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RESEARCH PAPER

Adoption level of farmers about redgram production technologies of UAS, Dharwad

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Abstract : The present study was conducted in Vijayapura and Bagalkot districts of Karnataka state during 2021-22.To study the Adoption level of farmers about redgram production technologies of UAS Dharwad by employing "*Ex-post facto*" research design and by using simple random sampling technique in Vijayapura and Bagalkot districts constituting a total sample size of 160 farmers. It was revealed that, 40.62 per cent of the redgram growers belonged to medium adoption level category, whereas, 36.25 and 23.13 per cent were observed in low- and high-level adoption categories, respectively.Redgram growers adopted recommended time of sowing (91.87 %), seed rate (73.75 %), variety (61.87 %), seed rate for mixed or inter crop (17.50 %), seed treatment with rhizobium (11.25 %), seed treatment with Phosphate Solubilizing Bacteria (6.87 %), spacing (73.75 %), FYM (71.25 %), chemical fertilizer (65.62 %), application of sulphur (15.62 %), application of zinc sulphate (23.13 %), foliar application of 19:19:19 (22.50 %), spraying of (2.0 %) DAP (15.62 %), first hoeing (93.12 %), second hoeing (55.63 %), Inter-cropping (14.37 %), post emergent herbicides (11.87 %), nipping (3.75 %), recommended method of controlling pod borer (81.25 %), control of spotted pod borer (47.50 %), control of pod fly (57.50%), controlling wilt (65.00%), controlling SMD (28.75 %), controlling phytophthora blight (26.25 %), mechanical harvesting (88.75 %) and manual harvesting (11.25 %). There is enough scope to encourage improved redgram production technologies by using mass contact methods and concerned transfer of technology centers. Thus, the efforts should be made to conduct training programmes and demonstrations.So, it is another vital thing that needs to be given priority to adoption of production technology.

Key Words : Adoption, Redgram, Production technology, Nipping, FYM, Micronutrients

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INTRODUCTION

India is the largest producer (25.00% of global production) and consumer (27.00% of world consumption) of pulses in the world, accounting 33.00 per cent of the world area and 22.00 per cent of world production. Pulses in India during 2019-20 were grown in an area of 28.30 m ha with 23.20 m t of production and 800 kg/ha productivity.

Red gram (*Cajanus cajan*) family Fabaceae. It is a well-known pulse crop. It is the second most important pulse crop after bengal gram in India. It is a perennial plant and a short annual crop in India and as a perennial

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in many other countries, where the pods are harvested at regular interval.More than 350 vernacular names of red gram have been recorded however, it is commonly known as Tur. Other names of red gram are Arhar, Tur, No eye pea, Angola pea, Congo bean, Gungo pea etc. Red gram is a native of peninsular India and was grown in this region for 3500 years. Its seeds have become a common food in Asia, Africa and Latin America.

Nutrition composition :

It contains (335 cal) Energy, 22.3 g Protein, 1.7 g Fat, 1.5 g Fibre, 57.6 g Carbohydrates and 3.5 g minerals. Principle proteins of red gram is Cajanin and Con- cajanin. It is also rich in Ca (7.3 mg), Fe (5.8 mg), P, I and amino acids like lysine and arginine. It also contains (0.45 mg) Thiamin, (0.19 mg) Riboflavin, Niacin (2.9 mg) and (132 mcg) Vitamin A value.

Botanical description:

Red gram [*Cajanus cajan* (L.) Millsp.] belongs to family Leguminosae. Plentiful nodules are present on roots, these nodules encompass rhizobium bacteria, which fixes atmospheric nitrogen. The flowers are self-pollinated but cross pollination may happen to some extent. The fruit of red gram is called as Pod. Seeds are round and lens shaped. Numerous species of Cajanus are recognized, differing in height, habit, time of maturity, colour, size and shape of pods and seeds. All these cultivated kinds belonged to these two groups.

The major markets for red gram in Karnataka are Gulbarga, Sedam, Yadgiri, Bidar, Vijayapura, Bellary and Bagalkot.The findings of the study would also help to elicit the adoption level of farmers about production technologies of redgram. Keeping these things in view, the present study was undertaken to know the adopton level of farmers about redgram production technologies in north Karnataka.

MATERIAL AND METHODS

The study was conducted in Vijayapura and Bagalkot districts of Karnataka in the year 2021-22 by using Ex-post facto research design and simple random sampling technique. Considering the major red gram growing areas, two taluksof Vijayapura and Bagalkot districts of North Karnataka were selected *viz.,* Sindagi, Muddebihal, Hunagund and Bagalkot. Further, from each taluk, two villages were randomly selected. Thus, total of 8 villages were selected for the study and 20 redgram growing farmers from each village were randomly selected to constitute a total sample of 160 farmers.To study the adoption level of farmers about redgram production technologies, a structured interview schedule was prepared by reviewing the previous studies and pretested in the non-sample area.Mean andstandard deviation were used for classification of the members into various categories.

The recommended production technologies in red gram cultivation were finalized after discussion with the specialists and referring the package of practices. Accordingly 25 recommended production technologies such as time of sowing, seed rate, spacing, nutrient management etc., were studied under sub heading of adoption of agronomic practices and 8 recommended production technologies such as control of pests and diseases studied under plant protection measures total and 2 recommended production technologies such as manual and mechanical harvesting studied under adoption of harvesting operations to constitute total 35 recommended production technologies of redgram. The adoption of the practices was tabulated by using frequency and percentage. Respondents were asked questions to know whether they have adopted each of recommended production technologies in red gram or not. The answers elicited from the farmers were quantified by giving "1" score to adoption and "0" to non-adoption. The total score was calculated after summing the scores obtained in the recommended practices, thus one could get the maximum of score 35 and minimum score of 0. Based on the total score, the respondents were grouped into three categories namely, 'low', 'medium' and 'high' using mean and standard deviation as a measure of check.

RESULTS AND DISCUSSION

The experimental findings obtained from the present study have been discussed in following heads :

Over all adoption level of redgram growers about production technologies :

It was observed from the Table 1 that, (40.62%) belonged to medium adoption category, whereas, (36.25%) and (23.13%) of the redgram growers belonged to low and high adoption category, respectively.

The probable reason for the above findings could be that, those practices which are easy to adopt and required less skill are adopted by a greater number of

Table 1: Distribution of redgram growers according to overall adoption recommended redgram production technologies (n=160)

Category	Frequency	Percentage
Low (<10.46)	58	36.25
Medium (10.46-12.80)	65	40.62
High (>12.80)	37	23.13
Mean=11.63	SD=2.75	

redgram farmers. While, those practices, which required more knowledge and skills are adopted by a lesser number of redgram growers. The distribution of farmers in different categories of adoption was also witnessed in the studies of Dwivedi *et al*. (2011), Chandawat *et al.* (2012), Choudhary *et al.* (2017) and Chouhan *et al.* (2019).

Adoption of improved redgram production technologies :

Adoption of improved production technologies in redgram drawn under the sub headings namely agronomic practices, plant protection measures and harvesting practices has been deliberated below.

Table 2a: Adoption of agronomic practices by redgram growers (n=160)

Sr. No.	Production technologies	Adoption	
		Frequency	Percentage
1.	Varieties: Recommended varieties TS-3R, GRG-811, BSMR-736	99	61.87
	Other than recommended varieties Gulyal local	61	38.13
2.	Time of sowing: As recommended: June to July	147	91.87
3.	Seed rate: a) Sole crop		
	As recommended: 4-5kg seeds per acre	118	73.75
	More or less than recommended: 6 to 7 kg and 2-3 kg seeds per acre	42	26.25
	Mixed or Inter crop		
	As recommended: 2.4-3.2 kg seeds peracre	28	17.50
4.	Seed treatment		
a.	Seed hardening with2% $CaCl_2$and drying for 7-8 hours to improve drought stress		
	tolerance	0	0.00
b.	Seed treatment with Rhizobium CC- 1		
	As recommended: 200g /acre of seeds (4-5kg seeds)	18	11.25
	Seed treatment withPhosphate Solubilizing Bacteria	11	6.87
c.	(PSB-1) @ 200g per acre of seeds		
d.	PGPR As recommended:200g /acre of seeds	0	0.00
5.	**Spacing:** As recommended: 90 cm X30 cm	118	73.75
	Other than recommended: 120 cm X30 cm	42	26.25
6.	Nutrient management		
a.	Application of FYM		
	As recommended:2.4tonnes per acre	114	71.25
	Other than recommended: 1 to 1.5 tonnes per acre	46	28.75
b.	Application of Chemical fertilizers		
	As recommended:10 :20: 0NPK / acre	105	65.62
	Less than recommended: 16: 12:0 NPK/ acre	55	34.38
c.	Application of Sulphur @ 8 kg/acre	25	15.62
d.	Zinc sulphate application @ 6 kg /acre	37	23.13
e.	Application of Crystallized Boron @ 1 kg /acre	0	0.00

Table 2b: Continued **(n=160)**

Sr. No.	Production technologies	Adoption	
		Frequency	Percentage
7.	Foliar spray of nutrients		
I	Foliar spray of 1.0 % 19:19: 19 at 10 gm/l	36	22.50
Ii	2.0% DAP spray once at pre-flowering and another at 15 days thereafter.	25	15.62
Iii	Foliar spray of Pulse magic @ 2 kg/acre once at flowering and @ 2 kg/acre15 days after flowering.	0	0.00
8.	Inter cultivation:		
a.	First hoeing 25-30 Days After Sowing (DAS).	149	93.12
	ii) Other than recommended: After 20days after sowing.	11	6.88
b.	Second hoeing	89	55.63
	i) As recommended: 45-60 days after sowing.		
	ii) Other than recommended: After 40 days after sowing.	71	44.37
9.	Intercropping		
a.	Pigeonpea+Greengram(1:3)	23	14.37
b.	Pigeon pea+ Foxtail millet (2:1)	0	0.00
10.	Weed control		
a.	i) As recommended: Application of Pendimethalin @ 1.3 liter /Acre (3.3 ml/ 1 liter of water) or 900 ml Alachlor/ acre as pre-emergent herbicide within 24 hours after sowing	0	0.00
b.	i)As recommended: Spraying of Imazethapyr 10 SL @ 400 ml/ Acre as early post emergence application at 3-5 leaf stage of weeds and spraying of paraquat 2.0 ml/ liter on weed leaves, 6 weeks after sowing.	19	11.87
11.	Hand weeding	141	88.13
12.	Nipping		
	Removal of terminal portion of the plant about 5-6 cm at 50 DAS.	6	3.75

Adoption of agronomic practices by redgram growers :

The comprehensive examination on adoption of agronomic practices of redgram as presented in Table 2a and 2b indicated that nearly three fifth (61.87%) of redgram growers adopted recommended variety and 38.13 per cent of them adopted gulyal local variety, unaware about improved varieties and non-availability of seeds at the time of sowing might be the reason for adoption of local variety. Further, majority of redgram growers adopted recommended time of sowing 91.87 per cent, followed by equal per cent of adoption of recommended spacing and seed rate 73.75 per cent, because majority of farmers used seed drill for redgram cultivation. This indicated that redgram growers were aware of the importance of seed, seed rate, time of sowing and spacing. Less extent (17.50%) of them adopted recommended seed rate for mixed/inter crop, red gram is grown as a sole crop in the study area this might be reason for lesser adoption.With respect to adoption of seed treatment practice very less percentage of redgram growers practiced rhizobium CC-1 seed treatment 11.25 per cent, seed treatment with Phosphate Solubilizing Bacteria 6.87 per cent and none of the respondents practiced $CaCl_2$ for seed hardening and seed treatment with Plant Growth Promoting Rhizobacteria. Lack of awareness about seed treatment, timely non-availability of inputs and not realising the importance of the seed treatment were the reasons for this condition.

Whereas, nutrient management, comparatively

Table 3: Adoption of plant protection measures by redgram growers		(n =160)	
Sr. No.	Production technologies	Adoption	
		Frequency	Percentage
13.	**Insect pest management**		
	Pod borer (*Helicoverpaarmigera*)		
	Spraying of Emamectin benzoate 05 SG @ 0.2 gm/ltr or 2 ml Quinalphos 25 EC per liter of water or 0.3 ml Indoxacarb 14.5 SC per liter of water.	130	81.25
	Spotted Pod borer		
	Spraying 2.0 ml of Profenofos 50 EC or 0.5 ml of DDVP 76 EC per liter of water at the at the time of early flowering.	76	47.50
	Pod fly		
	Spray 0.2 ml Imidacloprid 17.8 SL + 10 gm Jaggery per liter of water or Spray 0.6 gm Methomyl 40 SP + 10 gm Jaggery per liter of water at the time of pod formation and after 15 days spray 0.2 gm Thiamethoxam 25 WG + 10 gm Jaggery per liter	92	57.50
14.	**Disease management:**		
	Wilt		
	Seed treatment with 2gm capton 80 WP/ Thiram 75 WP /kg of seeds. or treat with 4gm Trichoderma viride /kg of seeds.	104	65.00
	Sterility mosaic disease		
	Spray 2.5 ml Dicofol (Miticide) 18.5 EC /1.5 mlOxydemetonmethyal 50 EC per liter of water.	46	28.75
	Phytophthora blight		
	Seed treatment with 4 gm Metalaxyl (4 %) + Mancozeb (64 %) 68 WP /kg of seeds and allow the water to drained out in the field	42	26.25
	Leap spot		
	Seed treatment with 2gm capton 80 WP/ Thiram 75 WP /kg of seeds. or Spray 1 gm carbendazim 50 WP/ per liter of water at appearance of disease symptoms and take second spray after 10-15 days.	0	0.00
	Dry root rot		
	Seed coat with 50 gm neem powder /kg of seeds.	0	0.00

Table 4: Adoption of harvesting operations by redgram growers		(n =160)	
Sr. No.	Production technologies	Adoption	
		Frequency	Percentage
15.	**Manual Harvesting**		
	Harvest when 75 per cent of pods turn brown colour.	18	11.25
16.	**Mechanical Harvesting**		
	Using combined harvester and for grain separation PKV machine is used.	142	88.75

higher per cent of redgram growers adopted application of recommended FYM and chemical fertiliser 71.25 and 65.62 per cent, respectively. The purpose of getting higher yield and better returns from redgram crop inspired them in better management of nutrients.Regarding application of zinc sulphate and sulphur was observed to a very less extent among redgram growers 23.13 and 15.62 per cent, respectively and none of them adopted application of crystallized boron, high cost of inputs, lack of knowledge about micronutrient application and non-availability of inputs in time were the reasons for this condition.

With regard to the practice of foliar application of 19:19:19 as recommended (1.0 %) was noticed among half of the redgram growers (22.50 %). Likewise, the practice of spraying (2.0 %) DAP Spray at pre-flowering and flowering stage also observed very less among redgramgrowers (15.62 %). Lack of knowledge about the importance of foliar application and its use found to be the reasons for less adoption. Further, the practice of inter cultivation, majority 93.12 per cent of redgram growers adopted first hoeing as recommended, while, recommended time of second hoeing was practiced by 55.63 per cent of the redgram growers due to unsupportable field conditions and also non-availability of bullocks at the time of intercultivation. Regarding, inter-cropping pigeonpea with greengram in 1:3 row proportion

was found to be adopted by very less 14.37 per cent of the redgram growers.The difficulty in management of two or more crops and also harvesting of the crops articulated as a reason for less adoption.

With respect to weed control none of redgram growers adopted application of pre-emergent herbicides and 88.13 per cent of the respondents adopted the method of hand weeding instead of application of post emergent herbicides. Application of post emergent herbicide practiced was adopted by only 11.87 per cent of the redgram growers. The fact that application of weedicides reduces the fertility of soil and also harmful to crop andsoil, were the reasons for less adoption. Further, the practice of nipping was adopted by only 3.75 per cent of the respondents. Lack of importance, unavailability of nipping instrument and high labour wages were the reason for less adoption.

Similarly, the past research studies conducted by Dwivedi *et al*. (2011), Chandawat *et al.* (2012) and Choudhary *et al.* (2017) found to support the present findings.

Adoption of plant protection measures by redgram growers :

The results on adoption of plant protection measures as indicated in Table 3 indicated that recommended method of controlling pod borer was seen in 81.25 per cent of the redgram growers. In case of Spotted pod borer control, practice of spraying recommended pesticide was noticed in 47.50 per cent of redgram growers. Aimed at the control of pod fly, practice of spraying recommended pesticide was noticed with 57.50 per cent of redgram growers, high cost of recommended pesticides might be the reason for moderate adoption.With respect to diseases control, recommended method of controlling wilt disease was noticed in 65.00 per cent of the redgram growers. The capton treated seeds were given by RSK was the reason for the situation.Likewise, Sterility Mosaic Disease control as recommended was noticed in 28.75 per cent of redgram growers and control of phytophthora blight as recommended was noticed in 26.25 per cent of the redgram growers. Lack of knowledge about disease management practices, some of the farmers perceived that diseases are not controllable and part of them spray pesticides to control diseases, were the reasons for less adoption of recommended control measures.

The research studies conducted by Melkeriand Mazhar (2018), Pavan Kumar (2019) and Yadav *et al.* (2020) also reported the similar distribution in the adoption of plant protection measures.

Adoption of harvesting operations by redgram growers :

The information on adoption of harvesting operations as depicted in Table 4 concluded that majority of redgram growers (88.75%) adopted mechanical harvesting, shortage of labour and high labour wages was the reason for above findings.Whereas, (11.25%) of the redgram growers adopted manual harvesting. The problem of splitting of grains from the mechanical harvesters and small and semi medium size of land holding were the reasons for adoption of manual harvesting.

The findings of past research studies conducted by Chandawat *et al.* (2012) and Pavan Kumar (2019) observed similar trend in harvesting.

Conclusion:

It can be concluded from the above findings that 40.62 per cent of the redgram growers belonged to medium adoption level category. With respect to adoption of recommended production technology, majority of the respondents are adopted time of sowing, inter cultivations, hand weeding, controlling of pod borer and mechanical harvesting.Comparatively low proportion of the growers adopted seed treatment with PSB, application of post emergent herbicides, nipping, inter cropping and manual harvesting.there is enough scope to promote improved redgram production technologies by using mass contact methods and concerned transfer of technology centres. Thus, the efforts should be made to deliver the required knowledge and skills through training programmes and demonstrations and conduct study tours to observe the profitable cultivation of redgram in other states and districts.

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