



International Journal of Research in Agronomy

E-ISSN: 2618-0618

P-ISSN: 2618-060X

© Agronomy

www.agronomyjournals.com

2025; SP-8(1): 170-172

Received: 17-11-2024

Accepted: 19-12-2024

K Rahul Vishwakarma

Coordinator & Scientist
(Entomology), DAATTC Sangupet,
PJTAU, Hyderabad, Telangana,
India

K Saritha

Scientist (Horticulture), DAATTC
Sangupet, PJTAU, Hyderabad,
Telangana, India

Rekha Manoj

Young Professional, Department of
Soil Science, DAATTC Sangupet,
PJTAU, Hyderabad, Telangana,
India

Jampala Rajashekar

Young Professional, Department of
Entomology, DAATTC Sangupet,
PJTAU, Hyderabad, Telangana,
India

Corresponding Author:

K Rahul Vishwakarma

Coordinator & Scientist
(Entomology), DAATTC Sangupet,
PJTAU, Hyderabad, Telangana,
India

Impact of red gram variety WRGe-97 under Front-line Demonstration (FLD's) of Soyabean + Redgram intercropping under rain-fed situation in Sangareddy district

K Rahul Vishwakarma, K Saritha, Rekha Manoj and Jampala Rajashekar

DOI: <https://doi.org/10.33545/2618060X.2025.v8.i1Sc.2355>

Abstract

This study was conducted under Front Line Demonstrations (FLDs) during 2022-23 and 2023-24 in Sangareddy district to enhance yield, reduce risk, and minimize pest and disease incidence through intercropping systems. The demonstration focused on comparing two varieties of red gram, WRGe-97 and a local variety. WRGe-97 exhibited significantly higher yields, with 8.8 qt/ha in 2022-23 and 9 qt/ha in 2023-24, outperforming the local variety, which recorded 6.5 qt/ha and 6.9 qt/ha, respectively. The average yield increase for WRGe-97 over the local variety was 30%. The plant height for WRGe-97 in the demonstration fields also exceeded the local variety, with average heights of 178.5 cm. The intercropping of WRGe-97 with soybean yielded higher combined returns, with a net income of Rs. 75,802 and Rs. 85,976 per hectare for the years 2022-23 and 2023-24, respectively, compared to Rs. 57,758 and Rs. 71,854 for the local variety. The results confirm the effectiveness of WRGe-97 as a superior intercrop with soybean, supporting the scalability of this system by District Agricultural Advisory and Transfer of Technology Centre, Sangareddy.

Keywords: Red gram variety WRGe-97, Front-line Demonstration (FLD), Soybean + Redgram intercropping

1. Introduction

Soybean (*Glycine max* L.), a vehicle of socio-economic transformation for millions of small and marginal farmers of central India is continued to occupy the premier position in the oilseed scenario of the country since 2006. Soybean contains around 40% protein with all the essential amino acids beside 18-20% oil. According to the first advance estimates 2023-24, Government of India soyabean crop is estimated at 115.28 lakh tonnes as compared to 149.85 lakh tonnes in 2022-23. Among the states, Madhya Pradesh is leading in soyabean production with 45.97 lakh tonnes followed by Maharashtra (45.74 lakh tonnes), Rajasthan (10.69 lakh tonnes), Karnataka (4.73 lakh tonnes) Gujarat (4.23 lakh tonnes) and Telangana (2.90 lakh tonnes) (Source: <https://www.igc.int>). In India, as in 2023 area under soyabean during 2023-24 was 125.61 lakh hectares as against 124.79 lakh hectares during 2022-23. Among the states, Madhya Pradesh stood first with 53.35 lakh ha followed by Maharashtra (50.72 lakh ha), Rajasthan (11.44 lakh ha), Karnataka (4.11 lakh ha), Gujarat (2.66 lakh ha) and Telangana (1.89 lakh ha) (Source: <https://agmarknet.gov.in/>). In Telangana, as in 2023 area under soyabean was 4,67,160 acres as against 4,33,468 acres during 2022-23. Among the districts, Nirmal stood first with 1,23,063 acres followed by Adilabad (1,08,522 acres), Kamareddy (91,927 acres), Sangareddy (78,830 acres) and Nizamabad (51,612 acres) (Source: www.agri.telangana.gov.in).

Soybean is a highly nutritious food with significant importance across various sectors, including milk production, oil processing, livestock feed, industrial applications, and human consumption (Addo and Oguntona, 1993)^[1]. Recognized as an ideal grain for meeting the protein and energy needs of both humans and animals, soybean is likely the world's most valuable crop. It is used as feed by billions of livestock, a source of dietary protein and oil for millions of people, and in the production of countless industrial products. Rich in protein, fat, energy, vitamins, and minerals, soybean is an excellent nutritional resource (Nwokolo, 1996)^[10]. The crop has an

average production cycle of 90-110 days from planting to harvest (Fabiya *et al.*, 2006)^[5].

About 6 million men and 6.3 million women that are living today have a history of coronary heart disease. Soyabean works in the prevention or minimizing the conditions through controlling cholesterol, blood pressure, vascular function and direct effects on the cells of the artery wall (AHA, 2000)^[2]. Soyabean prevents heart attack and stroke through lowering cholesterol. Soyabean is reputed to be able to lower total cholesterol levels by 30% (Desroches *et al.*, 2004)^[4].

Beneficial effects of soyabean on cholesterol concentrations have recently culminated in the U.S. Food and Drugs Administrations (FDA) approving a health claim that 25g of soyabean protein a day as part of diet low in saturated fat and cholesterol, may reduce the risk of heart diseases (Teixeira *et al.*, 2000)^[15]. It is also now known that the very high magnesium content of soyabean can cause expansion of the peripheral blood vessels thereby helping to decrease blood pressure to prevent hypertension (Lijuan *et al.*, 2000)^[9]. Men which were at risk of developing coronary heart disease consuming soyabean in diets have been found to have significant reductions in both diastolic and systolic blood pressure (Sagara *et al.*, 2004)^[12].

Pigeon pea (*Cajanus cajan* L.) is India's second most important grain legume, following chickpea, and accounts for 1.76% of the country's gross cropped area, contributing to 22% of total pulse production. This crop is a rich source of minerals and vitamins (Saxena *et al.*, 2002)^[13] and has a variety of ethnomedicinal uses. Floral decoctions of pigeon pea are traditionally used to treat ailments such as bronchitis, cough and cold, pneumonia, dysentery, and menstrual disorders (Singh & Kaur, 2012)^[14]. The leaves and seeds contain active constituents, including alkaloids, cyanogenic glycosides, flavonoids, saponins, and tannins (Aja *et al.*, 2015)^[3]. Beyond its nutritional and medicinal value, *Cajanus cajan* also plays an important ecological role as a natural barrier to soil erosion and as a biological nitrogen fixer, enhancing soil fertility. Additionally, an infusion of its leaves is used to treat conditions such as anemia, hepatitis, diabetes, urinary infections, yellow fever, and various skin irritations, especially in females.

Area under red gram reported during 2023-24 was 43.87 lakh ha (108.40 lakh acres) as against 46.13 lakh ha (113.99 lakh acres) during the same period in 2022-23. In India, major red gram cultivating states are Karnataka 13.76 lakh ha (34.00 lakh acres), Maharashtra 11.18 lakh ha (27.63 lakh acres), Madhya Pradesh 4.13 lakh ha (10.21 lakh acres), Uttar Pradesh 3.57 lakh ha (8.82 lakh acres), Gujarat 2.12 lakh ha (5.24 lakh acres) and Telangana 1.92 lakh ha (4.74 lakh acres). According to Central Government 1st advance estimates, all India red gram production in 2023-24 is at 3.42 million tonnes. In India, major red gram producing states are Maharashtra (8.76 lakh tonnes), Karnataka (8.77 lakh tonnes), Uttar Pradesh (3.89 lakh tonnes), Madhya Pradesh (3.62 lakh tonnes), Gujarat (2.46 lakh tonnes) and Telangana (1.53 lakh tonnes) (Source: www.agricoop.nic.in).

In Telangana major red gram growing districts are Vikarabad 47645 ha (117734 acres), Sangareddy 32513 ha (80342 acres), Adilabad 26949 ha (66593 acres), Narayanpet 20572 ha (50835 acres), Asifabad 16246 lakh ha (40144 acres), Gadwal 9084 ha (22448 acres) and Kamareddy 8501 ha (21007 acres). According to Telangana State Government 1st advance estimates, red gram production in 2023-24 is at 1.53 lakh tonnes from 1.89 lakh ha

(4.67 lakh acres) with productivity of 810 Kg/ha (328 Kg/acre) (Source: www.agri.telangana.gov.in).

This study was conducted with the following objectives:

1. To evaluate the impact of the red gram variety WRGe-97 on the yield and productivity of Soyabean + Red gram intercropping system under rain-fed conditions in Sangareddy District.
2. To assess the economic benefits and resource utilization efficiency (e.g., water, nutrients) of the Soyabean + Red gram intercropping system, incorporating WRGe-97, under the prevailing rain-fed agricultural conditions of Sangareddy District.

2. Materials and Methods

The present study was carried out by District Agricultural Advisory and Transfer of Technology Centre, PJTAU Sangupet in Sangareddy district based on the FLD's (Front-line Demonstrations) conducted during *kharif* season in the year 2022-23 and 2023-24 in farmer's field at different locations of the Sangareddy district. Total 20 demonstrations (10 in each year) were conducted on red gram variety WRGe-97 (Demo) under FLD's of Soyabean intercropping with red gram which is compared with Red gram local variety which is treated as check for two continuous years. The selection of farmers was done, on basis of survey by DAATTC, Sangareddy and imparted trainings to the selected farmers on agronomic and package of practices in Soyabean intercropping with Redgram. Field days were also conducted in each cluster to show the results of front-line demonstrations to the farmers of the same and neighbouring villages. The yield and economic performance of front-line demonstrations, the output was collected from FLDs as well as local control plots from all selected farmers of Soyabean intercropping with red gram for analysis and interpretation of the data. The data is interpreted and presented in terms of percentage and the qualitative data were converted into quantitative form and expressed in terms of per cent increased yield. Finally, the grain yield, cost of cultivation, net returns with benefit cost ratio was worked out. An average of cost of cultivation, yield and net returns of different farmers was analyzed by the formula. Average = $\frac{F1 + F2 + F3 + \dots + Fn}{N}$; F1 = Farmer; N = No. of Farmers. In the present study, technology index was operationally defined as technical feasibility obtained due to implementation of front-line demonstrations.

3. Results and Discussion

To enhance the yield, to reduce the risk and to minimise the pest and disease incidence these intercropping systems were demonstrated. These demonstrations were conducted under FLD's during the period of 2022-23 and 2023-24 in Sangareddy district. Among the two varieties in red gram, WRGe-97 showed the more yield when compared to local variety. Results were represented in Tab.1. WRGe-97 variety recorded a grain yield of 8.8 qt/ha and 9 qt/ha in 2022-23 and 2023-24 respectively which is more yield than local variety recorded a grain yield of 6.5 qt/ha and 6.9 qt/ha in 2022-23 and 2023-24 respectively. Demo variety showed an average of 30% more yield than check variety.

Table 1: Average plant height, yields of demo and check during 2022-23 and 2023-24

Year	Plant Height (Red gram)		Yield (qt/ ha)		% inc. (yield)
	Check (Local variety)	Demo (WRGe-97)	Check	Demo	
2022-23	176 cm	194 cm	6.5(a)+16.25(c)	8.8(b)+16.25(c)	35.3
2023-24	181 cm	197 cm	6.9(a)+16.9(c)	9(b)+16.9(c)	30.4
Mean	178.5 cm	195.5 cm	6.7+16.57	8.9+16.57	32.85

a= red gram local variety; b= red gram WRGe-97 variety; c= Soyabean crop

Table 2: Average economic indices of demo and check during 2022-23 and 2023-24

Year	Gross Returns (Rs/ha)		Cost of Cultivation (Rs/ha)		Net Returns (Rs/ha)		B:C Ratio	
	Check	Demo	Check	Demo	Check	Demo	Check	Demo
2022-23	112775	127955	55017	52153	57758	75802	2.04	2.45
2023-24	126040	140740	54186	54764	71854	85976	2.32	2.56
Mean	119407.5	134347.5	54601.5	53458.5	64806	80889	2.18	2.50

3.1 Economic indices of demo and check

The results revealed that, the maximum plant height was seen in demo for two years i.e., 176 cm and 181 cm respectively with an average of 178.5 cm. While, higher yield was noticed in demo of WRGe-97 variety for two years that is 8.8 qt/ha and 9 qt/ha respectively with an average mean of 8.9 qt/ha over check and mean increase of yield of demo was 35.3 and 30.4 respectively for two years (Table 1). However, the maximum yield of inter crop for two years (2022-23 and 2023-24) was seen in demo field i.e., 8.8+16.25 qt/ha and 9+16.9 qt/ha over check respectively. Similar results were seen in Praveen *et al.*, (2022) ^[11]. WRGe-97 variety of red gram was found to be most effective intercrop with soyabean than local variety.

Intercropping system of WRGe-97 variety of red gram and Soyabean gave net income of Rs. 75802/- and 85976/- per hectare for the year 2022-23 and 2023-24 and with local variety of red gram and Soyabean gave net income of Rs. 57758/- and 71854/- for the year 2022-23 and 2023-24 respectively (Table. 2) in 10+10 farmer's field. The proven intercropping systems based on the experiences are being scaled up by DAATTC, Sangareddy through front line demonstrations. Similar results were seen in Praveen *et al.*, (2022) ^[11].

4. Conclusion

The farmers harvested good crop yield from intercropping of Soyabean with red gram WRGe-97 variety compared to intercropping of Soyabean with red gram local variety and obtained highest yield and % increase in yield and net returns. While the net returns of Soyabean with red gram WRGe-97 variety are Rs. 75802/- and Rs. 85976/- for two consecutive years with benefit cost ratio of 2.45 and 2.56 respectively. The farmers benefited with Soyabean intercropped with WRGe-97 red gram variety which is considered as best intercrop variety when compared to local variety. DAATTC, Sangareddy conducted field days and showed the results to other farmers in the village.

5. References

- Addo AA, Oguntona CRB. Nutritional value of soyabeans. In: Training workshop of extension workers in soyabean processing and utilization. FMAWA/RD/UNAAB Soyabean popularisation. April 1993.
- American Heart Association (AHA). 2001 Heart and stroke statistical update. Dallas, TX: American Heart Association; 2000.
- Aja PM, Alum EU, Ezeani NN, Nwali BU, Edwin N. Comparative phytochemical composition of *Cajanus cajan* leaf and seed. Int J Microb Res. 2015;6:42-46.
- Desroches S, Mauger JF, Lamarche B, Ausman LM, Lichtenstein AH. Soy protein favorably affects LDL size independently of isoflavones in hypercholesterolemic men and women. J Nutr. 2004;134(3):574-579.
- Fabiya EF. Soyabean processing, utilization and health benefits. Pak J Nutr. 2006;5(5):453-457.
- Hanumantappa Srihari, Sangeeta, Shreevani GN, Hemalatha KJ, Veena T, Umesh Babu BS. Impact of front-line demonstration of Red gram + foxtail millet intercropping under rain-fed situation in Alkold village of Raichur District. Int J Res Agron. 2024;7(3S):367-369.
- [Internet] Agmarknet. Available from: <https://agmarknet.gov.in/>
- [Internet] International Grains Council (IGC). Available from: <https://www.igc.int>
- Lijuan Q, Ruzben C, Jianying S. Evaluation and utilization of nutrient components of Chinese soyabean germplasm. In: The Third International Soyabean Processing and Utilization Conference (ISPUC-III); 2000. p. 15-20.
- Nwokolo E. Soybean (*Glycine max* (L.) Merr.). In: Food and Feed from Legumes and Oilseeds. Boston, MA: Springer US; c1996. p. 90-102.
- Praveen N, *et al.* Impact of front-line demonstration of millets + redgram intercropping under rain-fed situation in Rangareddy district. The Pharma Innovation J. 2022;11(7):4194-4197.
- Sagara M, Kanda T, Njeleker M, Teramoto T, Armitage L, Birt N, *et al.* Effects of dietary intake of soy protein and isoflavones on cardiovascular disease risk factors in high risk, middle-aged men in Scotland. J Am Coll Nutr. 2004;23(1):85-91.
- Saxena KB, Kumar RV, Rao PV. Pigeonpea nutrition and its improvement. In: Quality Improvement in Field Crops. Food Products Press; c2002. p. 227-260.
- Singh B, Kaur S. Review of *Cajanus cajan* as important medicinal plant. Int J Nat Prod Sci. 2012;1:140.
- Teixeira SR, Potter SM, Weigel R, Hannum S, Erdman JW Jr, Hasler CM. Effects of feeding 4 levels of soy protein for 3 and 6 wk on blood lipids and apolipoproteins in moderately hypercholesterolemic men. Am J Clin Nutr. 2000;71(5):1077-1084.
- [Internet] Telangana Agriculture Department. Available from: www.agri.telangana.gov.in
- [Internet] Ministry of Agriculture and Farmers Welfare, India. Available from: www.agricoop.nic.in