hand sprayer using volume of spray 1 kg ha^{-1} on day after crop sowing. Rice straw mulch was uniformly spread 10 days after sowing to reduce weed competition in respective treatments. For the crop's success, all agronomic and cultural procedures were followed. Data was collected by randomly selecting five representative plants from each net plot and tagging them. These tagged plants were used to collect biometric data at various phases of development. The crop was harvested at 67 DAS (28 September 2019), separately and stacked plot wise for sun drying and subsequent threshing, after being judged mature by ocular observation. As part of the normal method, grain and stover samples were examined for nutritional contraction. The standard statistical method of 'Analysis of Variance' was used to conduct the statistical analysis of the data. The 'F' test was used to determine the significance of the treatment effect (Variance ratio). Critical difference (C. D.) was used to examine the difference between the treatments' means at a 5% probability level. When the variance ratio (F test) was found to be significant at the 5% level, the standard error of mean (SEm+) and critical differences (CD) were calculated to compare two means.

Result and Discussion

A. Growth Attributes

Several intercultural strategies had a significant impact on crop development. The first growth phase, which lasted from sowing to 20 days, revealed that the treatment T3 (Rice straw mulch + Pendimethalin), which improved the soil environment by maintaining a favourable temperature, reducing evaporation, and enhancing microbial activity, significantly increased the different growth parameters of green gram, including plant height, number of leaves $plant^{-1}$, and dry matter accumulation $plant^{-1}$ (Table 1). Verma *et al*. (2017) [23], Kumar *et al*. (1995) [15], Vedi *et al*. (2006) [22], and Bunkar *et al*. (2017) all agree on the results (2013). However, about 40 days until harvest, significant alterations were observed. Two hand weeding at 20 & 40 DAS (T_6) produced significant plant height, no. of branches $plant^{-1}$ and dry matter accumulation $plant^{-1}$ followed by straw mulching + Pendimethalin (T_3)> T_2 (rice straw mulch @ 2 tones ha^{-1}) > T_4 (hoeing at 15 DAS) > T_5 (hoeing at 30 DAS) >control (Table 1). Due to elimination of early crop weed competition, weeds were effectively controlled under (T_6) treatment and hence there was no serve competition by height. Improvement of soil physical properties (soil air, soil pore-space) decreases root competition for nutrient and water so plant height increases resulting inincrease inno. Of branches $plant^{-1}$ and obviously higher dry matter accumulation $plant^{-1}$. Similar results also reported by Ali *et al.* (2013) [1], Chhodavadia *et al.* (2013.) [5], Leva *et al.* (2018) [16] in green gram.

B. Yield Attributes

Statistical examination of the data demonstrated that the various intercultural treatments used in the experiment had a substantial effect on yield attributes (Table 1). Hand weeding at 20 & 40 DAS (T_6) resulted in the highest number of pods $plant^{-1}$ (18.08), Pod length (9.35 cm), number of grains pod^{-1} (11.33), and 1000 grain weight (38.06 g), followed by straw mulching + Pendimethalin (T_3), straw mulch (T_2), hoeing at 15 DAS (T_4), hoeing at 30 DAS (T_5), and control (T_1) treatments. It's possible that this is due to more successful weed control in these treatments, resulting in less weed competition for crop growth. This allows the green gram crop to take advantage of more moisture, nutrients, and sunlight. Under these treatments, increased growth and resource optimization resulted in a bigger number of branches, which resulted in a greater number of pods $plant^{-1}$. In green gram, Leva *et al*. (2018) [16], Ali *et al*. (2013) [1], Chhodavadia *et al*. (2013) [5], and Jadhav (2013) [9] in soybean came to similar conclusions.

Table 1: Influence of different intercultural techniques on growth and yield attributes of green gram

Treatments	Plant height (cm) At			No. of branches plant^{-1}			Dry matter accumulation plant^{-1}			No. of pods plant^{-1}	Pod length (cm)	No. of grains pod^{-1}	1000-grain weight (g)
	20 DAS	40 DAS	Harvest	20 DAS	40 DAS	Harvest	20 DAS	40 DAS	Harvest				
T_1	18.62	34.25	39.75	1.85	2.55	4.01	1.17	3.90	3.45	10.02	6.10	5.45	31.12
T_2	22.50	38.50	44.75	2.30	3.90	5.50	2.28	5.75	5.29	16.09	8.12	9.18	36.11
T_3	24.25	39.50	46.75	2.45	3.95	5.82	2.50	6.00	5.35	17.03	8.48	10.24	37.07
T_4	21.00	37.75	44.52	2.15	3.45	4.95	2.01	5.60	4.50	14.34	7.91	8.34	34.00
T_5	18.90	36.75	43.50	1.90	3.10	4.85	1.32	4.80	4.21	13.40	7.63	7.62	33.69
T_6	19.50	42.00	49.00	1.95	4.05	6.05	1.52	6.20	5.47	18.08	9.35	11.33	38.06
SE±	00.67	00.58	00.54	0.10	0.14	0.22	0.08	0.25	0.07	0.07	0.11	0.10	0.13
CD (P=0.05)	2.01	1.76	1.65	0.31	0.42	0.67	0.23	0.78	0.20	0.95	0.34	0.29	0.40

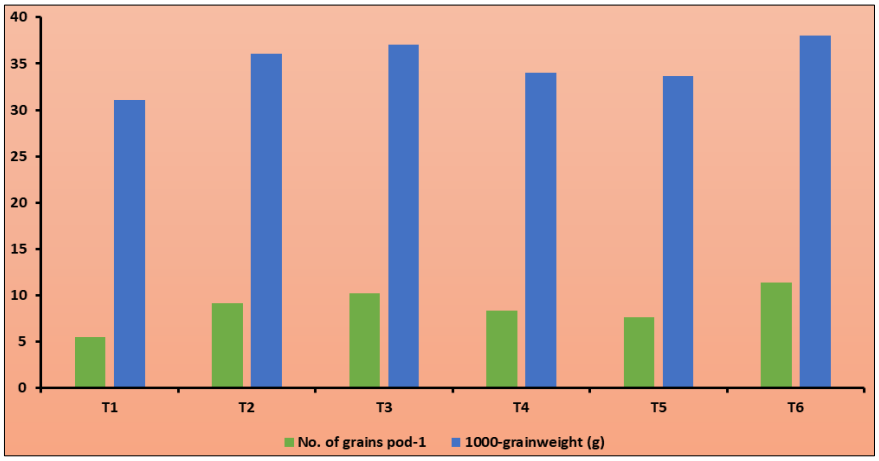

Fig 1: Effect of intercultural techniques on number of grains pod-1 and1000 grain weight of green gram under custard apple based Agri-horti system

C. Yield: Treatment T_6 produced significantly higher grain and stover yields of green gram. The higher grain yield (920.75 kg ha^{-1}), stover yield (1860.00 kg ha^{-1}), biological yield (2780.75 kg ha^{-1}) and harvest index (33.08%) obtained under two hand weeding (20 & 40 DAS) treatments (T_6) are due to the maximum number of pods plant^{-1}, pod length, number of grains pod^{-1}, and 1000-grain weight (Table 2). Closely results were also found in case of Kumar *et al.* (2004) [14], Nandan *et al.* (2011) [17], Kaur *et al.* (2009) [11], Komal *et al.* (2015) [13], Khaliq *et al.* (2002) [12].

Table 2: Influence of different intercultural techniques on yield of green gram

Treatments	Grain yield (kg ha^{-1})	Stover yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index (%)
T_1	452.00	1329.75	1781.75	25.36
T_2	797.50	1728.00	2525.50	31.57
T_3	854.25	1792.75	2675.00	31.93
T_4	763.00	1654.00	2417.00	31.56
T_5	752.00	1620.00	2372.00	31.70
T_6	920.75	1860.00	2780.75	33.08
SE±	4.03	6.20	102.02	0.011
CD (P=0.05)	12.27	18.86	310.32	0.034

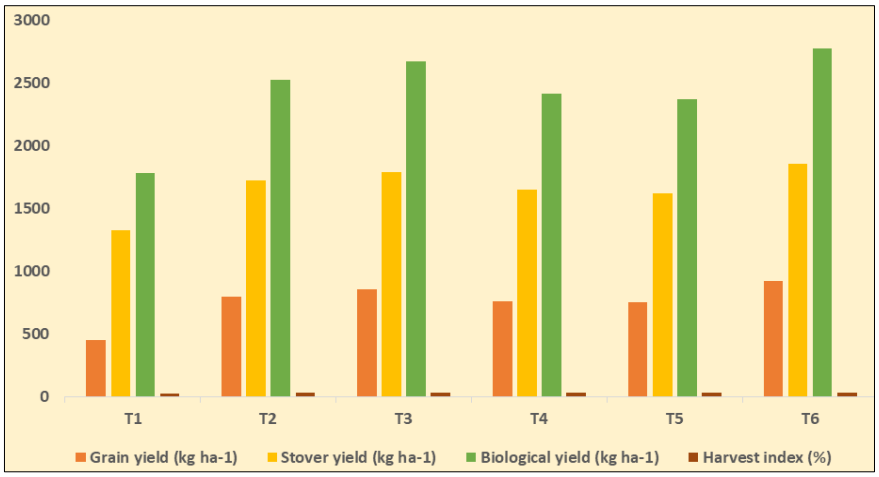

Fig 2: Effect of intercultural techniques on Harvest index (%), Grain, Stover and Biological yield (kg ha-1) of green gram under custard apple based Agri-horti system

Conclusion

It seems logical to conclude that in *kharif* green gram under sandy loam soil of South Campus, BHU, Mirzapur Agro-climatic conditions, potential production, profit, and efficient and economic intercultural techniques can be achieved by using the traditional method of hand weeding and intercultural to keep two hand weeding at 20 and 40 DAS where labour is readily available. Alternatively integrated weed control approach rice straw mulch + Pendimethalin 1 kg ha^{-1} pre-emergence can be employed if agricultural labours are scarce, costly and timely unavailable.

Future Scope

The evidences of positive effect on agricultural and horticultural component under the Agri-horti system further need deep study and it should be encouraged in future as integration of more than one component ultimately enhances income per unit area of farmers and crop diversification also play a major role in minimizing losses due to failure of one crop and reduces the effect of Climate change. Adoption of such system improves the microclimate and soil productivity.

Acknowledgement

Authors are highly indebted and grateful to the Institute of Agricultural Sciences, Banaras Hindu University for sponsoring this research work with great supervision and support during entire course of work. Authors will also be grateful to reviewers of this manuscript. Their Feedbacks and suggestions proved to be highly fruitful in bringing quality to this manuscript.

Conflict of interest: Nil

References

1. Ali S, Patel JC, Desai LJ, Singh J. Weed control in kharif green gram (*Vigna radiate* L. Wilczek), Bioinfolet 2013;10:458-461.
2. Arif M, Khan M, Akbar H, Sajjad, Ali S. Prospects of wheat as a dual purpose crop and its impact on weeds, Pakistan Journal of Weed Science Research 2006;12(2):13-17.
3. Bunkar D, Singh RK, Choudhary HR, Jat AL, Singh K. Effect of row spacing and mulching on growth and productivity of mungbean (*Vigna radiata* L. Wilczek) in guava (*Psidium guajava* L.) based Agri-horti system, Environment & Ecology 2013;31(1):160-163.
4. Chauhan CN. Effect of spacing, weeds and phosphorus management on chickpea (*Cicer arietinum* L.), M.Sc. (Ag.) Thesis, Gujarat Agricultural University, Navsari, Gujarat (India) 2000.
5. Chhodavadia SK, Mathukiya RK, Dobariya VK. Pre- and post-emergence herbicides for integrated weed management in summer green gram, Indian Journal of Weed Science 2013;45(2):137-139.
6. Chhodavadia SK, Sagarka BK, Gohil BS, Dobariya VK. Herbicidal weed control in green gram, Agriculture: Towards a New Paradigm of Sustainability 2011. ISBN, 978-93-83083-64-0.
7. DES Directorate of Economics and Statistics. Department of agriculture and cooperation ministry of agriculture, New Delhi 2015-2016.
8. Dungarwal HS, Chaplot PC, Nad&da BL. Chemical weed control in mung bean (*Vigna radiate* L.), Indian Journal of Weed Science 2003;35:283-84.
9. Jadhav VT. Yield and economics of soybean under integrated weed management practices, Indian Journal of Weed Science 2013;45:39-41.
10. Kaur G, Brar HS, Singh G. Effect of weed management on weeds, nutrient uptake, nodulation, growth and yield of summer mungbean (*Vigna radiate* L.), Indian Journal of Weed Science 2010;42(1&2):114-119.
11. Kaur G, Brar HS, Singh G. Effect of weed management on weeds, growth and yield of summer mungbean (*Vigna radiata* L.), India Journal of Weed Science 2009;41(3&4):228-231.
12. Khaliq A, Slam AZ, Cheema ZA. Efficacy of different weed management strategies in mungbean (*Vigna radiata* L.), International Journal of Agriculture & Biology 2002;04(2):237-239.
13. Komal S, Yadav RS. Effect of weed management on growth, yield and nutrient uptake of green gram, Indian Journal of Weed Science 2015;47(2):206-210.
14. Kumar R, Thakral SK, Kumar S. Response of green gram (*Vigna radiata* L.) to weed control and fertilizer application under different planting system, Indian Journal of Weed Science 2004;36:131-132.
15. Kumar V, Bishnoi OP, Rao VUM, Singh D, Singh S. Biomass production in summer moong under various mulching treatments, Indian Journal of Plant Physiology 1995, 94-96.
16. Leva RL, Vaghasiya HY, Patel RV. Combined effect of herbicides and cultural methods of weed control on growth and yield of summer green gram (*Vigna radiata* L. Wilczek) under south Gujarat condition, International Journal of Chemical Studies 2018;6(4):2348-2352.
17. Nandan B, Kumar A, Sharma BC, Sharma N. Chemical and cultural methods for weed control of green gram under limited moisture conditions of Kandi belt of Jammu, Indian Journal of Weed Science 2011;43:241-242.
18. Patel JP. Integrated weed management in Rabi pigeonpea (*Cajanus cajan* (L.) Millsp.) M.Sc. (Ag) Thesis, Gujarat Agricultural University, Navsari, Gujarat India 2000.
19. Patel RI, Saras PK, Patel CK, Patel NV, Rabari KV. Effect of weed control measures on weed growth and yield of mungbean (*Vigna radiata* L.), International Journal of Agricultural Sciences 2018, 12.
20. Sardana V, Singh S, Sheoran P. Efficacy and economics of weed management practices in black gram (*Vigna mungo* L.) under rainfed conditions, Indian Journal of Weed Science 2006;38:77-80.
21. Tiwari R, Vivek Naresh RK, Tyagi, Shivangi S, Kumar A. Evaluation of effective weed management strategy for enhancing productivity and profitability of chickpea (*Cicer arietinum* L.) under sub-tropical climate of western U.P., International Journal of Chemical Studies 2019;7(5):928-933.
22. Vadi HD, Kachot NA, Polara JV, Sekh MA, Kikani VL. Effect of tillage and mulching on yield and yield-attributing characters of pigeonpea, Advances in Plant Sciences 2006;19(2):497-499.
23. Verma SK, Prasad SK, Singh SB, Singh YB, Singh RP, Bahadur S. Influence of mulching and weed management practices on weeds and nutrient uptake in green gram (*Vigna rediata* L.) under eight-year-old custard apple plantation, International Journal of Bio-resource and Stress Management 2017;8(2):191-195.