Adoption Of Greengram Production Technologies By Farmers Of Northern Transition Zone Of Karnataka

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Abstract: The present study on adoption of improved production technologies in greengram among farmers of northern transition zone of Karnataka was undertaken during 2022-23. The ex-post facto research design was employed to collect data from 80 farmers growing improved varieties (DGGV-2 and DGG-1) and 40 farmers growing other varieties of greengram. The results on overall adoption of recommended production technologies highlighted that 21.25 per cent of improved variety growers and 17.50 per cent of other variety growers were observed in high adoption category. Whereas in medium adoption category 50.00 per cent of improved variety growers and 35.00 per cent of other variety growers were noticed. But in low adoption large per cent of other variety growers (47.50 %) were observed as compared to 28.75 per cent of improved variety growers

Key words: Adoption, agronomic practices, DGGV-2 and DGG-1 varieties, plant protection measures, harvesting operations

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1. Introduction

Green gram (*Vigna radiate* L.) commonly known as "mung" or "mung bean" is a native of India and central Asia and it was grown in these regions since prehistoric times.It is broadly cultivated throughout the Asia, including India, Pakistan, Bangladesh, Sri Lanka and South China. India contributes 33.00 per cent of global area with 22.00 per cent of global production of green gram. Among pulse crops, greengram is the third important crop grown in nearly 16.00 per cent of the total pulse area of the country (45.17 lakh hectares) produces 25.32 lakh tonnes with the productivity of 548 kg/ha (Anon., 2021).

In India, major green gram growing states are Maharashtra (23.05%), Andhra Pradesh (17.39%), Karnataka (17.46%), Bihar (14.69%) and Tamil Nadu (7.25%) (Anon., 2021). And in Karnataka, green gram is the major *kharif* season pulse crop in the rainfed ecosystem. The most popular earliest cultivars cultivated by the farmers were Pusa Baisakhi and Chinamung. These cultivars were spread on a large area across districts of Dharwad, Gadag and Belagavi in the state for long years. Farmers were cultivating these cultivars in the absence of alternative improved cultivars. University of Agricultural Sciences, Dharwad has notified seed production of green gram varieties TAP-7 (KGM 1), China mung, Selection-4 and IPM 2-14 and recently DGGV-2 in the year 2012, and DGG-1 in 2016-17. The recommended crop production and crop protection technologies such as time of sowing, seed treatment, intercultivation, intercropping, weed management, nutrient

management, plant protection, time of harvesting and method of harvesting for increasing the crop productivity also released for improving the productivity in greengram.

2. Methodology

The "*ex-post-facto*" research design was employed to conduct study in Northern Transition Zone of Karnataka during 2022-2023. Considering the major greengram growing area and also adoption of improved varieties DGGV-2 or DGG-1 varieties, two talukas from each districts *viz.,* Dharwad (13,045.00 ha), and Kundgol (9,800.00 ha) from Dharwad district and Belagavi (10,246.00 ha) and Bailhongal (3,900.80 ha) taluks from Belgavi district were selected. Further, from each selected taluka, two hoblis were selected. Finally, eight hoblis were selected for the study. By employing simple random sampling technique, 10 farmers growing improved greengram variety growers (DGGV-2 variety growers five farmers and DGG-1 variety growers five farmers) and 5 farmers growing other greengram variety from each hobli was randomly selected to constitute a total sample of 120 farmers. The recommended production technologies in greengram cultivation was finalized after discussion with the specialists and referring the package of practices. Accordingly under adoption of agronomic practices 18 recommended production technologies covering the aspects of time of sowing (1) seed rate (1), seed treatment (3), spacing (1), nutrient management (7), intercultivation (2), intercropping (1),and weed control (2) were finalised. Similarly, under plant protection measures seven recommended technologies for control of pests and three practices for control of diseases were finalised. Finally, under harvesting manual and mechanical harvesting practices were finalised to arrive at 32 recommended production technologies of greengram. The adoption of the practices by DGGV-2 and DGG-1 variety growers and other variety growers was tabulated by using frequency and percentage. The adoption of each of recommended production technologies in green gram was 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 32 and minimum score of zero. Based on the total score, the respondents were grouped into three categories namely, 'low', 'medium' and 'high' adoption using mean and standard deviation as a measure of check.

3. Results And Discussion

The results on adoption of improved production technologies in greengram among the farmers as delineated under agronomic practices, plant protection measures and harvesting practices has been discussed below.

3. 1. Adoption of agronomic practices

The detailed analysis on adoption of agronomic practices of greengram as presented in Table 1 revealed that majority of improved variety growers and other variety growers adopted recommended time of sowing (95.00% and 97.50 % respectively) and seed rate (100.00% and 85.00 % respectively), followed by adoption of recommended spacing (60.00 and 45.00 % respectively). This revealed that farmers were aware of the importance of seed, time of sowing and spacing.

In adoption of seed treatment practice very less percentage of improved variety growers and also other variety

growers found to practiced rhizobium seed treatment (21.95% and 27.50 % respectively), $Cacl_2$seed hardening (11.25 and 10.00 % respectively), and inoculating the Phosphorus Solubilizing Bacteria (6.25 and 5.00 % respectively).Lack of knowledge and not realising the importance of the practice were the reasons for the situation.

Regarding nutrient management comparatively high per cent of improved variety growers adopted recommended FYM and chemical fertiliser (67.50 and 55.00 % respectively), as compared to 45.00 per cent of other variety growers. The intention of getting high yield from new varieties inspired the improved variety growers in better management of nutrients.

Whereas application of rock phosphate and gypsum was observed to a very less extent among improved variety growers (8.75 and 5.00 % respectively) and other variety growers (10 and 7.50 % respectively). Non- availability of the inputs locally was the reason for the situation.

Further, the practice of foliar application of 19:19:19 as recommended (1.0 %) was noticed among one-third of both improved variety growers (31.25%) and other variety growers (30.00 %). Similarly, the practice of spraying pulse magic at flowering stage also witnessed very less adoption among improved variety growers (21.25 %) and other variety growers (25.00 %). Lack of knowledge about the benefits of micronutrients and its application found to be the reasons for less adoption.

With regard to practicing inter cultivation, cent percent of other variety growers and 99.16 per cent of improved variety growers adopted first hoeing as recommended, whereas recommended time of second hoeing was practiced by 60.00 per cent of improved variety growers and 65.00 per cent of other variety growers due to unfavourable field situation and also non-availability of bullocks for inter-cultivation.

Practice of inter-cropping pigeon pea with greengram in 1:3 row proportion was found to be adopted by only 10.00 per cent of the farmers. The difficulty in management of crops and also harvesting expressed for less adoption.

In case of weed control majority of greengram farmers adopted recommended method of manual weeding. Chemical weed control as recommended was practiced by only 12.50 per cent by improved variety growers and 15.00 per cent by other variety growers, but, high per cent of improved variety growers (43.75 %) and 32.50 per cent of other variety growers found to applied weedicide more than recommended dosage. The belief that high dosage of weedicide control weeds effectively and also not aware of the recommendation were the reasons for the deviation.

Similarly, the past research studies conducted by Dwivedi *et al*. (2011), Chandawat *et al.* (2014), Singh and Waris (2014), Babubhai (2018), Reddy *et al.* (2018) and Gopal (2019) found to support the present findings.

3. 2. Adoption of plant protection measures

The results on adoption of plant protection measures as shown in Table 2 revealed that recommended method of controlling sucking pests, agromygid fly and pod borer control was adopted by moderate per cent of improved variety growers (31.25, 43.75 and 38.75 per cent respectively) and also other variety growers (37.50, 57.50 and 42.50 per cent respectively).

For the control of Spingid moth, practice of summer ploughing was noticed with all the farmers but recommended method of pesticide use was noticed with

42.50 per cent improved variety growers and 50.00 per cent of other variety growers.

In case of Black weevil control, 10.00 per cent of improved variety growers and negligible per cent of other variety growers (2.50%) followed recommended chemical dosage since the pest was a minor one and also not causing major damage to yield.

With regard to diseases control, recommended method of powdery mildew disease was noticed with 70.00 per cent of the other variety growers as compared to 42.50 per cent of improved variety growers. The resistance of DGGV-2 variety to powdery mildew was the reason for the situation.

Similarly, Cercospora leaf spot control as recommended was observed with 50.00 per cent of other variety growers as compared to 10.00 per cent of improved variety growers. The less severity of the disease was expressed for less adoption of recommended measure.

The research studies conducted by Ashok kumar *et al.* (2018) and Balaji and Varaprasada (2018) also reported the similar distribution in the adoption of plant protection measures.

3. 3. Adoption of harvesting operations

The data on adoption of harvesting operations as shown in Table 3 depicted that majority of improved variety growers (68.75%) adopted mechanical harvesting whereas manual harvesting was the major harvesting method among other variety growers (72.50%).

Non suitability of varieties like Nirmala and China mung for mechanical harvesting, whereas DGGV-2 and DGG-1 varieties were specifically developed for mechanical harvesting with the suitable height of the crop, hence the high adoption of mechanical harvesting in improved varieties.

Further, the practice of defoliation in green gram by spraying Paraquat @ 5.0 ml/lit to facilitate easy pod harvesting in manual method was practiced by majority of improved variety growers (60.00%) and one-fourth of other variety growers (24.13%). But in case of mechanical harvesting only 20.00 per cent of improved variety growers found to adopt as compared to other variety growers (36.36%).

The problem of blowing out seeds from the exhaust in performing mechanical harvesting which resulted in 10.00 per cent yield loss was the reason for less adoption of defoliation in carrying out mechanical harvesting.

The findings of past research studies conducted by Patel *et al.* (2016) and Reddy *et al.* (2018) observed similar trend in harvesting.

3. 4. Overall adoption of improved production technologies in greengram

The distribution of greengram growers in the overall adoption of recommended production technologies as shown in Table 4 and Fig.1, highlighted that in high adoption category 21.25 per cent of improved variety growers and 17.50 per cent of other variety growers were observed. Similarly, in medium adoption category high per cent of farmers (50.00%) growing DGGV-2 and DGG-1 varieties was noticed as compared to other variety growers (47.50%). But, in low adoption large per cent of other variety growers (47.50 %) were observed as compared to 28.75 per cent of improved variety growers.

The existence of significant F value also indicates that the greengram growers differed with respect to adoption of recommended cultivation practices.

The incidence of more education level and high extension contact among farmers cultivating DGGV-2 and DGG-1 variety which resulted in acquiring better knowledge of cultivation practices, and also possession of more farm resource availability among improved variety growers found support the incidence of high adoption among DGGV-2 & DGG-1 variety growers.

The differential adoption of recommended production technologies among pulse crops growing farmers was also witnessed in the research studies conducted by Choudhary *et al.* (2017), Ashok kumar *et al.* (2018), Babubhai (2018), Brunda (2018), Reddy *et al*. (2018), Gopal (2019) and Singh *et al.* (2019).

4. Conclusion

The results of the study revealed that very less percent of farmers were noticed in the category of high adoption of recommended cultivation practices. Hence, technologies suitable for overcoming major constraints in adoption of improved greengram production technologies with a focus on evolving suitable varieties for mechanised harvesting and designing small machineries for small scale cultivators needs greater attention for strengthening confidence among farmers in reaping higher economic benefits.

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Table 1. Adoption of agronomic practices in greengram cultivation among farmers of northern transition zone of Karnataka

(n=120)

Sl. No.	Particulars of production technologies	Adoption of practices					
		DGGV-2 & DGG-1 growers (n_1=80)		Other variety growers (n_2 =40)		Total (n=120)	
		f	%	f	%	f	%
1	**Time of sowing:** i) As recommended: June first week to July first week	76	95.00	40	100.00	116	96.67
	ii) Other than recommended: July 2nd week to last week of July	04	05.00	00	00.00	04	03.33
2	**Seed rate:** i) As recommended: 5kg seeds per acre	78	97.50	34	85.00	112	93.33
	ii) More than recommended: 6 to 7 kg seeds per acre	02	2.50	06	15.00	08	06.67
3	**Seed treatment**						
a.	Seed hardening with2% $Cacl_2$and drying for 7-8 hours to impart drought hardiness	09	11.25	04	10.00	13	10.83
b.	Seed treatment with Rhizobium i) As recommended: 200g /acre of seeds(5kg seeds)	18	21.95	11	27.50	29	24.16
	ii) Other than recommended: 250- 500 g/ acre of seeds (5kg seeds)	13	17.50	04	10.00	17	14.17
c.	Inoculating the Phosphor as Solubilizing Bacteria (PSB) @ 500 g per acre of seeds	05	6.25	02	5.00	07	5.83
4	**Spacing:** i) As recommended: (Row to row 30 cmto 37.5 cmand seed to seed 7.5- 10 cm) (12 inches X 4 inches)	48	60.00	18	45.00	66	65.00
	ii) Other than recommended: (18X4inches)	32	40.00	22	55.00	54	45.00
5	**Nutrient management**						
a.	Application of FYM i) As recommended:2 tonnes per acre once in three years	54	67.50	18	45.00	72	60.00
	ii) Other than recommended: 1 to 1.5 tonnes/once in three years	07	8.75	06	15.00	13	10.83
b.	Application of Chemical fertilizers i) As recommended:10 :20: 0NPK / acre	44	55.00	18	45.00	62	51.66
	ii) More than recommended: 20: 30:0 NPK/ acre	36	45.00	22	55.00	58	48.34
c	Application of P in the form of Rock Phosphate	07	8.75	4	10.00	11	9.16

d	Gypsum application :40 kg /acre or Sulphur @ 8 kg acre.	04	5.00	03	7.50	07	5.83
Sl. No.	**Particulars of production technologies**	**Adoption of practices**					
		DGGV-2 & DGG-1 growers (n_1=80)		**DGGV-2 & DGG-1 growers (n_1=80)**		**DGGV-2 & DGG-1 growers (n_1=80)**	
		f	**%**	**f**	**%**	**f**	**%**
e	**Foliar spray of nutrients**						
i	Foliar spray of 1.0 % 19:19: 19	25	31.25	12	30.00	37	30.83
Ii	2.0% DAP sparyonce at pre-flowering and another at 15 days thereafter.	0	00.00	0	00.00	0	00.00
iii	Foliar spray of Pulse magic @ 2 kg/acre once at flowering	17	21.25	10	25.00	27	22.50
6	**Inter cultivation:**						
a.	First hoeing 20-25 Days After Sowing (DAS).	80	100.00	39	97.50	119	99.16
b.	Second hoeing i) As recommended:30-35 days after sowing.	48	60.00	26	65.00	74	61.66
	ii) Other than recommended: After 40 days after sowing.	32	40.00	14	35.00	46	38.33
7	**Intercropping**						
	Pigeonpea+Greengram (1:3)	8	10.00	4	10.00	12	10.00
8	**Weed control**						
a.	**Hand weeding:**						
	i) As recommended:One hand weeding before 30 DAS.	72	90.00	35	87.50	107	89.16
	ii) Other than recommended: 2 hand weedings(1st weeding before 20-25 DAS and 2nd is after 35- 40 DAS)	08	10.00	05	12.50	13	10.84
b.	**Chemical method of weed control**						
	i)As recommended: Application of Pendimethalin @ 1.3 litre /acre (3.3 ml/ 1 litre of water) as pre-emergent herbicide within 24 hours after sowing	10	12.50	16	15.00	28	23.33
	ii) Other than recommended: Application of Pendimethalin @ 1.5 litre/acre (5ml/ 1 litre of water) as pre-emergent herbicide within 24-48 hours after sowing	35	43.75	13	32.50	48	40.00

Table 2. Adoption of plant protection measures

(n =120)

Sl. No.	Particulars of production tehnologies	Adoption of production technologies					
		DGGV-2 & DGG-1 growers (n_1=80)		Other variety growers (n_2 =40)		Total (n=120)	
		f	%	f	%	f	%
I	**Insect pest management**						
1.	**Sucking pests control**						
a.	Spraying of neem oil 2% or 1.7 ml Dimethoate 30 EC per litre of water.	25	31.25	15	37.50	40	33.33
b.	Installation of yellow and blue sticky traps @ 12-15/ ha.	00	00.00	0	00.00	00	0.00
2.	**Agromygid fly control**						
	Spray 0.2 ml of Imidachlopid or 0.3 ml of Thiamethoxam, or 1.0 ml of Monocrotophosperlitre of water	35	43.75	23	57.50	58	48.33
3.	**Pod borer control**						
	Spray 0.075 ml of Flubendiamide 39.35 SC or 0.15 ml of Chlorantraniliprole 18.5% W/W SCor 0.2 gm of Emamectin benzoate 5% SG or 0.1 ml of Spinosad 45 SC or 0.3 ml of Indoxacarb 14.5 SC or 4 gm of Carboryl 50 DWP per litre of water.	31	38.75	17	42.50	52	43.33
4.	**Spingid moth control**						
a.	Summer ploughing	80	100.00	40	100.00	120	100.00
b.	Spray 4.0 ml carbaryl per litre of water or 2.0 ml chloropyriphos in one litre of water	34	42.50	20	50.00	54	45.00
c.	Other than recommended: Manualy collecting the larger insects and destroying them	12	15.00	7	17.50	19	15.83
5.	**Black weevil control**						
	Spraying with Chlorpyriphos 20 EC @ 2 ml/l of water or dusting of Quinolphos21.25 kg / ha	8	10.00	1	2.50	9	7.50
11.	**Disease management:**						
1.	**Powdery Mildew control**						
	Spray Propiconazole 25 EC1ml or 1 ml Hexaconazole 5 EC or 3.0 g water soluble Sulphur or 1.0 gCarbendazimin one litre of water.	34	42.50	28	70.00	62	51.67
2.	**Cercospora leaf spot control**						
	Spray ml/ltHexaconazole 5 EC or @ 3 g/lt COC 50 WP or 2.0 gMancozeb at the time of flowering stage	8	10.00	20	50.00	28	23.33
3.	**Yellow mosaic virus disease control**						
	Uproot and burning of infected plants or buried in the soil	12	15.00	2	5.00	14	11.66

Table 3. Adoption of harvesting operations

(n =120)

Sl. No.	Particulars of production technologies	Adoption of production technologies					
		DGGV-2 & DGG-1 growers (n_1=80)		Other variety growers (n_2 =40)		Total (n=120)	
		f	%	f	%	f	%
1.	**Manual harvesting**	25	31.25	29	72.50	54	45.00
	a) Time of harvesting i)As recommended: First picking at the time of 75 per cent pods become dry and after 8-10 days remaining pod will be picked	18	72.00	22	75.86	40	74.07
	ii) Other than recommended:First picking at the time of 90 per cent pods become dry	07	28.00	07	24.13	14	25.93
	b) Defoliation of green gram by spraying Paraquat @ 5.0 ml/lit to facilitate easy pod harvesting	15	60.00	07	24.13	22	40.74
2.	**Mechanical harvesting**	55	68.75	11	27.50	66	55.00
	Defoliation of green gram through Paraquat @4.0 ml/lit to facilitate Mechanical harvesting	11	20.00	4	36.36	15	22.73

Table 4. Distribution of greengram farmers in the overall adoption of recommended production technologies

Sl. No.	Category	DGGV-2 &DGG-1 growers (n_1=80)		Other variety growers (n_2 =40)		Total (n=120)		F Value
		f	%	f	%	f	%	
1	Low	23	28.75	20	47.50	43	35.83	0.643*
2	Medium	40	50.00	13	35.00	53	44.17	
3	High	17	21.25	07	17.50	24	20.00	
Mean SD Low High		11.32 1.79 10.55 12.08		11.12 1.70 10.39 11.84		11.51 1.81 10.74 12.28		

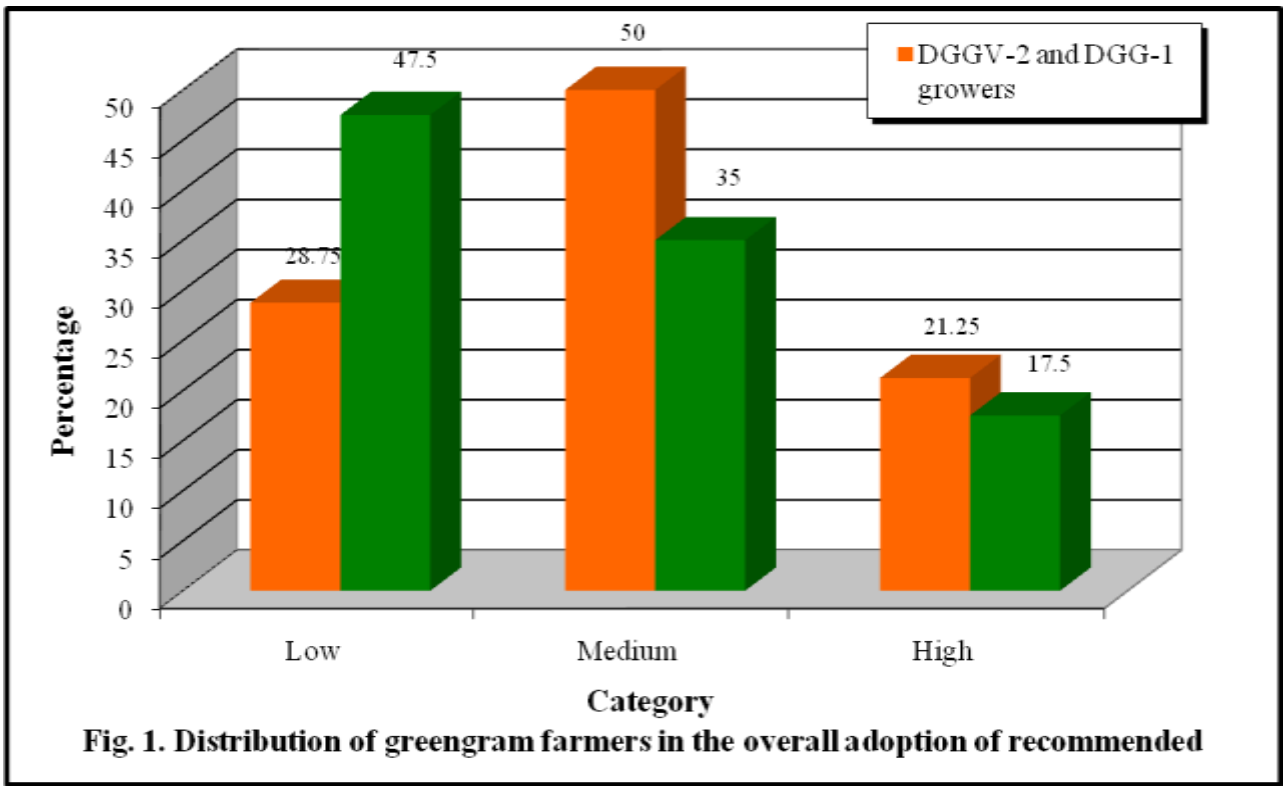

Fig. 1. Distribution of greengram farmers in the overall adoption of recommended