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Knowledge and adoption patterns of improved green gram varieties among farmers: Insights from KVK's CFLDs

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Abstract

Introduction: In Indian agriculture, the green revolution of the 1960s is pivotal and would not have occurred without the utilization of high yielding wheat and paddy varieties; therefore, variety plays an important role in replicating such a revolution in any other crop today. All other factors, such as increased crop output, reduced water consumption, fertilizer and pesticide use and reduced environmental effect, are dependent on variety. Realizing the importance of improved varieties in boosting up the Indian agriculture and enhancing the farmer's income, the KVK- Dharwad has been promoting several varietal interventions under CFLDs since 2018-19.

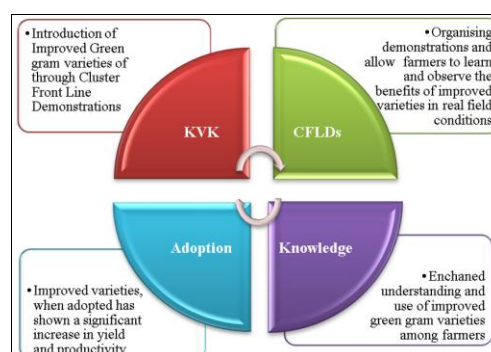
Context: Green gram is a significant pulse crop due to its high nutritional value and ability to improve soil fertility through nitrogen fixation. However, traditional farming methods and outdated seed varieties often limit productivity and profitability for smallholder farmers. To address these challenges, KVKs have been at the forefront of promoting agricultural innovation through interventions like CFLDs. The success of these initiatives depends heavily on farmers' knowledge of improved varieties, their willingness to adopt new technologies and the effectiveness of the CFLD approach.

Objective: The study was conducted to find out the level of knowledge and adoption of improved green gram production technologies and also to assess the impact of the improved varieties promoted by the KVK through CFLDs on socio- economic conditions of the farmers.

Methods: A sample of 120 farmers from the beneficiary list of KVK- Dharwad was drawn by following a simple random sampling technique from Dharwad district of Karnataka. The collected data was analyzed to find the level of knowledge and adoption of green gram production technologies and assess the impact on yield and income of the farmers.

Results & Discussion: Nearly half (44.17%) of the green gram farmers had medium knowledge whereas 34.16 percent and 21.67 percent of the farmers had high and low knowledge levels, respectively. half of the farmers (50.00%) belonged to medium adoption level category whereas 26.67 percent and 23.33 percent of the farmers had high and low adoption levels of recommended cultivation practices of green gram. The results indicated the positive effect of new improved varieties of green gram (DGGV-2) over the existing practices with an increased net returns of Rs.57885/ha when compared to local variety Rs.44735/ ha with B: C ratio 2.13.

Graphical Abstract



Keywords: Improved green gram varieties, cluster frontline demonstrations, Krishi Vigyan Kendra, farmer adoption, knowledge level, impact, assessment

Introduction

Green gram (*Vigna radiata*), commonly known as mung

bean, plays a vital role in Indian agriculture due to its adaptability to diverse agro-climatic conditions, short

duration and high nutritional value. It is the third important pulse crop of India after chickpea and pigeonpea. As a legume, it is also crucial for soil health, enhancing nitrogen fixation and sustainability in cropping systems. In Karnataka, Green gram has seen a remarkable surge in cultivation in its traditional belt in the Gadag and Dharwad districts, and its sowing area across the state has remained almost stable. The agriculture department has a target of cultivating green gram on 3.99 lakh hectares of land in the state. It expects 1.49 lakh tonnes of production, with an average yield of 380 to 400 kg per hectare. Interestingly, the average yield in the state is highest in the Dharwad district, with an average of 544 kg per hectare (Deccanherald, 2024) [4]. The Green gram variety DGGV-2 is high yielding (12-14 t/ha) variety, early maturity (70-75 days), tall with long pods and bold seeds and well suitable for mechanical harvesting and resistant to moong bean YMV, leaf crinkling and powdery mildew diseases. Hence by considering the above variety as a boon to many Green gram farmers, KVK-Dharwad has been playing a diligent role in promoting this variety to Green gram farmers through CFLDs in Dharwad district.

Despite its significance, the productivity of green gram remains suboptimal due to various constraints, including lack of access to quality seeds, substandard agronomic practices and limited awareness among farmers about improved varieties. To address these barriers, Krishi Vigyan Kendras (KVKs) have played a pivotal role in promoting agricultural innovations through Cluster Frontline Demonstrations (CFLDs). These demonstrations have been instrumental in introducing improved varieties of green gram, along with associated best practices, to farmers. CFLDs serve as a platform for the evaluation and dissemination of advanced agricultural technologies, aiming to bridge the gap between research outcomes and field-level

adoption (Kumar *et al.*, 2019) [5]. Through CFLDs, KVKs aim to improve farmers' knowledge and practices by showcasing the benefits of high-yielding, pest-resistant varieties and improved agronomic techniques.

However, the adoption of improved green gram varieties is influenced by several factors, including socio-economic characteristics, access to extension services, and farmers' awareness and perceptions of the technology. This study seeks to assess the knowledge and adoption patterns of improved green gram varieties among farmers who participated in KVK's CFLDs. Understanding these adoption patterns can provide insights for refining extension strategies and enhancing the impact of agricultural interventions (Singh & Meena, 2020) [10].

Methodology

The study was conducted during the year 2021 in Dharwad district which is situated in Northern part of Karnataka state at 74° 28' North latitude and 14° 31' East longitude, its altitude ranges between 365 to 730m. The district falls in the Northern Transitional Zone (Zone 8) and surrounded by Belgaum in North, Haveri in South, Uttara Kannada in west and Gadag in East. "Ex post-facto" research design has been adopted for the study. Dharwad and Navalgund taluks of Dharwad district were purposively selected based on the availability of highest numbers of farmers who have adopted the technologies promoted by the KVK. A sample of 120 farmers from the beneficiary list of KVK- Dharwad was drawn by following a simple random sampling technique from the selected taluks. A structured interview schedule was developed in line with the objective of the study and data was collected using personal interview technique. The collected data has been analyzed with the help of the SPSS.

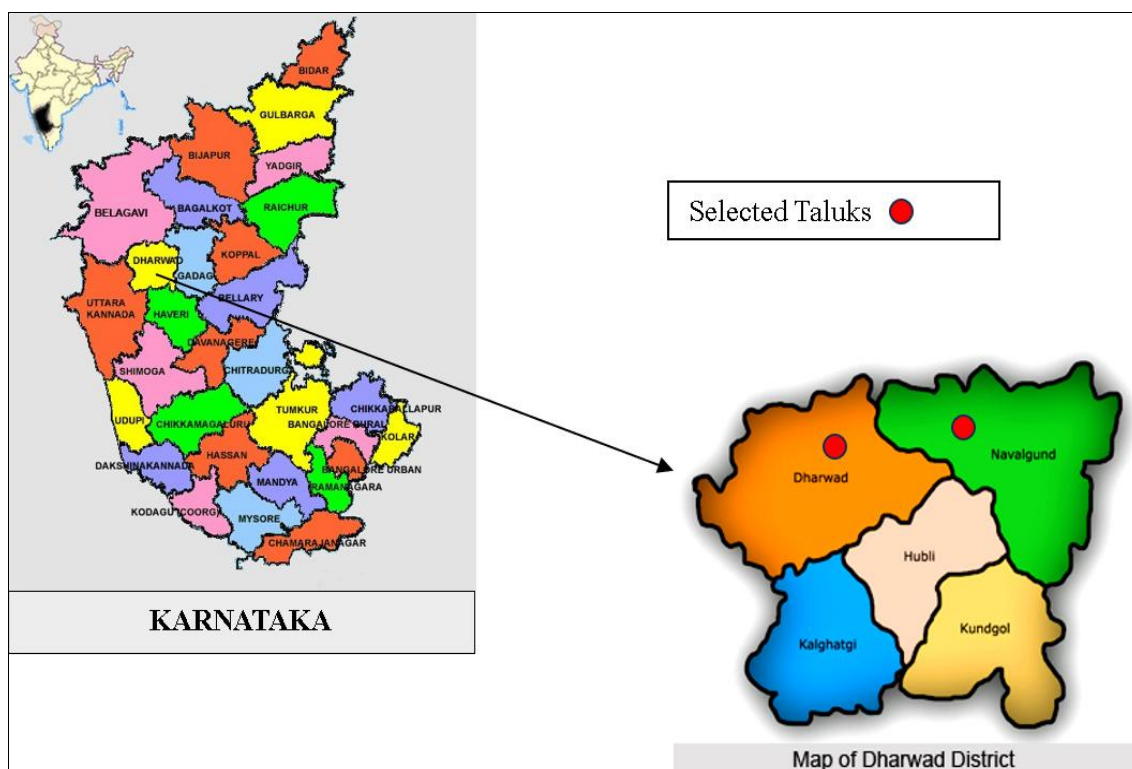


Fig 1: Map depicting the locale of the study

Knowledge & Adoption

The “Teacher made test” suggested by Anastasi (1961) [1] was employed to measure the knowledge level of respondents. The knowledge test was constructed based on package of practices for green gram referring to the package of practice of the University of Agricultural Sciences, Dharwad. The procedure followed by Hinge (2009) [3] was used to measure the general adoption level of the respondents. The answers elicited from the farmers regarding the knowledge and adoption statements were quantified by giving score 1 for known item and 0 to not known item and “1” score to adoption and “0” to non-adoption. The total score obtained by the respondents from all practices was the knowledge and adoption score of the individual respondent. 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.

Income

It is expressed in monetary terms and it referred to net profit gained by farmer by cultivating green gram and it was worked out by using the following formula

Net returns = Gross returns - Total cost of cultivation

Gross returns = Average yield per acre x Average market price per quintal

Paired t-test

Paired t- test is used to measure the difference between the productivity and income of the respondents before and after the adoption of KVK promoted technologies.

Results

Knowledge of Green gram growers in respect of individual recommended cultivation practices

It is clearly observed from the Table 1 that cent percent of the green gram growers had knowledge regarding practices like selection of variety, sowing time, seed rate, seed treatment, FYM application, inter cultivation, manual weeding and harvesting time. Majority of the farmers had knowledge of chemical control of powdery mildew (95.00%), summer ploughing to control leaf eating caterpillar (95.83%), mechanical harvesting (88.33%), spacing (84.16%), recommended dose of NPK (81.67%), growth regulators usage like pulse magic (80.00%). More than half of the farmers had knowledge regarding chemical control of pod borer (60.00%), management practices of sucking pests (55.83%), chemical control of weeds (55.83%) and (50.83%) each of farmers had knowledge use of growth regulators like 19:19:19 and chemical control of leaf eating caterpillar.

It is also evident from Table 1 that majority of the farmers had no knowledge regarding inoculation of PSB to seeds (100%), use of growth regulators like DAP (95.83%), chemical control of leaf blotch (93.33%), management of YMV (86.67%), Gypsum application (85.00%), chemical control of black weevil (80.00%), intercropping (69.17%), chemical control of cercospora leaf spot (66.67%).

The data pertinent to knowledge level of green gram growers regarding the recommended cultivation practices as presented in Fig 2 revealed that nearly half (44.17%) of the green gram farmers had medium knowledge whereas 34.16

percent and 21.67 percent of the farmers had high and low knowledge levels, respectively.

Adoption level of green gram growers in respect of individual recommended cultivation practices

The findings from Table 2 revealed that no gap was noticed in adoption of practices like selection of varieties, sowing time, FYM application and inter-cultivation. It is also clear that more than three fourth of the farmers adopted practices like seed rate (89.17%), summer ploughing to control leaf eating caterpillar (81.67%), manual weeding (80.00%), seed treatment (78.33%), mechanical harvesting (75.00%), recommended dosage of NPK (75.83%) and more than half of the farmers adopted practices like spacing (70.83%), usage of growth regulators like Pulse magic (60.00%), chemical control of powdery mildew (53.33%). The results confirm with those of Suradkar *et al.* (2015) [13].

It was noticed that majority of the farmers had not adopted practices like gypsum application (93.33%), chemical control of black weevil (89.17%), management of cercospora leaf spot (75.83%), chemical weed control (64.17%), usage of growth regulators like 19:19:19 (62.50%), chemical control of sucking pests and leaf eating caterpillar (60.00%), management of pod borer (53.33%), and manual harvesting (50.83%). No adoption was observed in practices such as inoculating PSB to seeds, inter cropping, usage of growth regulator DAP, management practices of YMV and leaf blotch. The distribution of green gram growers according to the adoption level in Fig 3 revealed that half of the farmers (50.00%) belonged to medium adoption level category whereas 26.67 percent and 23.33 percent of the farmers had high and low adoption levels of recommended cultivation practices of green gram.

Impact of the varietal interventions of KVK on farmers income

A cursory look into Table 3 indicated the positive effect of new improved varieties of green gram (DGGV-2) over the existing practices. It is also inferred that green gram variety (DGGV-2) resulted in increased net returns of Rs.57885/ha when compared to local variety Rs.44735/ ha with B: C ratio 2.13 indicating the profitability of this crop to the farmers over the existing local varieties (Tadepalli Yamini *et al.* 2022; Singh *et al.* 2019) [14, 8].

Comparison of economic parameters of green gram farmers before and after the adoption of KVK interventions

The ‘t’ test values furnished in Table 4 revealed that there is significant difference between the green gram cultivars Shing moong and DGGV-2 regarding yield, price and net returns at 1 percent level of significance (Khorne GW *et al.* 2022) [12].

Discussion

Knowledge level of green gram growers about recommended cultivation practices

It is clearly observed from the Table 1 that cent percent of the green gram growers had knowledge regarding practices like selection of variety, sowing time, seed rate, seed treatment, FYM application, inter cultivation, manual weeding and harvesting time. Whereas majority of the

farmers had knowledge of cultivation practices like chemical control of powdery mildew, summer ploughing to control leaf eating caterpillar, mechanical harvesting, spacing, recommended dose of NPK, growth regulators usage like pulse magic. The possible reasons might be due to the fact that, green gram growers were familiar with these simple practices which neither requires special skills for cultivation nor involves much risk and extension participation of the green gram growers in extension activities such as CFLDs might have promoted the farmers to acquire more knowledge about recommended cultivation practices of green gram.

It is also evident from Table 1 that majority of the farmers had no knowledge regarding practices like inoculation of PSB to seeds, use of growth regulators like DAP, chemical control of pests and diseases, Gypsum application and intercropping. The reasons for above findings might be, due to negligence and lack of interest in farmers, less contact with extension personal and complexity in understanding and remembering the recommended cultivation practices. These results indicated that nearly three fourth of the green gram growers had medium to high level of knowledge about recommended cultivation practices of green gram. It might be due to the fact that majority of the farmers were middle aged, literates and had medium to high experience in green gram cultivation. Further, high economic motivation and medium extension participation and scientific orientation of farmers might have influenced them to have medium to high level of knowledge about the recommended cultivation practices of green gram (Singh *et al.*, 2024)^[11].

Adoption level of green gram growers in respect of individual recommended cultivation practices

The findings from Table 2 revealed that no gap was noticed in adoption of practices like selection of varieties, sowing time, FYM application and inter-cultivation. The probable reason for the full adoption of these practices might be due to the fact that most of the farmers are generally aware of these practices further, simplicity and low cost of practices might also be the reason. Demonstrations conducted by KVK might have influenced farmers to know and adopt the recommended cultivars of green gram and majority of the farmers have adopted improved variety by changing the local variety due to high yield, drought tolerance and disease resistance (Maluvu *et al.*, 2024)^[6].

It is also clear that more than three fourth of the farmers adopted practices like seed rate, summer ploughing to control leaf eating caterpillar, manual weeding, seed treatment, mechanical harvesting, recommended dosage of NPK and more than half of the farmers adopted practices like spacing, usage of growth regulators like Pulse magic, chemical control of powdery mildew. Since, farmers know the importance of practices like seed rate and seed treatment there is less gap in adoption of these practices, due to less

incidence of weeds farmers have opted for manual weeding in order to cut down the expense on weedicides. Further, lack of knowledge, lack of technical skill to follow the practice, high cost of fertilizers and non-availability of chemical fertilizers might be the reason for gap in adoption of recommended dosage of fertilizers.

It was noticed that majority of the farmers had not adopted practices like gypsum application, chemical control of pests and diseases, usage of growth regulators like 19:19:19 and manual harvesting. The probable reasons for gap in adoption of these practices might be high cost and non-availability of labour for harvesting. Lack of knowledge, high cost and non-availability of the chemicals might be the reason for less adoption of chemical fertilizers and plant protection measures. Less incidence of pests and diseases like leaf eating caterpillar, black weevil, cercospora leaf spot and leaf blotch.

No adoption was observed in practices such as inoculating PSB to seeds, inter cropping, usage of growth regulators like DAP, management practices of YMV and leaf blotch. The reason might be due to lack of knowledge, interest and negligence of farmers. Due to fragmentation of land and as majority of the farmers were opting for mechanical harvesting, farmers were not adopting intercropping. Due to no infestation of diseases like YMV and leaf blotch. This result inferred that nearly half of the green gram growers belonged to medium adoption of recommended cultivation practices of green gram. The probable reason might be due to the fact that majority of the farmers belonged to medium knowledge level regarding recommended cultivation practices, medium to large land holding, medium extension participation, scientific orientation and innovativeness might have kept them in these circumstances (Singh *et al.*, 2024)^[11]. Further, lack of awareness about innovation attributes such as its simplicity to understand, profitability, impact visibility and high cost of agricultural inputs might also be the reason for such type of result.

Impact of the varietal interventions of KVK on farmers income

It was evident that there was a significant increase in the net returns of the green gram farmers by 29.40 percent due to the adoption of improved cultivar of green gram DGGV-2 which might be due to its yield advantage than that of the local variety. Moreover, the price of the produce increased by 2.13 percent (Rajasekhar *et al.*, 2024)^[7] and this may be due to quality produce obtained from the improved variety in terms of increased number of pods per plant, pod length, percent pod filling, shining and bold size of seeds as compared to the local variety. Results were found in accordance with the findings of Gaur and Jadav (2020)^[2] and Singh and Bisen (2020)^[9].

Table 1: Knowledge of Green gram growers in respect of individual recommended cultivation practices (n = 120)

SL. No.	Recommended technology	Knowledge level			
		Known		Not known	
		f	%	f	%
1.	Selection of variety: (DGGV-2, shing moong)	120	100.00	0	0.00
2	Time of sowing June first week to July first week	120	100.00	0	0.00
3	Seed rate: (5-6 kg seeds per acre)	120	100.00	0	0.00
4	Seed treatment Seed hardening with 2% CaCl ₂ up to 1 hr and drying for 7-8 hrs to impart drought hardiness Rhizobium @ 200g /acre of seeds PSB of seeds (500g /acre)	120	100.00	0	0.00
5	Spacing Row to row 30cm to 37.5cm and seed to seed 7.5- 10 cm	101	84.16	19	15.84
6	Nutrient management Application of 2 tonnes FYM per acre	45	100.00	0	0.00
7	Chemical fertilizers 10: 20: 0 NPK kg / acre	98	81.67	22	18.33
	Application of P in the form of Rock Phosphate and inoculating PSB to seeds	0	0.00	120	100.00
	Gypsum application @ 40 kg /acre or Sulphur @ 8 kg acre with any other source	18	15.00	102	85.00
8	Inter cultivation a) First hoeing at the time of 20-25 DAS. b) Second hoeing at the time of 30-35DAS.	120	100.00	0	0.00
9	Intercropping Pigeonpea+Green gram (1:3)	37	30.83	83	69.17
10	Weed Management i) Manual weeding	120	100.00	0	0.00
	ii) Application of Pendimethalin @ 1.3 litre /Acre (3.3 ml/ 1 litre of water) as pre-emergent herbicide within 24 hours after sowing followed by one intercultivation at 30 DAS	67	55.83	53	44.17
11	Growth regulators usage i. Foliar spray of 1.0% 19:19: 19 at (10g/l)	61	50.83	59	49.17
	ii. 2.0% DAP (20 g/l) once at pre-flowering and another at 15 days thereafter.	5	4.17	115	95.83
	iii. Foliar spray of Pulse magic @ 2 kg/ha once at flowering	96	80.00	24	20.00
12 A.	Plant protection: Insect pest management Sucking pests control Spraying of neem oil 2% or 1.7 ml Dimethoate 30 EC per litre of water. Installation of yellow and blue sticky traps @ 12-15/ ha or 1.0 ml Methyle parathion or 1.0 ml of Monocrotophos	67	55.83	53	44.17
	Pod borer control Spray 2ml Quinolophos 25 EC/ lt of water.	72	60.00	48	40.00
	Leaf eating caterpillar control 1. Summer ploughing	115	95.83	5	4.17
	2. 4.0 ml carbaryl or 2.0 ml chloropyriphos	61	50.83	59	49.17
	Black weevil control Spraying with Chlorpyriphos 20 EC @ 2 ml/l of water or dusting of Quinolophos 21.25 kg / ha	24	20.00	96	80.00
	Disease management: Powdery Mildew control Spray 1ml Propiconazole 25 EC or 1 ml Hexaconazole 5 EC or 3.0 g water soluble Sulphur or 1.0 g Carbendazem	114	95.00	6	5.00
	Cercospora leaf spot control Spray with 1 ml/l Hexaconazole 5 EC or 3 g/l COC 50 WP or 2.0 g Mancozeb at the time of flowering stage	40	33.33	80	66.67
	Yellow mosaic control Uproot and burning of infected plants or buried in the soil	16	13.33	104	86.67
	Leaf blotch control: Seed treatment of 2.0 g Carbendazem and spraying of 1 ml/l Hexaconazole	8	6.67	112	93.33
13 A	Harvesting Manual harvesting First picking at the time of 75 percent pods become dry and after 8-10 days remaining pod will be picked	120	100.00	0	0.00
B	Mechanical harvesting Defoliation of Green gram through Paraquat @4.0 -5.0 ml/lit to facilitate Mechanical harvesting	106	88.33	14	11.67

f= frequency % = percentage

Table 2: Adoption level of Green gram growers in respect of individual recommended cultivation practices (n= 120)

SL. No.	Recommended technology	Adoption level			
		Adopted		Not adopted	
		f	%	f	%
1.	Selection of variety: (DGGV-2, shing moong)	120	100.00	0	0.00
2	Time of sowing June first week to July first week	120	100.00	0	0.00
3	Seed rate: (5-6 kg seeds per acre)	107	89.17	13	10.83
4	Seed treatment Seed hardening with 2% CaCl ₂ up to 1 hr and drying for 7-8 hrs to impart drought hardness Rhizobium @ 200g /acre of seeds PSB of seeds (500g /acre)	94	78.33	26	21.67
5	Spacing Row to row 30cm to 37.5cm and seed to seed 7.5- 10 cm	85	70.83	35	29.17
6	Nutrient management Application of 2 tonnes FYM per acre	120	100.00	0	0.00
7	Chemical fertilizers 10: 20: 0 NPK kg / acre	91	75.83	29	24.17
	Application of P in the form of Rock Phosphate and inoculating PSB to seeds	0	0.00	120	100.00
	Gypsum application @ 40 kg /acre or Sulphur @ 8 kg acre with any other source	8	6.67	112	93.33
8	Inter cultivation a) First hoeing at the time of 20-25 DAS. b) Second hoeing at the time of 30-35DAS.	120	100.00	0	0.00
9	Intercropping Pigeonpea + Green gram (1:3)	0	0.00	120	100.00
10	Weed Management i) Manual weeding	96	80.00	24	20.00
	ii) Application of Pendimethalin @ 1.3 litre /Acre (3.3 ml/ 1 litre of water) as pre-emergent herbicide within 24 hours after sowing followed by one intercultivation at 30 DAS	43	35.83	77	64.17
11	Growth regulators usage i. Foliar spray of 1.0% 19:19: 19 at (10g/l)	45	37.50	75	62.50
	ii. 2.0% DAP (20 g/l) once at pre-flowering and another at 15 days thereafter.	0	0.00	120	100.00
	iii. Foliar spray of Pulse magic @ 2 kg/ha once at flowering	72	60.00	48	40.00
12 A.	Plant protection: Insect pest management Sucking pests control	48	40.00	72	60.00
	Spraying of neem oil 2% or 1.7 ml Dimethoate 30 EC per litre of water. Installation of yellow and blue sticky traps @ 12-15/ ha or 1.0 ml Methyle parathion or 1.0 ml of Monocrotophos				
	Pod borer control Spray 2ml Quinolophos 25 EC/ lt of water.	56	46.67	64	53.33
	Leaf eating caterpillar control 1. Summer ploughing	98	81.67	22	18.33
	2. 4.0 ml Carbaryl or 2.0 ml Chloropyriphos	48	40.00	72	60.00
	Black weevil control Spraying with Chlorpyriphos 20 EC @ 2 ml/l of water or dusting of Quinolophos 21.25 kg / ha	13	10.83	107	89.17
B.	Disease management: Powdery Mildew control Spray 1ml Propiconazole 25 EC or 1 ml Hexaconazole 5 EC or 3.0 g water soluble Sulphur or 1.0 g carbendazim	64	53.33	56	46.67
	Cercospora leaf spot control Spray with 1 ml/l Hexaconazole 5 EC or 3 g/l COC 50 WP or 2.0 g Mancozeb at the time of flowering stage	29	24.17	91	75.83
	Yellow mosaic control Uproot and burning of infected plants or buried in the soil	0	0.00	120	100.00
	Leaf blotch control: Seed treatment of 2.0 g Carbendazim and spraying of 1ml/l Hexaconazole	0	0.00	120	100.00
13 A	Harvesting Manual harvesting First picking at the time of 75 percent pods become dry and after 8-10 days remaining pod will be picked	59	49.17	61	50.83
B	Mechanical harvesting Defoliation of Green gram through Paraquat @ 4.0 ml/lit to facilitate Mechanical harvesting Defoliation of Green gram through Paraquat @ 5.0 ml/lit to facilitate easy pod harvesting	90	75.00	30	25.00

f= frequency%= percentage

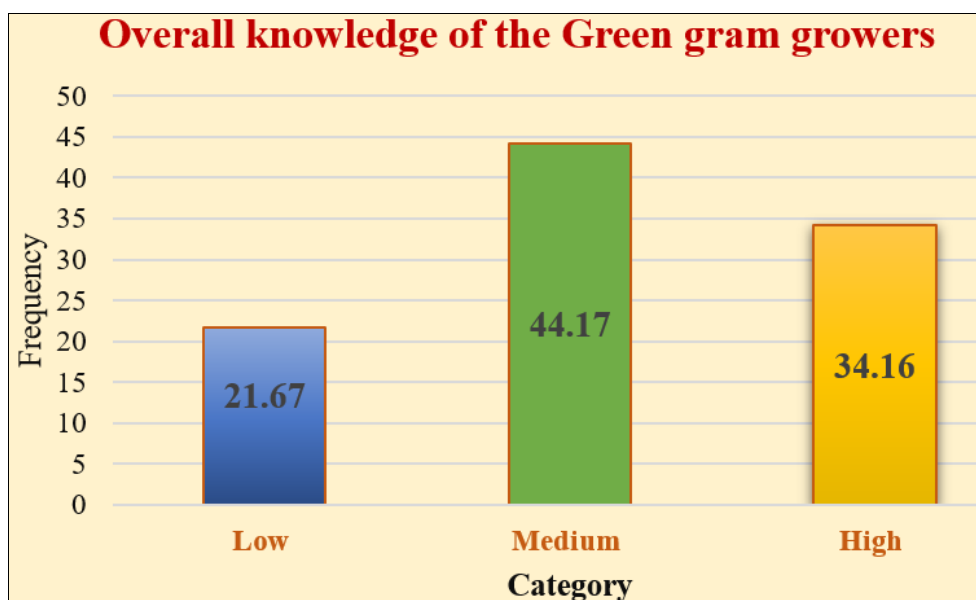
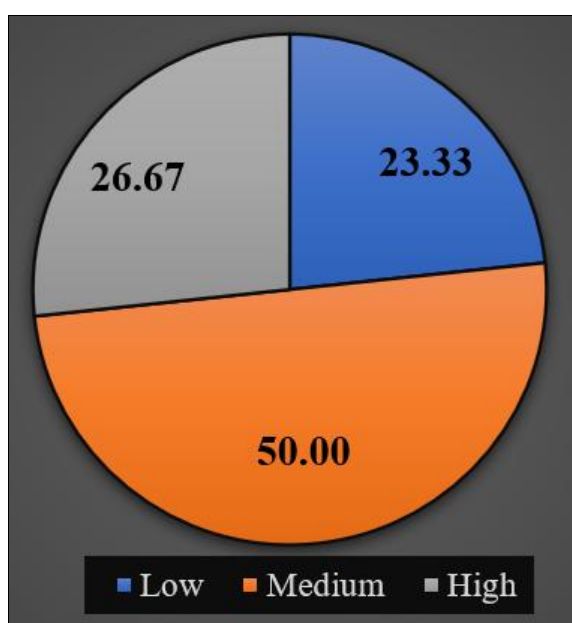
Table 5: Impact of the varietal interventions of KVK on income of green gram growers, (n=120)

Varieties	Shing moong (local variety)	DGGV-2 (Improved Variety)	% increase
Yield (q/ha)	11.80	13.65	15.70
Price (Rs/q)	6100	6230	2.13
Cost of cultivation (Rs/ha)	27245	27156	-0.4
Gross returns (Rs/ha)	71980	85040	18.14
Net returns (Rs/ha)	44735	57885	29.40
B:C	1.64	2.13	

Table 6: Comparison of economic parameters of Green gram farmers before and after the adoption of KVK intervention, (n=120)

S. No.	Parameters	DGGV-2 vs Shing moong
		t- value
1.	Yield	8.62**
2.	Price	2.20**
3.	Net returns	11.85**

** significant at 1%

**Fig 2:** Overall knowledge of the green gram growers**Fig 3:** Overall adoption of the green gram growers

Conclusion

In conclusion, the study had primarily focused on KVK's varietal interventions, as well as the extent of knowledge, adoption and the varietal contribution in enhancing farmers' income has been measured. Researchers and extensionists may find the data useful in gaining a better grasp of farmer knowledge, adoption and restrictions. The study's pertinent findings and feedback will provide valuable information to all private, voluntary and government agencies for the development of appropriate extension strategies and these findings can be better utilized to strengthen the measures for the successful implementation of extension activities by the KVK to accomplish a difficult task. Thus, the research can help guide policy decisions, improve extension services and refine strategies to boost pulse production, thereby enhancing the livelihoods of smallholder farmers and contributing to national food security goals.

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competing interests.

Data availability: Data would be made available on request.

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Appendix: The supplementary data, table, graph in jpeg format for online visibility to the readers are submitted as an appendix.

Author's contribution: First author is the primary contributor to the operationalization, designing and execution of the study. The second author is acknowledged for his role in guiding the study, providing feedback and reviewing the manuscript. The third and fourth author contributed their support during data collection, writing manuscript and editing. The content of the manuscript approves the specific contributions of each author.

References

1. Anastasi A. Psychological Testing. New York: The Macmillan Co.; c1961.
2. Gaur V, Jadav P. Impact of demonstrations on productivity and profitability of greengram in Gandhinagar district of Gujarat. *J Krishi Vigyan*. 2020;8(2):174-177.
3. Hinge RB. A study on diffusion and adoption of wine grape production technology in Maharashtra [M.Sc. thesis]. Dharwad: Univ. Agric. Sci.; c2009.
4. Surge in green gram cultivation in traditional belt. *Deccan Herald*; [cited 2024 Dec 9]. Available from: <https://www.deccanherald.com/india/karnataka/surge-in-green-gram-cultivation-in-traditional-belt-3067772>.
5. Kumar R, Sharma NK, Yadav S. Impact of cluster frontline demonstrations on adoption of improved technologies of greengram in Haryana. *J Pharmacogn Phytochem*. 2019;8(5):2046-2048.
6. Maluvu ZM, Oludhe C, Kisangau D, Maweu J. Adaptation strategies and interventions to increase yield in green gram production under a changing climate in Eastern Kenya. *Afr. J Clim. Change Resour Sustain*. 2024;3(1):370-386.
7. Rajashekar B, Rajashekhar M, Reddy TP, Reddy MJM, Shankar A, Shaila O, *et al*. Impact of cluster frontline demonstrations on promotion of pulse crops in farmers' fields of Telangana, India. *J Exp. Agric. Int*. 2024;46(9):624-632.
8. Singh AP, Doharey RK, Singh P, Kumar M, Singh RK, Pandey RK, *et al*. Adoption level of farmers about recommended cultivation practices of green gram (summer season) in Fatehpur district of Uttar Pradesh. *J Pharmacogn Phytochem*. 2019;8(1):411-413.
9. Singh NK, Bisen NK. Effect of integrated crop management practices on yield and economics of brinjal in Seoni district of Madhya Pradesh. *J Krishi Vigyan*. 2020;8(2):65-69.
10. Singh R, Meena SR. Knowledge level and adoption pattern of improved mung bean production technology. *Legume Res*. 2020;43(2):236-239.
11. Singh SK, Singh AK. Study on the level of knowledge and adoption of improved urd production technology and its relationship with socio-demographic profile of the farmers. *J Agrisearch*. 2024;11(2):123-127.
12. Khorne GW, Ahire RD, Tanpure MU. Economic analysis of processing of green gram mill's in Maharashtra. *International Journal of Advanced Chemistry Research*. 2022;4(2):242-247. DOI: <https://doi.org/10.33545/26646781.2022.v4.i2d.105>
13. Suradkar DD, Mane SS, Deshmukh JM. Adoption of recommended production technology of green gram. *Ann Plant Soil Res*. 2015;17(Special Issue):514-516.
14. Tadepalli Y, Devendrappa S, Halakatti SV. Assessment of yield and income due to varietal interventions by KVK in Dharwad district of Karnataka State. *J Exp Zool India*. 2022;25:1601-1604.