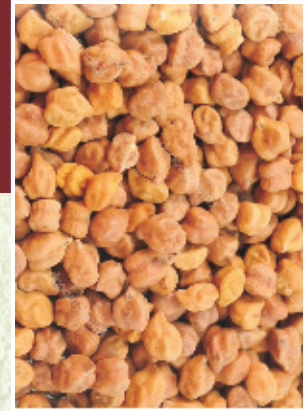


NATIONAL FOOD SECURITY MISSION-PULSES

Achievement of CFLDs at Partner Farmers Fields

राष्ट्रीय खाद्य सुरक्षा मिशन-दलहन

साथी किसानों के प्रक्षेत्रों पर समूह अग्रिम पंक्ति प्रदर्शनों की उपलब्धियाँ
(2016 to 2019)



सत्यमेव जयते

Department of Agriculture, Cooperation and Farmers Welfare
Ministry of Agriculture and Farmers Welfare
Government of India, New Delhi

कृषि, सहकारिता एवं किसान कल्याण विभाग
कृषि एवं किसान कल्याण मंत्रालय
भारत सरकार, नई दिल्ली



भाकृअनुप
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ICAR-Agricultural Technology Application Research Institute, Zone-II

भाकृअनुप-कृषि तकनीकी अनुप्रयोग अनुसंधान संस्थान, क्षेत्र-II

Jodhpur-342 005, Rajasthan, India
जोधपुर 342 005, राजस्थान, भारत

(ISO 9001-2015)

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Message

India is the world's largest producer (25% of global output), the consumer (27% of world consumption) and the highest importer (14%) of pulses. Pulses account for about 20% of the food grain area and contribute about 7-10% of the country's total food grain production. Pulses are cultivated in both the seasons of Kharif and Rabi. Rabi pulses make up over 60% of total output. KVKs of Rajasthan, Haryana, and Delhi have conducted CFLDs at partner farmers' fields to demonstrate the production potential. Results of CFLDs have been found in enhancing productivity per unit area and augmentation of farmers' income.

In a nutshell, the moth bean's average productivity was 4.95q/ha during 2016-2019. Black gram exhibits a yield of 6.20q/ha. Green gram and chickpea productivity have been demonstrated as 7.39q/ha and 17.94q/ha, respectively. In terms of yield gap, 1.00q in moth bean, 1.07q in black gram, 1.67q in green gram, and 4.23q/ha in Chickpea have been minimized through the conductance of CFLDs. Henceforth, KVKs are required strenuous effort to reduce yield gaps at partner farmers' fields under different farming situations.

I wish to express my sincere gratitude to the Hon'ble Union Minister of Agriculture and Farmers Welfare. I also thank the Secretary, DARE & DG, ICAR, and Director, Department of Agriculture & Cooperation, for their kind support and guidance in this program's execution.

I appreciate the Assistant Director General's efforts (Agricultural Extension) at Headquarters and Director of ICAR-ATARI, Zone-II, Jodhpur and their scientists; KVKs of Rajasthan, Haryana, and Delhi for effective implementation and timely monitoring.

I hope this publication will be of interest to scientists, policy-makers, extension workers, students, and farmers.

Dated: 5th May 2021

(A.K. Singh)

Deputy Director General (AE)

Dr. S.K. Singh
Director



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Preface

Krishi Vigyan Kendras of Rajasthan, Haryana, and Delhi conducted the CFLDs under NFSM-Pulses for enhancing sustainable pulse production. Since 2015-16, KVKs have been committed to executing the Government of India's flagship program. Production technologies of necessary pulses, i.e., moth bean, black gram, green gram, and Chickpea, have been demonstrated at partner farmers' fields.

From 2016-17 to 2018-19, 24668 CFLDs have been laid out in 10157.61 ha area by ICAR-Agricultural Technology Application Research Institute, Zone-II, Jodhpur, through active involvement of KVKs. From 2016 to 2019, an average yield of CFLDs under moth bean, black gram, green gram, and Chickpea was recorded as 4.95, 6.20, 7.39, and 17.94q/ha respectively. Under moth bean, 25.32% yield increased while black gram 20.85% green gram 29.17% and chickpea 30.85%.

I compliment the scientists of ICAR-Agricultural Technology Application Research Institute, Zone-II, Jodhpur for implementing, monitoring & coordinating this scheme with different stakeholders involved in the pulses production.

I am also thankful to Directors of Extension Education from various State Agriculture Universities and Senior Scientist & Head, SMSs of KVKs for implementing NFSM-Pulses to enhance pulses production in the right spirit Rajasthan, Haryana, and Delhi states.

I am sure that KVKs will make much effort to achieve self-sufficiency in pulses production in the country.

I hope this publication will motivate other progressive farmers and help policy planners, scientists, extension workers, students, and farmers.

(S.K. Singh)

Abbreviation

1.	ATARI	Agricultural Technology Application Research Institute
2.	BCR	Benefit-Cost Ratio
3.	CFLDs	Cluster Front Line Demonstrations
4.	DAC&FW	Department of Agriculture, Cooperation & Farmers Welfare
5.	DAS	Days After Sowing
6.	FYM	Farm Yard Manure
7.	GOI	Government of India
8.	Ha	Hectare
9.	ICAR	Indian Council of Agricultural Research
10.	IDM	Integrated Disease Management
11.	INM	Integrated Nutrient Management
12.	IPM	Integrated Pest Management
13.	IWM	Integrated Weed Management
14.	KVKs	Krishi Vigyan Kendras
15.	NFSM	National Food Security Mission
16.	PSB	Phosphorus Solubilizing Bacteria
17.	Q.	Quintals
18.	Rs.	Rupees
19.	SMSs	Subject Matter Specialists

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Executive Summary

1. Moth bean (*Vigna aconitifolia*)

Moth bean is cultivated in some parts of Rajasthan of our Country. It is generally grown in arid and hyper semi-arid regions with extreme weather and or without rains during the rainy season. Moth bean is a drought-resistant crop of Rajasthan. The crops can be grown in sandy & sandy loam soils. It is an important pulse crop of arid and semi-arid regions of India and Pakistan. The height of the moth bean is approximately 40 cm height. Yellow flowers on the hairy and densely packed branches of the moth bean plant develop into yellow-brown pods, measuring about 2-3 inches in length. The pods generally hold 4 to 9 seeds inside. Seeds are rectangular and found in a variety of colors including, yellow-brown and whitish-green, and mottled with black. Moth bean seeds are very high in protein (22-24%). A total of 9.26 lakh hectare (ha.) and 2.77 lakh tonnes of Moth production were recorded in the country during the twelfth plan (2012-15) period. Area and production of moth bean have been highest in Rajasthan (96.75% and 94.49%), followed by Gujarat (2.38% and 3.6%). However, Rajasthan's (292 kg/ha) yield was below the national average yield of (299 kg/ha). In Rajasthan, during 2019-20, the total area was 9.53 lakh ha. and production was 2.91 lakh tonnes with the productivity of 306 kg/ha (Source: fourth advance estimate, <http://www.agriculture.rajasthan.gov.in/content/agriculture/en/Agriculture-Department-dep/agriculture-statistics.html>)



Krishi Vigyan Kendras (KVKs) of Zone-II conducted a total of 1696 Cluster Front Line Demonstrations (CFLDs) on moth bean in 689.16 ha area from Kharif-2016 to Kharif-2019 under the Government of India (GOI) sponsored scheme National Food Security Mission (NFSM). The moth bean's average productivity was recorded at 4.95 quintals (q)/ha from Kharif-2016 to Kharif-2019. Full technology packages were demonstrated at farmers' fields. The state-wise success stories of moth bean CFLDs have been presented herein.

2. Black gram (*Vigna Mungo L.*)

Black gram is one of the essential pulses crops during Kharif. It is cultivated throughout the country. It is best suited to rice fallows during rabi in southern and south-eastern parts of India. Black gram needs relatively heavier soils than a green gram. The crop is resistant to adverse climatic conditions and improves soil fertility by fixing atmospheric nitrogen in the soil. It has been reported that the crop produces an equivalent to 22.10 kg of N/ha. The Black gram plays a vital role in the Indian diet, as it contains vegetable protein and supplements to the cereal-based diet. It contains about 24-26% protein, almost three times of cereals and other minerals and vitamins. Besides, it is also used as nutritive fodder, especially for milch animals.

KVKs of Zone-II conducted a total of 3569 CFLDs on the Black gram in 1390.00 ha area from Kharif-2016 to Kharif-2019 under NFSM under different micro-farming situations and cropping pattern. The average productivity of black gram was recorded at 6.20 q/ha from Kharif-2016 to Kharif-2019. Full technology packages were demonstrated at farmers' fields. The state-wise success stories of black gram CFLDs have been presented herein.



3. Green gram (*Vigna radiata L.*)

Green gram is one of the important pulse crops in India. It is grown in approximately 4.20 million ha area in India and 1.8 million ha in Rajasthan. It is a drought-resistant crop, suitable for dryland farming, and predominantly used as an intercrop with other crops. Green gram is an excellent source of high-quality protein (24%), having high digestibility. It is consumed as whole grains as well as "Dal" in a variety of ways in our food. It is also a good source of Riboflavin, Thiamine, and Vitamin C (Ascorbic acid). When green gram is sprouted, seeds synthesized remarkable quantity of ascorbic acid (Vitamin C). Green gram is also used as green manure. A leguminous crop can fix the atmospheric nitrogen (30-40 kg N/ha). It also helps in preventing soil erosion. Being a short duration crop, it fits well in many intensive crop rotations. Green gram can be used as feed for cattle. After harvesting the pods, green plants are uprooted or cut from the ground level, chopped into small pieces, and fed to cattle. The husk of the seed can be soaked in water and used as cattle feed. It is a self-pollinated crop. In North India, it is cultivated in both kharif and zaid/summer seasons and South. India, it is cultivated in rabi Season especially in coastal regions.

KVKs of Zone-II conducted a total of 6269 CFLDs on the Green gram in 2661.00 ha area from Kharif-2016 to Kharif-2019 under NFSM. The average productivity of green gram was recorded at 7.39q/ha from Kharif-2016 to Kharif-2019. Full technology packages were demonstrated at farmers' fields under different farming situations. The state-wise success stories of green gram CFLDs have been presented herein.



4. Chickpea (*Cicer arietinum L.*)

Among Chickpea growing states in India, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Andhra Pradesh, Karnataka, Chhattisgarh, Bihar, and Jharkhand contribute more than 95% to total production. In India, both desi and Kabuli-type chickpea varieties are grown. In recent years, the country has witnessed a remarkable increase in the area, production, and productivity of Chickpea. India contributes to a major share of the world's chickpea area (70%), production (67%), and the largest Chickpea producing nation. The area of Chickpea was 1.59 million ha during 2018-19 with the production of 1.86 MT with the productivity of 11.69 q/ha in Rajasthan. India has made remarkable progress in expanding the chickpea area and production. This has helped the country mainly compensate for the loss in the chickpea area in northern India due to the expansion of irrigated wheat cultivation. Traditionally chickpea varieties cultivated in northern India required low temperature and prolonged winter for better growth. Hence, chickpea cultivation was confined to the northern and central regions. With the intensification of wheat cultivation during the Rabi season due to the green revolution, the area of the pulse reduced in the northern states, especially where irrigation facilities were available. This has forced Chickpea to shift to a comparative warmer and harsher growing environment of the southern states. The development of short-duration chickpea varieties, which are better adapted to warmer, short-season environments like central and southern India, has helped establish Chickpea as a Rabi crop in these states. Its low water requirement is mainly cultivated in the Rajasthan, as this state is known for the country's rainfed and resource-scarce regions. Chickpea plays a major role in supplementing the income of small and marginal farmers of Rajasthan. Following are some health benefits of Chickpea:



- It is a good source of fiber, so it helps in weight loss.
- It is a good source of protein and energy.
- It helps in stabilizing sugar levels in the blood.
- It helps in reducing (Low-density lipoprotein) LDL cholesterol.
- It may boost energy levels due to their iron content.
- It has a low glycemic index, which is suitable for diabetic patients.

However, the lack of adoption of improved varieties and recommended package of practices, scarcity of water & resource conservation technologies, etc., are the significant factors that lead to the low productivity of Chickpea in Rajasthan. The GOI has introduced NFSM with a vision to increase the production of pulses crops during May 2007. Under this mission, CFLDs were conducted to show the performance of production potential of the recommended production technology under real farming situations in different agro-climatic zones of Rajasthan. KVKs conducted CFLDs under ICAR-Agricultural Technology Application Research Institute (ATARI), Zone-II, Jodhpur.

ICAR-ATARI, Zone-II conducted a total of 13134 CFLDs on Chickpea in 5417.45 ha area from Rabi-2016-17 to Rabi-2018-19 under NFSM. The average productivity of Chickpea was recorded at 17.94 q/ha from Rabi 2016-17 to Rabi-2018-19. Full technology packages were demonstrated at farmers' fields. The state-wise success stories on chickpea CFLDs have been presented herein.

KRISHI VIGYAN KENDRA, BIKANER-I (RAJASTHAN)

Sh. Ravinder Kumar S/o Sh. Dilip Singh Bishnoi

Village: Sarhkunjia
District-Bikaner (Rajasthan)



1. Technology demonstrated

Variety: RMO-257

Seed rate: 10-12 kg/ha.

Seed treatment

- Carbendazim 2 gm/kg seed and Rhizobium spp. and Phosphorus Solubilizing Bacteria (PSB) cultures (200 ml for 6 kg seed).

Nutrient management

- Soil application of Nitrogen 20 kg, Phosphorus 40 kg, Potash 20 kg, Sulphur 20 kg, and Zinc 20 kg per ha.

Weed management

- Spraying of post-emergence herbicide- Imazethapyr 10% SL @ 0.5 liter/ ha in 500-600 liter of water at 20-25 Days After Sowing (DAS).

Disease and Insect/Pest management

- *Yellow mosaic virus*: Spraying of Imidacloprid 17.8% SL @ 0.5 ml/l water of 10-15 days' intervals if required (prevent whitefly infestations).
- *Cercospora leafspot*: Spraying of Mancozeb 45% WP @ 2.0 g/l of water.

2. Performance of technology

- Under CFLDs, an average yield of moth bean was obtained as 7.62q/ha compared to farmers' practices, i.e., 6.20 q/ha.
- The average yield of moth bean was 22.90% higher than farmers' practices.
- Net income of CFLDs was Rupees (Rs.) 20510.00, while farmers' practices were Rs. 15565.00. Thus, farmers got Rs. 4945.00 per ha. as an additional income.
- B:C ratio of CFLDs plot was recorded 2.50 as compared to farmers' practices, i.e., 2.30.

Table 1 Performance of moth bean production technology in Bikaner during Kharif 2016

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	6.20	16808.14	32373.14	15565.00	2.30
CFLD	7.62	23017.15	43527.15	20510.00	2.50
% Increase	22.90	36.94	34.45	31.77	8.70



Field day organized at farmers' field

3. Yield

- The average yield under CFLDs was 7.62q/ha. It was 3.07q/ha and 4.49q/ha higher than the average yield of the district (4.55 q/ha) and state (3.13q/ha), respectively.

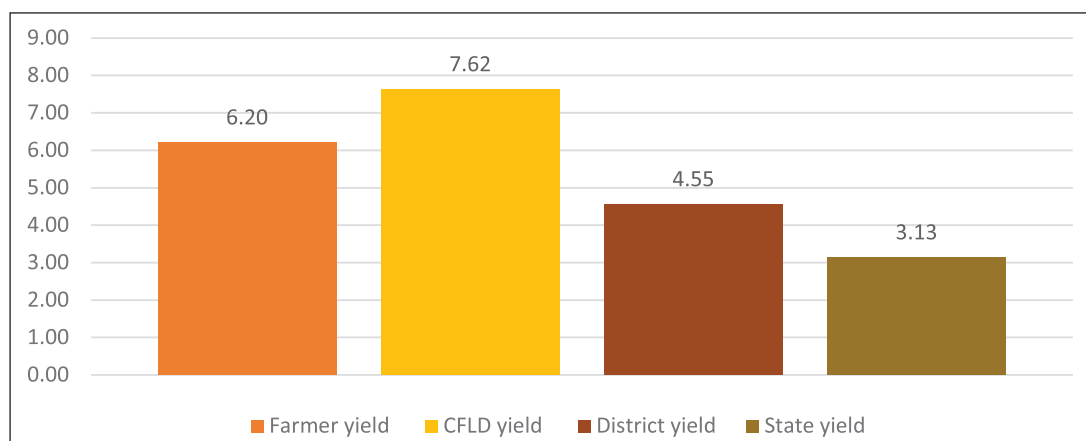


Fig. 1 Comparative average yield (q/ha) of Moth bean in Bikaner district of Rajasthan

4. Institutional involvement

- ICAR-ATARI, Zone-II, Jodhpur, organized workshop cum training programs & group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.
- Nodal officers of KVKs imparted training to farmers before and during the implementation of CFLDs.
- Timely field visits were made by Subject Matter Specialists (SMSs).
- District agricultural departments and progressive farmers were invited to share their field experiences.
- Regular follow-up visits were made.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Moth bean.
- Balanced use of fertilizers helped in increasing the yield.
- Weeds management through Imazethapyr 10% SL@ 0.5 liter/ha in 500-600 liter of water at 20-25 DAS minimized the weeds population.
- Seed treatment, timely use of fungicides, and insecticides helped in disease & insect management.
- All partner farmers kept factsheets during crop season, and they filled in relevant observations. Thereby farmers have become empowered to provide feedback to the scientific community and sustainability of technology packages to farmers and other extensions.

6. Farmer's feedback

- Farmers showed interest in following all components of crop improvement like; crop geometry, optimum seed rate, timely sowing, seed treatment, Integrated Nutrient Management (INM), Integrated Weed Management (IWM), Integrated Disease Management (IDM), and Integrated Pest Management (IPM).
- Farmer prefers improved and disease-resistant moth bean variety, i.e., RMO-257, and promoted this variety to other farmers.
- Kept 30-35% produce of CFLD as seed for distribution to other farmers.
- More than 65 partner farmers of nearby villages procured seeds of improved variety of moth bean during 2018 and 2019, and 118.00 ha area was covered under improved variety during both Kharif season.

KRISHI VIGYAN KENDRA, PALI (RAJASTHAN)

Sh. Mangi Lal S/o Sh. Kera Ram

Village-Artia, Tehsil-Rohat
District-Pali (Rajasthan)



1. Technology demonstrated

Variety: CZM-2

Seed rate: 8-10 kg/ha.

Seed treatment: Carbendazim 2 gm/kg seed.

Nutrient management: 60 kg DAP/ha.

Weed management: Manual.

Disease management

- *Yellow mosaic virus:* Spraying of Dithen M 45 2ml /liter water.

Insect/pest management

- *Sucking pest:* Spraying of Dimethoate 2ml/liter water.

2. Performance of technology

- An average yield of moth bean CFLDs was 8.90q/ha, whereas in farmer's practices, yield was 5.80q/ha.
- An average yield of moth bean under CFLDs was 53.45% higher than farmer's practices.
- Net income of CFLDs was Rs.17400.00. However, in farmer's practices, net income was Rs. 12300.00. Thus, farmers got Rs.5100.00 per ha. as an additional income.
- B:C ratio of CFLDs was recorded at 2.30 as compared to farmer's practices (1.20).

Table 2 Performance of moth bean production technology in Pali during Kharif 2017

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	5.80	10809.09	23109.09	12300.00	1.20
CFLD	8.90	14690.39	32090.39	17400.00	2.30
% Increase	53.45	35.91	38.86	41.46	91.67



Field day organized at farmer's field

3. Yield

- The average yield of CFLDs was 8.90 q/ha. The yield was 5.81q/ha and 5.80q/ha, higher than the average yield of the district (3.09 q/ha) and state (3.10q/ha), respectively.

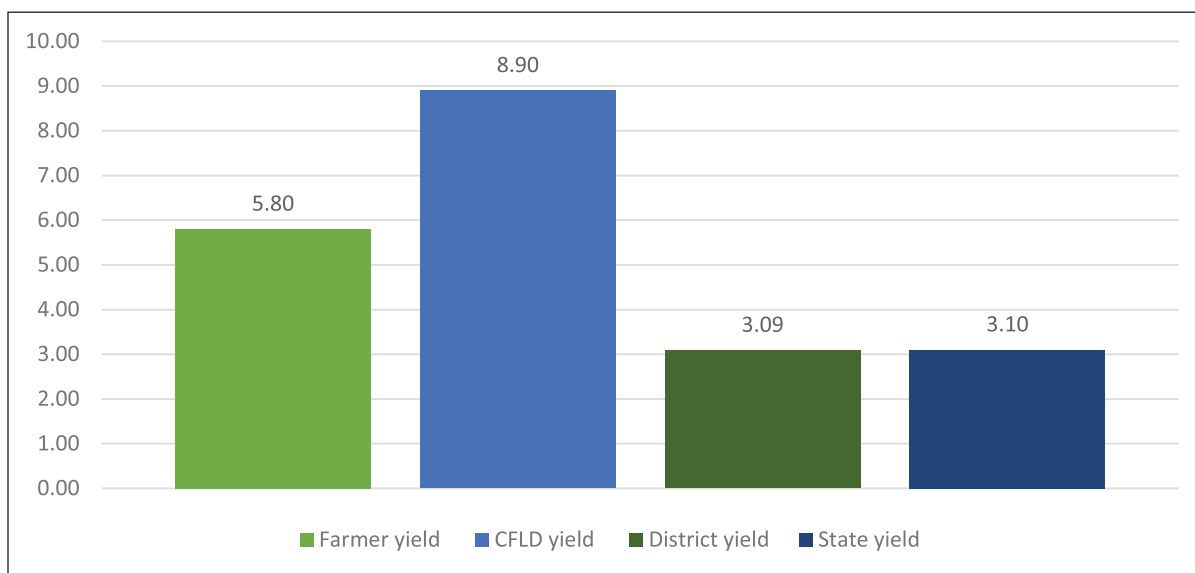


Fig. 2 Comparative average yield (q/ha) of Moth bean in Pali district of Rajasthan

4. Institutional involvement

- ICAR-ATARI, Zone-II, Jodhpur organized workshop-cum-training programs and group meetings for nodal officers of all KVKs.
- Nodal officers of KVKs imparted training for farmers before & during the implementation of CFLDs.
- Timely field visits made by SMSs and telephonic advisory/consultancy, extension activities, etc., were also organized.
- District Agricultural Departments and progressive farmers were invited to share their field experiences.
- Regular follow up visits were made
- After 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry enhanced the yield of Moth bean.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Weeds management through hand weeding minimized the weeds population.
- Seed treatment and timely use of fungicides & insecticides helped in disease & insect management.
- All partner farmers kept factsheets during crop season and filled all relevant observations. Thereby, farmers have become empowered to provide feedback to the scientific community and sustainability of technology packages to farmers and another extension personal.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, IPM, etc.
- Farmers preferred improved moth bean variety (CZM-2) and also promoted this variety to fellow farmers.
- He has kept 30-35% produce of CFLD as seed for distribution to the Artia village farmers.
- More than 65 partner farmers of nearby villages procured seeds of improved variety of moth bean during 2018 and 2019, and it was reported that 130.00 ha area was covered under quality seeds of an accepted variety of moth bean.

KRISHI VIGYAN KENDRA, KVK CHURU-I (RAJASTHAN)

Sh. Jeevan Ram S/o Sh. Gauru Ram Meghwai

Village- Ghotra, Tehsil- Sujangarh
District- Churu-1 (Rajasthan)



1. Technology demonstrated

Variety: RMO-257

Seed rate: 12 kg/ha.

Nutrient management

- Application of 12-16 tones/ha of FYM with Rhizobium & PSB 600 g/ha. 20 kg/ha N and 32 kg/ha P₂O₅. Soil application of 20 kg ZnSo₄.

Weed management

- Spraying of pre-emergence herbicide i.e., Pendimethalin 30% EC 3.30 liter/ha (1.25 kg a.i.).

Disease management

- Seed treatment with Carbendazim (2g/kg seed).
- *Root and Collar Rot*: Soil application of Trichoderma 5 kg + 100 kg FYM ha.

Insect/Pest management

- *Aphids*: Spraying of Dimethoate 30% EC 1200 ml/ha at flowering stage.

2. Performance of technology

- The average yield of moth bean was obtained as 5.25 q/ha. The yield of farmer's practices was 3.9q/ha.
- The average yield of Moth bean was 34.61 % higher than farmer's practices.
- The net income of CFLDs was Rs.12050.00, farmer's practices were Rs.5584.00. Thus, farmers got Rs. 6466.00/ ha. as an additional income through CFLDs.
- B: C ratio of CFLDs plot was recorded 2.01 compared to farmer's practices (1.54).

Table 3 Performance of moth bean production technology in Churu during Kharif 2018

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	3.9	10256.00	15840.00	5584.00	1.54
CFLD	5.25	11900.00	23950.00	12050.00	2.01
% Increase	34.61	16.02	51.19	115.79	30.51



Field visit at farmer's field

3. Yield

- The yield of CFLDs was 5.25q/ha, which was 2.79q/ha higher than the average district yield (2.46 q/ha), 2.97q/ha higher than the state average yield (2.28 q/ha), and 2.26 q/ha higher than the national average yield (2.99 q/ha).

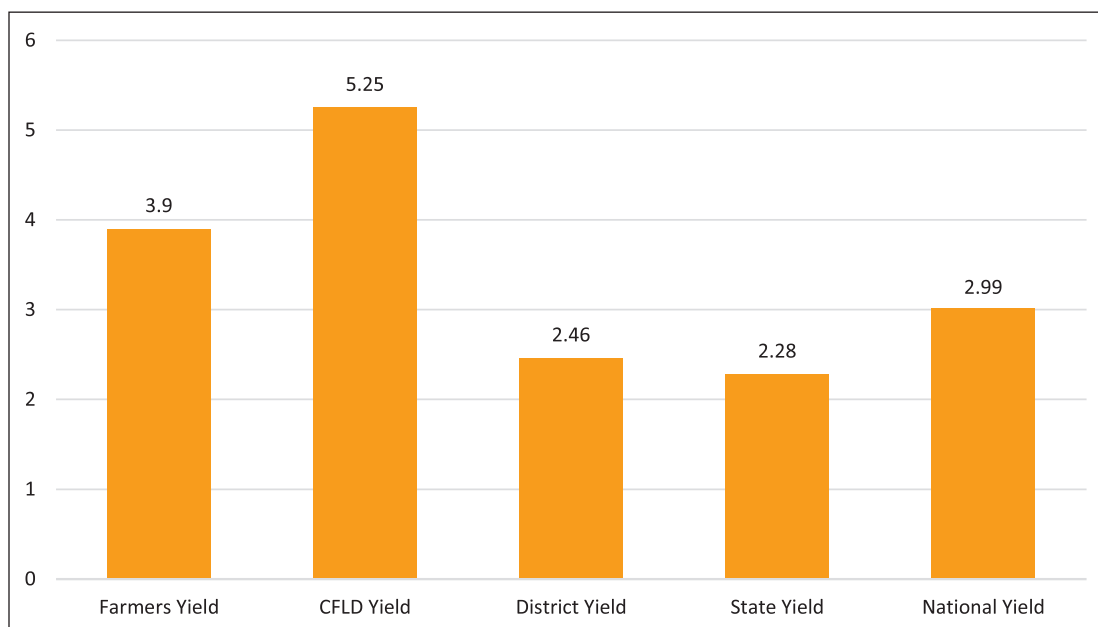


Fig. 3 Comparative average yield (q/ha) of Moth bean in Churu district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/consultancy, extension activities, etc., also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular following visits before sowing, after 20 days sowing for technical observations to assess crop stands at the time of insect pest management and maturity stage, and ascertain farmer reaction for applying accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed yield of Moth bean.
- Balanced and need-based use of fertilizers helped in increasing yield.
- Weeds management by spraying pre-emergence herbicide Pendimethalin 30% EC 3.30 liter/ha (1.25 kg a.i.) minimized the weeds population.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- All partner farmers kept factsheets during crop season, and they filled all relevant observations. Thereby farmers have become empowered to provide feedback to the scientific community and sustainability of technology packages to farmers and other extensions.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmer prefers high-yielding moth bean variety RMO-257 and promoted this variety to other farmers.
- He has kept 30-35% produce of CFLD as seed for distribution to farmers of the village- Ghotra during Kharif-2020.

KRISHI VIGYAN KENDRA, NAGAUR-II (RAJASTHAN)

Sh. Gumana Ram S/o Sh. Ladhu Ram

Village- Chak, Post- Didwana
District- Nagaur (Rajasthan)



1. Technology demonstrated

Variety: RMO-257

Seed rate: 10-12 kg/ha.

Sowing method: Line sowing by seed drill in light soil

Nutrient management

- Application of 10-15 tonnes of FYM per ha. 10 kg/ha N, 30 kg/ha P₂O₅, and 25 kg ZnSO₄ (21%) kg/ha at the sowing time.

Seed treatment

- Seed treatment with NPK liquid consortia 5 ml/kg seed. Use of waste decomposer solution as a spray.

Weed management

- One hand weeding after 30 DAS.

Disease management

- Seed treatment with Carbendazim (2g/kg seed).
- *Yellow vein mosaic virus*: Spraying of Imidacloprid 17.8% SL @ 300 ml/ha and Neem oil 5-8 ml/liter water.
- *Bacterial blight*: Seed treatment with Streptocyclin 100 ppm (1g in 10-liter water)

Insect management

- *Termites*: Soil treatment with Neem cake 200 kg/ha at the time of sowing.
- *Red hairy caterpillar*: Soil application with Quinalphos 1.5% @ 25 kg/ha.
- *Sucking pest*: Spraying of Imidacloprid 17.8% SL @ 300 ml/ha and Neem oil 5-8 ml/litre water.

2. Performance of technology

- The average yield of moth bean in CFLDs 8.5 q/ha, where as in farmer's practices yield was 6.4 q/ha.

- The average yield of moth bean CFLDs was 32.81% higher than that of farmer's practices.
- The net income of CFLDs was Rs. 33676, while farmer's practice was Rs. 23730. Thus, farmers got Rs. 9946.00 per ha additional income through CFLDs.
- B: C ratio of CFLDs was recorded 3.28 as compared to farmer's practices 2.83.

Table 4 Performance of moth bean production technology in Nagaur during Kharif 2019

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	6.4	13000.00	36730.00	23730.00	2.83
CFLD	8.5	14800.00	48476.00	33676.00	3.28
% Increase	32.81	13.84	32.03	41.91	15.90



Field day at farmer's field

3. Yield

- The average yield of CFLDs was 8.5 q/ha, which was 4.16 q/ha higher than the average district yield (4.34 q/ha), 6.22 q/ha higher than the state average yield (2.28 q/ha), and 5.04 q/ha higher than the national average yield (3.46 q/ha).

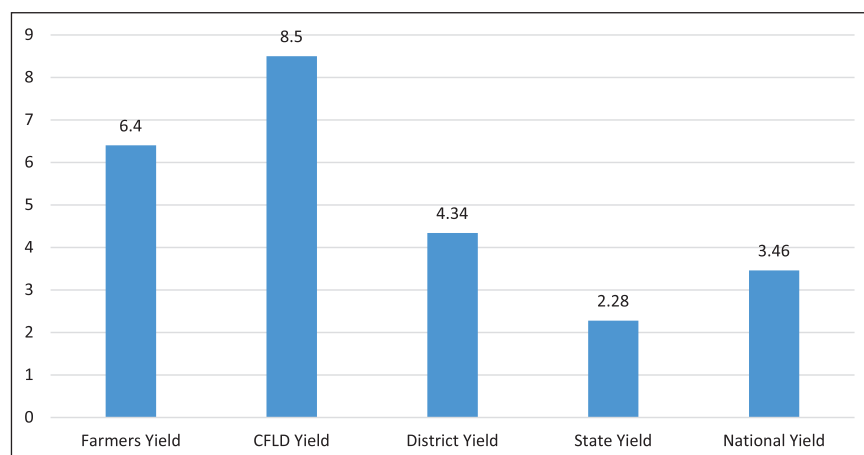


Fig. 4 Comparative average yield (q/ha) of Moth bean in Nagaur district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities etc., also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular following visits before sowing, after 20 days sowing for technical observation of crop stands at the time of insect pest management and maturity stage, and ascertain farmer reaction for applying accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Moth bean.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Weeds management, through one hand weeding at 30 DAS minimized the weeds population.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- All partner farmers kept factsheets during crop season, and they filled all relevant observations. Thereby farmers have become empowered to provide scientific community feedback and sustainability of technology packages to farmers and other extensions.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmer prefers high-yielding moth bean variety RMO-257 and promoted this variety to other farmers.
- He has kept 30-35% produce of CFLD as seed for distribution amongst farmers of village-Chak during Kharif-2020.

KRISHI VIGYAN KENDRA, JHALAWAR (RAJASTHAN)

Sh. Paras Ram S/o Sh. Mathura Lal

Village: Chachlao, Post: Sunel,
District, Jhalawar (Rajasthan)



1. Technology demonstrated

Variety: PU-31

Seed rate: 12-15 kg/ha.

Seed treatment

- Seed treatment with Carbendazim 2 gm/kg seed and Rhizobium spp. and PSB cultures (one bottle (200 ml) for /6 kg seed).

Nutrient management

- Soil application of N: P₂O₅:K₂O: S (20:40:20:20) per ha.

Weed management

- Postemergence:* Spraying of Imazethapyr a.i. 10 SL@ 0.5 litre/ ha in 500-600 litre of water at 20-25 DAS.

Insect/Pest management

- Yellow mosaic:* Spraying of Imidacloprid @ 0.5 ml/l 10-15 days' intervals if required (prevent whitefly infestations).
- Cercospora leafspot:* Spraying of Mancozeb 45 WP @ 2.0 g/l

2. Performance of technology

- The average yield of black gram CFLDs was obtained at 12.72 q/ha, whereas farmers' practices were 9.27 q/ha.
- Average yield of black gram CFLDs was 37.22 % higher than farmer's practices.
- The net income of CFLDs was Rs. 47097.00, while farmer's practice was Rs. 35905.00. Thus, farmers got Rs. 28471.80 per ha additional income through CFLDs.
- B: C ratio of CFLDs was recorded 2.53 as compared to farmer's practices 2.78.

Table 5 Performance of black gram production technology in Jhalawar during Kharif 2016

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	9.27	31551.69	67456.69	35905.00	2.53
CFLD	12.72	48831.49	95928.49	47097.00	2.78
% Increase	37.22	54.77	42.21	31.17	9.88



Field day organized at farmer's field

3. Yield

- The average yield of CFLDs was 12.72 q/ha, which was 5.84 q/ha higher than the average district yield (6.88 q/ha), 6.31 q/ha higher than the state average yield (6.41 q/ha), and 6.21 q/ha higher than the national average yield (6.51 q/ha).

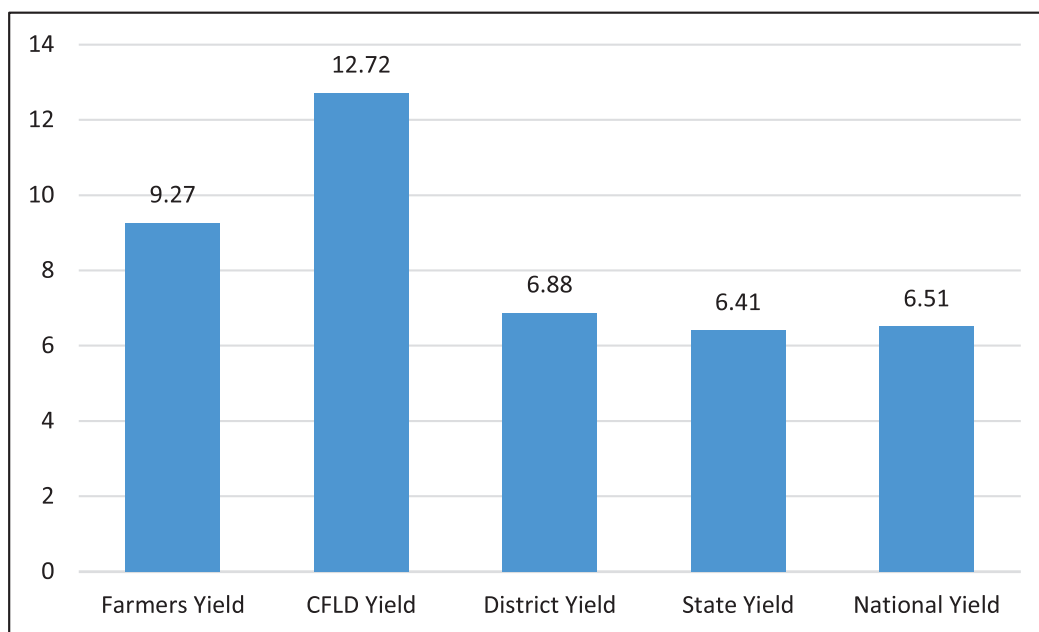


Fig. 5 Comparative average yield (q/ha) of black gram in Jhalawar district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities, etc., also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular following visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Black gram.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Weeds management through post-emergence Imazethapyr a.i. 10 SL@ 0.5 liter/ ha in 500-600 liter of water at 20-25 DAS minimized the weeds population.
- Seed treatment and timely use of fungicides and insecticides helped in disease management.
- All partner farmers kept factsheets during crop season, and they filled all relevant observations. Thereby farmers have become empowered to provide feedback to the scientific community and sustainability of technology packages to farmers and other extensions.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmers prefer high-yielding moth bean variety PU-31 and promoted this variety to other farmers.
- He has kept 30-35% produce of CFLD as seed and distribute it to farmers of the village- Chachlao.

KRISHI VIGYAN KENDRA, BHARUCH (GUJARAT)

Sh. Jaswantbhai Navalbhai Vasava

Village-Galiba, Tashil-Netrang,
District-Bharuch (Gujarat)



1. Technology demonstrated

Variety: Gujarat Urd-1

Seed rate: 12-15 kg/ha.

Seed treatment

- Carbendazim 3 gm/kg seed and Rhizobium and PSB cultures (one bottle @ 200 ml for /8 kg seed)

Nutrient management

- N: P₂O₅:K₂O:S (20:40:20:20)

Insect/Pest management

- Spraying of Neem Oil @ 5 ml/lit 10-15 days intervals to manage vector whitefly transmitting YMV in black gram.

2. Performance of technology

- The average yield of black gram CFLDs was 10.05 q/ha, whereas farmers' practices were 7.25 q/ha.
- The average yield of black gram CFLDs was 38.62 % higher than farmer's practices.
- The net income of CFLDs was Rs. 29502.00, while farmer's practice was Rs. 19350.00. Thus, farmers got Rs. 10152.85 per ha. Additional income through CFLDs.
- B: C ratio of CFLDs was recorded 3.40 as compared to farmer's practices 2.31.

Table 6 Performance of black gram production technology in Bharuch during Kharif 2016

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	7.25	14544.49	33894.45	19350.00	2.31
CFLD	10.05	16280.20	53782.20	29502.00	3.40
% Increase	38.62	11.93	58.68	52.47	47.18



Field day organized at farmer's field

3. Yield

- The average yield of CFLDs was 10.05 q/ha, which was 2.71 q/ha higher than the average district yield (7.34 q/ha), 3.85 q/ha higher than the state average yield (6.20 q/ha), and 3.54 q/ha higher than the national average yield (6.51 q/ha).

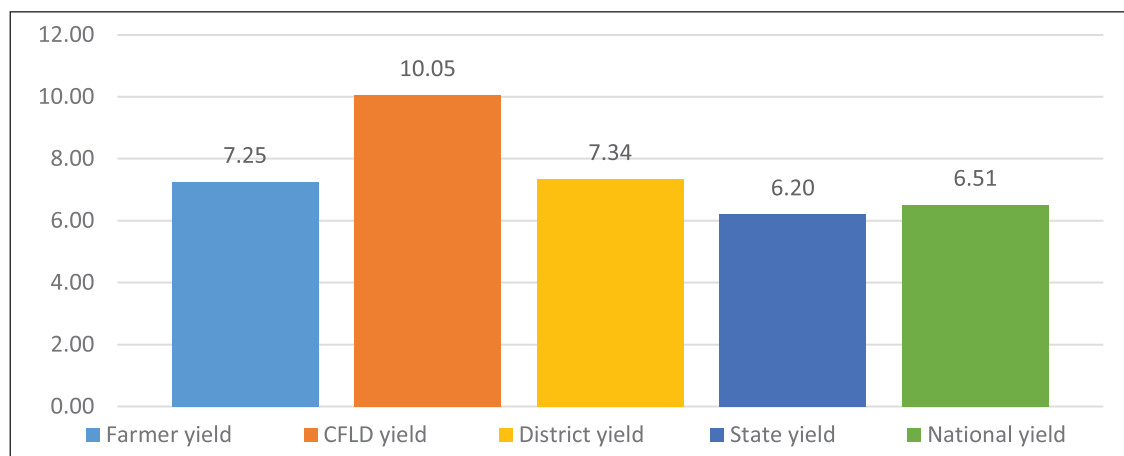


Fig. 6 Comparative average yield (q/ha) of black gram in Bharuch district of Gujarat

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.

- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities, etc., also organized.
- District Agricultural Departments and progressive farmers were invited to share their field experiences.
- Regular follow-up and visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and ascertain farmer reaction for applying accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry management enhanced the yield of Black gram.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- All partner farmers kept factsheets during crop season and they filled all relevant observations. Thereby farmers have become empowered to provide scientific community feedback and sustainability of technology packages to farmers and other extensions.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmer prefers high-yielding black gram variety Gujarat Urd-1 and promoted this variety to other farmers.
- He has kept 30-35% produce of CFLD as seed for sale and farmer to farmer sharing.

KRISHI VIGYAN KENDRA, JHALAWAR (RAJASTHAN)

Sh. Bhairu Lal Lodha S/o Kanwar Lal Lodha

Village- Gadiyamer, Tehsil-Asnawar
District-Jhalawar (Rajasthan)



1. Technology demonstrated

Variety: PU-31

Seed rate: 12-15 kg/ha.

Seed treatment

- Carbendazim 50% WP @ 2 gm/kg seed; for seed born disease. and Rhizobium spp. @ 10 ml/kg seed, PSB cultures each @ 10 ml/kg seed for utilizing atmospheric N.

Nutrient management

- Soil application of N: P₂O₅ (20:40) kg/ha.

Weed management

- *Postemergence:* Spraying of Imazethapyr 10 SL @ 0.5 litre/ ha in 500-600 litre of water at 20-25 DAS.

Disease management

- *Cercospora leafspot:* Spraying of Carbendazim 50% WP @1.0 g/l.

Insect/Pest management

- *Aphid, Jassid, and Fly:* Spraying of Dimethoate @ 2.0 ml/l water at flowering stage.

2. Performance of technology

- The average yield of black gram CFLDs was 13.95 q/ha, whereas the farmer's practice was 10.37 q/ha.
- The average yield of black gram CFLDs was 34.52% higher than farmer's practices.
- The net income of CFLDs was Rs. 26237.00, while farmer's practice was Rs. 13026.00. Thus, farmers got Rs. 13211.00 per ha additional income through CFLDs.
- B:C ratio of CFLDs were recorded 2.23 as compared to farmer's practices 1.58.

Table 7 Performance of black gram production technology in Jhalawar during Kharif 2017

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	10.37	19226.84	32252.84	13026.00	1.58
CFLD	13.95	24636.86	50873.86	26237.00	2.23
% Increase	34.52	28.1	57.73	101.42	41.14



Field visit at farmer's field

3. Yield

- The average yield of CFLDs was 13.95 q/ha, which was 6.24 q/ha higher than the average district yield (7.71 q/ha), 7.71 q/ha higher than the state average yield (6.24 q/ha), and 7.44 q/ha higher than the national average yield (6.51 q/ha).

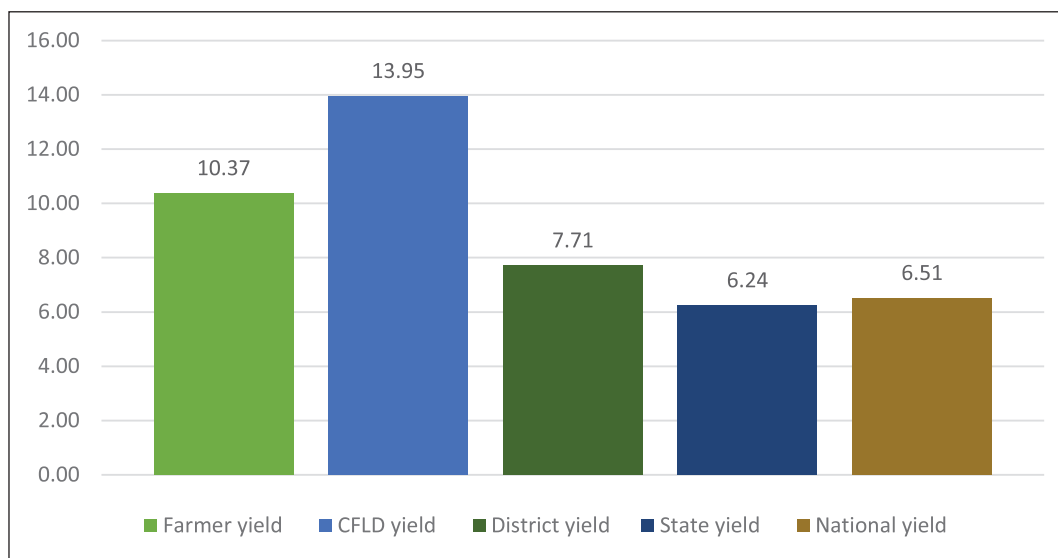


Fig. 7 Performance of black gram in Jhalawar district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities etc. also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular follow-up visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and ascertain farmer reaction for applying accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Black gram.
- Balanced and need based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- All partner farmers kept factsheets during crop season and they filled all relevant observations. Thereby farmers have become empowered to provide scientific community feedback and sustainability of technology packages to farmers and another extension personal.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmers prefer use of seeds of improved variety PU-31 of Urd bean and promoted this variety to other farmers.
- He has kept 30-35% produce of CFLD as seed and distribute to farmers of village- Gadiyamer.

KRISHI VIGYAN KENDRA, CHITTORGARH (RAJASTHAN)

Sh. Hajari Lal S/o Sh. Narayan Lal Jat

Village-Nanga Khera, PS-Dungla
District- Chittorgarh (Rajasthan)



1. Technology demonstrated

Variety: Pratap Urd-1

Seed rate: 12-15 kg/ha

Nutrient management

- Soil application of 10 tonnes of FYM with Azotobactor & PSB, 15 kg N + 40 kg P₂O₅/ha-1

Weed management

- Spraying of Pre-emergence herbicide- Pendimethalin (1.25 kg a.i.) and post-emergence herbicides- Imazethapyr (500ml/ha) after 20-25 days of sowing.

Disease management

- Seed treatment with Carbendazim (2gm/kg seed) against collar rot

Insect management

- Spraying of Imidacloprid 17.8%SI @250ml/ha at the time of flower initiation for sucking pest management.

2. Performance of technology

- The average yield of black gram CFLDs was 12.80 q/ha, whereas farmers' practices were 8.46 q/ha.
- The average yield of black gram CFLDs was 51.30% higher than that of farmer's practices.
- The net income of CFLDs was Rs. 43512.00, while farmer's practice was Rs. 26036.00.
- B:C ratio of CFLDs was recorded 3.28 as compared to farmer's practices 2.58, which was lower from CFLDs.

Table 8 Performance of black gram production technology in Chittorgarh during Kharif 2018

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	8.46	15850.00	40880.00	26036.00	2.58
CFLD	12.80	19300.00	63921.00	43512.00	3.28
% Increase	51.30	21.76	56.36	67.12	27.13



Field day organized at farmer's field

3. Yield

- The average yield of CFLDs was 12.80 q/ha, 7.50 q/ha more than average district yield (5.30 q/ha), and 8.66 q/ha higher than the state average yield (4.14 q/ha).

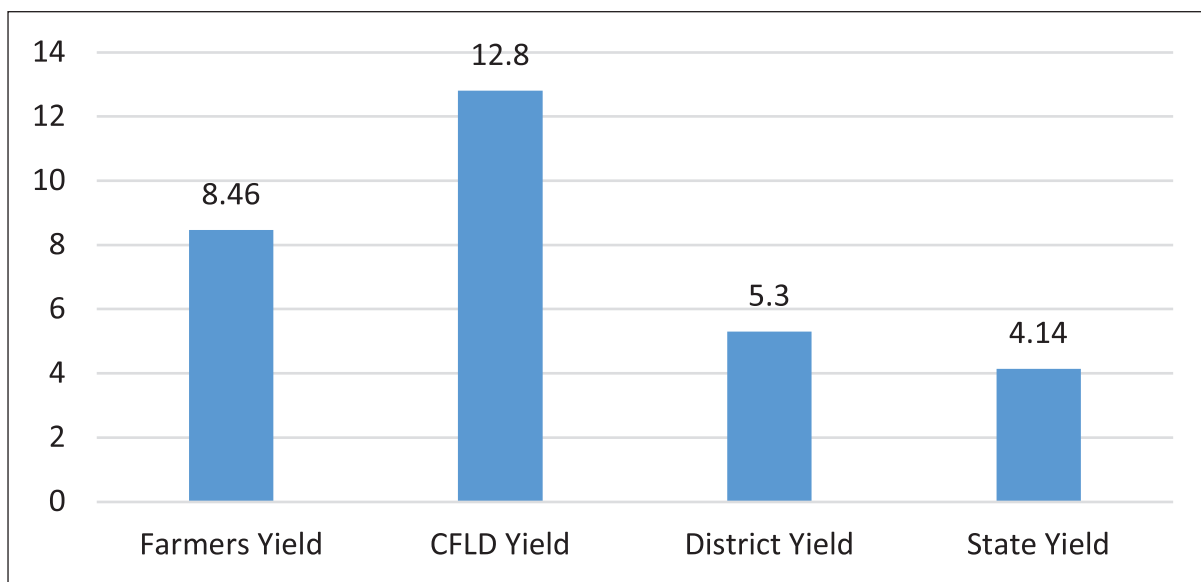


Fig. 8 Comparative average yield (q/ha) of Black gram in Chittorgarh district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities etc. also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular follow-up visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and ascertain farmer reaction for applying accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry were found in increasing the yield of Black gram.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- Weeds management through Spray of Pre-emergence herbicide-Pendimethalin (1.25 kb a.i.) and post-emergence herbicides –Imazethapyr (500ml/ha) after 20-25 days of sowing minimized the weed population.
- All partner farmers kept factsheets during crop season, and they filled all relevant observations. Thereby farmers have become empowered to provide scientific community feedback and sustainability of technology packages to farmers and other extension personnel.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmer prefers high-yielding urd bean variety Pratap Urd-1 and promoted this variety to other farmers.
- He has kept 30-35% produce of CFLD as seed and distribute to farmers of the village- Nanga Khera.

KRISHI VIGYAN KENDRA, SIKAR (RAJASTHAN)

Sh. Mangal Chand Jat

Village- Sulyawas, Via-Dantaramgarh,
District- Sikar (Rajasthan)



1. Technology demonstrated

Variety: IPM-02-3

Seed rate: 12-15 kg seed/ha.

Nutrient management

- Soil application of N: P₂O₅:K₂O:S (15:35:0:20).

Weed management

- Spraying of Imazethapyr a.i. 10 SL @ 0.5 litre/ ha in 500-600 litre of water at 20-25 DAS.

Disease management

- *Blight*: Spraying of Mancozeb 45 WP @ 2.0 g/l (2 kg/ha).

Insect management

- *Aphid, whitefly and thrips*: Spraying of Imidacloprid @ 0.5 ml/l 10-15 days' intervals if required (prevent whitefly infestations).

2. Performance of technology

- The average yield of green gram CFLDs was 12.54 q/ha, whereas farmers' practices were 7.76 q/ha.
- The average yield of green gram CFLDs was 61.60% higher than farmer's practices.
- The net income of CFLDs was Rs. 37952.00, while farmer's practices net income was Rs. 30253.00. Thus, farmers got Rs. 7699.00 per ha. Additional income through CFLDs.
- B: C ratio of CFLDs was recorded 3.08 as compared to farmer's practices 2.88.

Table 9 Performance of green gram production technology in Sikar during Kharif 2016

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	7.76	18807.27	43059.77	30253.00	2.88
CFLD	12.54	27968.00	65919.50	37952.00	3.08
% Increase	61.60	48.70	53.08	25.45	6.94



Field day organized at farmer's field

3. Yield

- The average yield of CFLDs was 12.54 q/ha, which was 4.29 q/ha higher than average district yield (8.25 q/ha), 7.59 q/ha higher than the state average yield (4.95 q/ha), and 8.38 q/ha higher than the national average yield (4.16 q/ha).

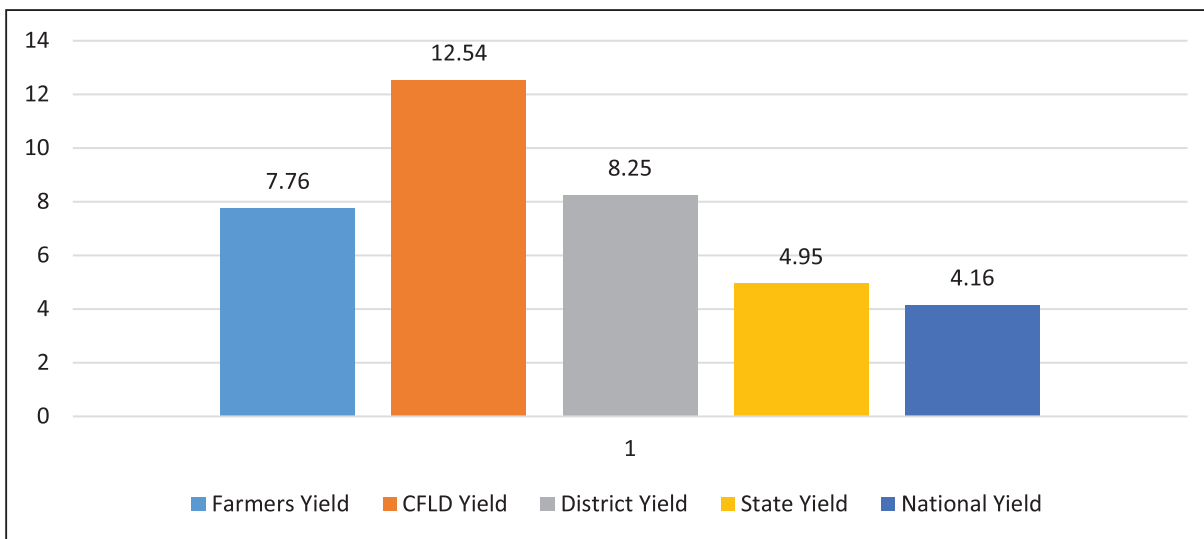


Fig. 9 Performance of Green gram in Sikar district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through technical sessions and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities, etc., also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular follow-up visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and also ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of a Green gram.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- Weeds management through Imazethapyr a.i. 10 SL@ 0.5 litre/ ha in 500-600 litre of water at 20-25 DAS minimized the weed population.
- All partner farmers kept factsheets during crop season and they filled all relevant observations. Thereby farmers have become empowered to provide scientific community feedback and sustainability of technology packages to farmers and another extension personal.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmers prefer high-yielding green gram variety IPM-02-3 and promoted this variety to other farmers.
- He kept 30-35% produce of CFLD as seed for the farmer to farmer extension in same & nearby villages.



KRISHI VIGYAN KENDRA, AJMER (RAJASTHAN)

Sh. Nathu Lal S/o Nand Ram

Village-Kumarikheda, Madhopura
Post-Sarwar, District-Ajmer (Rajasthan)



1. Technology demonstrated

Variety: IPM-02-3

Seed rate: 16 kg seed/ha.

Seed treatment

- Carbendazim 1 gm/kg seed + NPK consortia @ 5 ml/kg seed

Nutrient management

- Soil application of 15 kg N & 35 Kg P₂O₅ Sulphur @ 20 kg/ha.

Weed management

- Spraying of Imazethapyr 10% SL @ 40 gm ai/ha as early post-emergence weedicide (20 DAS) and followed by manual weeding.

Disease management

- *Blight*: Spraying of Carbendazim + Mancozeb @ 2gm/l.

Insect/Pest management

- *Whitefly & Jassids*: Spraying of Imidacloprid 0.5 ml/water at flowering stage.

2. Performance of technology

- The average yield of green gram CFLDs was obtained at 13.50 q/ha, whereas farmer's practices were 9.20 q/ha.
- The average yield of green gram CFLDs was 46.74% higher than farmer's practices.
- The net income of CFLDs was Rs. 48404.00, while farmer's practices net income was Rs. 29215.00. Thus, farmers got Rs. 19189.00 per ha. Additional income under CFLDs.
- B: C ratio of CFLDs was recorded 3.53 as compared to farmer's practices 2.74.

Table 10 Performance of green gram production technology in Ajmer during Kharif 2017

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	9.20	20426.77	44641.77	29215.00	2.74
CFLD	13.50	25753.85	74157.85	48404.00	3.53
% Increase	46.74	66.94	66.12	65.68	28.83



Field day organized at farmer's field

3. Yield

- The average yield of CFLDs was 13.50 q/ha, which was 6.92 q/ha higher than the average district yield (6.58 q/ha), 9.18 q/ha higher than the state average yield (4.32 q/ha), and 8.69 q/ha higher than the national average yield (4.81 q/ha).

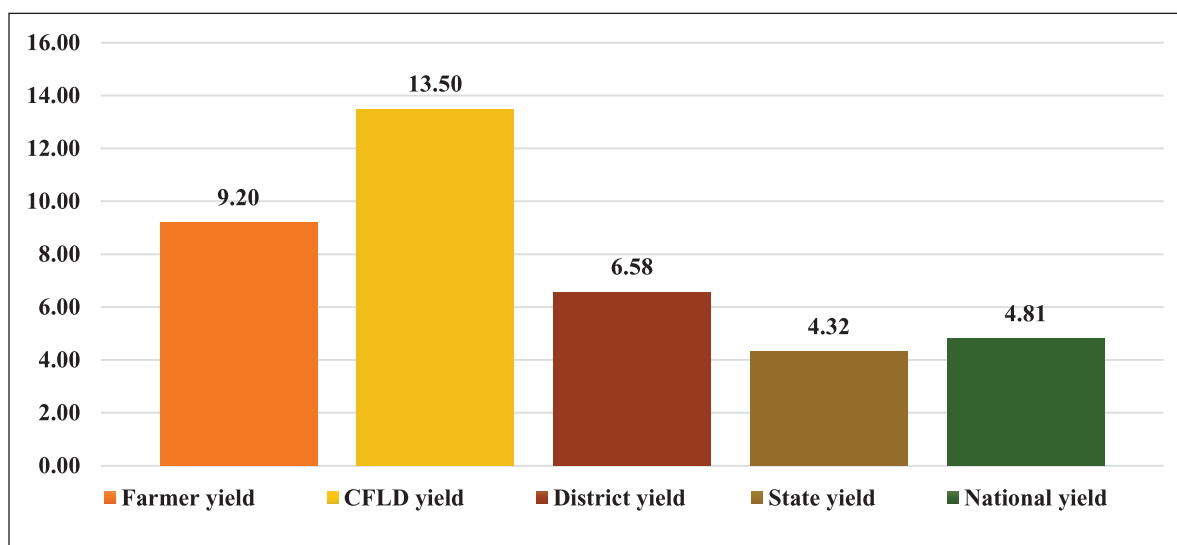


Fig. 10 Performance of green gram in Ajmer district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities, etc., also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular follow-up visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and ascertain farmer reaction for applying accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of a Green gram.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- Weeds management through Imazethapyr 10% SL @ 40 gm ai/ha as early post-emergence weedicide (20 DAS) and followed by manual weeding minimized the weed population.
- All partner farmers kept factsheets during crop season, and they filled all relevant observations. Thereby farmers have become empowered to provide scientific community feedback and sustainability of technology packages to farmers and other extension personal.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmers prefer high-yielding green gram variety IPM-02-3 and promoted this variety to other farmers.
- He kept 30-35% produce of CFLD as seed for farmer to farmer extension.



KRISHI VIGYAN KENDRA, DHOLPUR (RAJASTHAN)

Sh. Rambabu S/o Sh. Lohre

Village- Gopalpura, PS-Saipau
District- Dholpur (Rajasthan)



1. Technology demonstrated

Variety: IPM 02-3

Seed rate: 12-20 kg/ha

Nutrient management

- Soil application of 4-4.5 tonnes of FYM with Rhizobium culture, Zinc sulphate 33% @15kg/ha.

Weed management

- Spray of post-emergence herbicide Imazethapyr 10% SL @ 400gm/ha after 20-25 days of sowing.

Disease & Pest Management

- Seed treatment with Carbendazim 2g/kg seed or Tebuconazole (Raxil 2% DS) @ 1.25g/kg or Trichoderma viride 7 gm/kg seed.
- *Root and Collar Rot:* Above-mentioned seed treatment and soil application of Trichoderma viride 2.5 kg + 100 kg cow dung per ha.
- After 25-day spraying of Dimethoate 30% EC 2 ml/l water spray for sucking pest management. 45-day green gram crop pod borer was attacking, therefore, spraying of quinalphos two ml/l water.

2. Performance of technology:

- The average yield of green gram CFLDs was obtained at 12.5 q/ha, whereas the farmer's practice was 9.7 q/ha.
- The average yield of green gram CFLDs was 28.87% higher than farmer's practices.
- The net income of CFLDs was Rs. 67667.50, while farmer's practices net income was Rs. 49390.00. Thus, farmers got Rs. 18277.50 per ha. additional income through CFLDs.
- B: C ratio of CFLDs was recorded 3.50 as compared to farmer's practices 2.67.

Table 11 Performance of green gram production technology in Dholpur during Kharif 2018

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	9.7	18500.00	67890.00	49390.00	2.67
CFLD	12.5	19520.00	80282.00	67667.50	3.50
% Increase	28.86	5.51	18.25	37.00	31.08



Field visit at farmer's field

3. Yield

- The average yield of CFLDs was 12.5 q/ha, which was 8.14 q/ha higher than the average district yield (4.36 q/ha), 8.18 q/ha higher than the state average yield (4.32 q/ha).

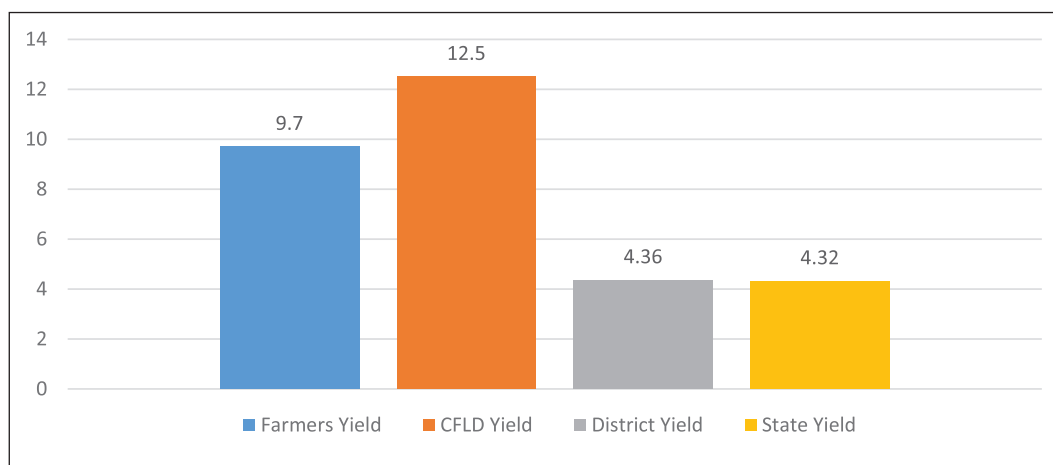


Fig. 11 Comparative average yield (q/ha) of green gram in Dholpur district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities, etc., also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular following visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Green gram.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- Weeds management through One hand weeding after 20- 25 days sowing and Spray of post-emergence herbicide Imazethapyr 10% SL @400gm/ha minimized the weed population.
- All partner farmers kept factsheets during crop season, and they filled all relevant observations. Thereby farmers have become empowered to provide scientific community feedback and sustainability of technology packages to farmers and other extension personal.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmers prefer high-yielding green gram variety IPM 02-3 and promoted this variety to other farmers.
- He kept 30-35% produce of CFLD as seed and the farmer to farmer exchange in village & neighboring villages.



KRISHI VIGYAN KENDRA, BHIWANI (HARYANA)

Sh. Pawan Kumar S/o Sh. Bhana Ram

VPO- Surpura Kalan, Block- Bahal
Tehsil- Loharu, District –Bhiwani



1. Technology demonstrated

Variety: MH-421

Seed rate: 15-20 Kg seed per ha. in line sowing.

Nutrients management

- Soil application of 15 Kg N/ha and 40 Kg/ha P₂O₅ per ha+20 kg Sulphur.

Weed management

- Timely weed management by manually at 25 DAS and 45 DAS.

Disease management

- Seed treatment with biofertilizer (Rhizotika+PSB) and Bavistin 2.5 g/Kg seed.

Insect management

- Two sprays of imidacloprid @500 ml/ha in 500 ltr. Water at 10-15 days interval.

2. Performance of technology

- The yield of green gram CFLD was obtained at 10.00 q/ha, whereas farmer practices was 7.80 q/ha.
- The average yield of green gram CFLD was 28.20% higher than farmer practices.

Table 12 Performance of green gram production technology in Bhiwani during Kharif 2018

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	7.80	12250.00	32760.00	20510.00	1.67
CFLD	10.00	13750.00	42000.00	28250.00	2.05
% Increase	28.20	12.24	28.21	37.74	22.75



Demonstration of seed treatment at farmer field

3. Yield

- The average yield of CFLDs was 10.00 q/ha, which was 4.20 q/ha higher than the average district yield (5.80 q/ha), 4.50 q/ha higher than the state average yield (5.50 q/ha).

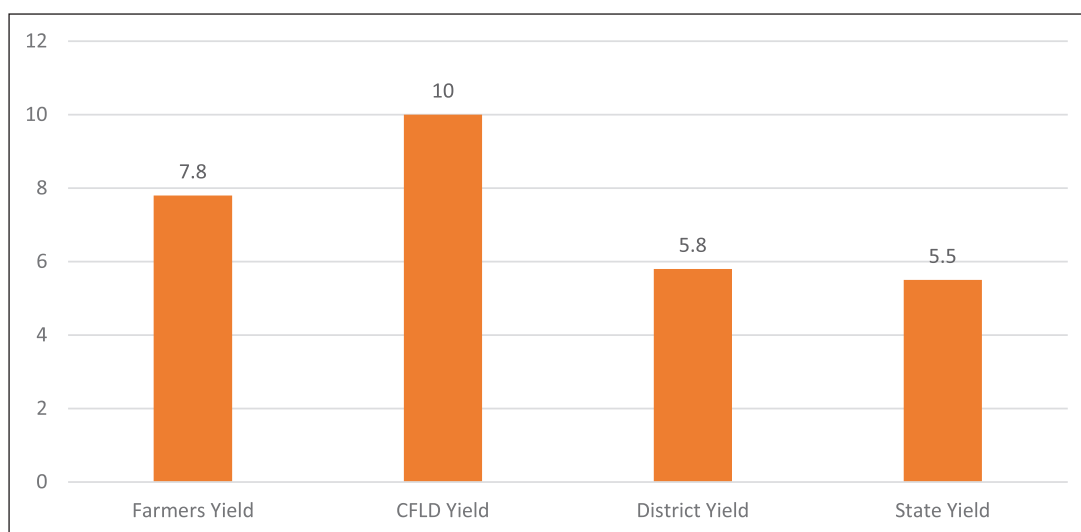


Fig. 12 Comparative average yield (q/ha) of green gram in Bhiwani district of Haryana

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities etc. also organized.
- Local agricultural departments and progressive farmers were invited for sharing their field experiences.

- Regular following visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and also ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Green gram.
- Balanced and need based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- Weeds management through manually at 25 DAS and 35 DAS minimized the weed population.
- All partner farmers kept factsheets during crop season and they filled all relevant observations. Thereby farmers have become empowered to provide feedback to scientific community and sustainability of technology packages to farmers and other extension personal.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmers prefer the high-yielding green gram variety MH-421 and promoted this variety to other farmers.
- He kept 30-35% produce of CFLD as seed and farmer to farmer exchange in the village & neighboring villages.

KRISHI VIGYAN KENDRA, HANUMANGARH-I (RAJASTHAN)

Smt. Sukhjeet Kaur W/o Sh. Sadhu Singh

VPO- Jandawala Sikhan,
District- Hanumangarh (Rajasthan)



1. Technology demonstrated

Variety: MH-421

Seed rate: 12-15 kg/ha.

Soil treatment: *Trichoderma harzianum* @ 5 kg per ha.

Nutrient management

- 20 kg/ha N, 40 kg/ha P₂O₅ as soil application through 88 kg DAP & 9 kg urea.

Weed management

- Spraying of post-emergence herbicide Imazethapyr 10% SL @ 40 gm a.i. per ha. in 400-500 litre water at 20-25 days of sowing.

Plant Protection measures

- Two spray of each COTTO 12 @ 1 ml/lit. Water for management of whitefly and DAMAN A 47 @ 1 ml/l water for pod borer.

2. Technology demonstrated

- The yield of green gram CFLD was obtained at 15.20 q/ha, whereas farmer's practice was 8.80 q/ha.
- The yield of green gram CFLDs was 72.72% higher than farmer's practices.
- The net income of CFLDs was Rs. 66088.00, while farmer's practices net income was Rs. 33805.00. Thus, farmers got Rs. 32283.00 per ha. Additional income through CFLDs.
- B:C ratio of CFLDs were recorded 3.60 as compared to farmer's practices 2.30.

Table 13 Performance of green gram production technology in Hanumangarh during Kharif 2019

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	8.80	14595.00	48400.00	33805.00	2.30
CFLD	15.20	17512.00	83600.00	66088.00	3.60
% Increase	72.72	19.98	72.72	95.49	56.52



Field day organized at farmer's field

3. Yield

- The average yield of CFLD was 15.2 q/ha, which was 9.27 q/ha higher than average district yield (5.93 q/ha) and 10.88 q/ha higher than the state average yield (4.32 q/ha).

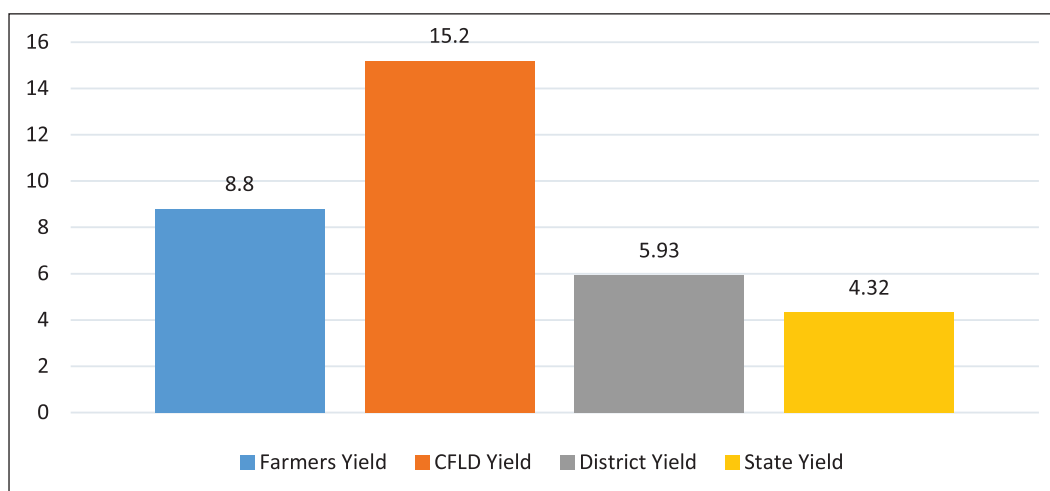


Fig. 13 Comparative yield (q/ha) of mung bean in Hanumangarh district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through the technical session and field visits.

- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities etc. also organized.
- Local agricultural departments and progressive farmers were invited to share their field experiences.
- Regular following visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Green gram.
- Balanced and need-based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- Weeds management through spraying of post-emergence herbicide Imazethapyr 10% SL @ 40 gram a.i. per ha. in 400-500 liter water at 35 DAS minimized the weed population.
- All partner farmers kept factsheets during crop season and they filled all relevant observations. Thereby farmers have become empowered to provide scientific community feedback and sustainability of technology packages to farmers and other extension personal.

6. Farmer's feedback

- Farmers showed interest in following all crop improvement components like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM, and IPM.
- Farmers prefer the high-yielding green gram variety MH-421 and promoted this variety to other farmers.
- She kept 30-35% produce of CFLD as seed and farmer to farmer exchange in the village & neighboring villages.

KRISHI VIGYAN KENDRA, JAMNAGAR (GUJARAT)

Sh. Dangar Ramjibhai Murubhai

Village: Nesda, Taluka: Jodiya, District: Jamnagar
State- Gujrat



1. Technology demonstrated

Variety: GG-5

Seed rate: 80 kg seed/ha.

Seed treatment: Rhizobium + P.S.M. (500 ml each).

Nutrient management

- 20 kg N+40 kg P₂O₅/ha.

Weed management: Hand hoeing at 25 DAS.

Insect/Pest management

- Installation of Pheromone trap and spraying of Beauveria bassiana, HaNPV.

2. Performance of technology

- The average yield of chickpea CFLD was obtained 25.00 q/ha, whereas farmer's practice was 21.25 q/ha. The average yield of chickpea CFLDs was 17.65% higher than farmer's practices.
- The net income of CFLDs was Rs. 102250.00 while farmer's practices net income was Rs. 81363.00. Thus, farmers got Rs. 20887.00 per ha. additional income through CFLDs.
- B:C ratio of CFLDs was recorded 3.70 as compared to farmer's practices 2.86, which lower from CFLDs plot.

Table 14 Performance of chickpea production technology in Jamnagar during rabi 2016-17

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	21.25	30200.00	111563.00	81363.00	2.86
CFLD	25.00	32000.00	131250.00	102250.00	3.70
% Increase	17.65	5.96	17.65	25.67	29.37



Field day organized at farmer's field

3. Yield

- The average yield of CFLDs was 25.00 q/ha, which was 14.39 q/ha higher than average district yield (10.61 q/ha), 8.18 q/ha higher than state average yield (11.24 q/ha) and 15.49 q/ha higher than national average yield (9.51 q/ha).
- The average yield of CFLDs was recorded 2.00 q/ha lower as compared to potential yield which is 27.00 q/ha.

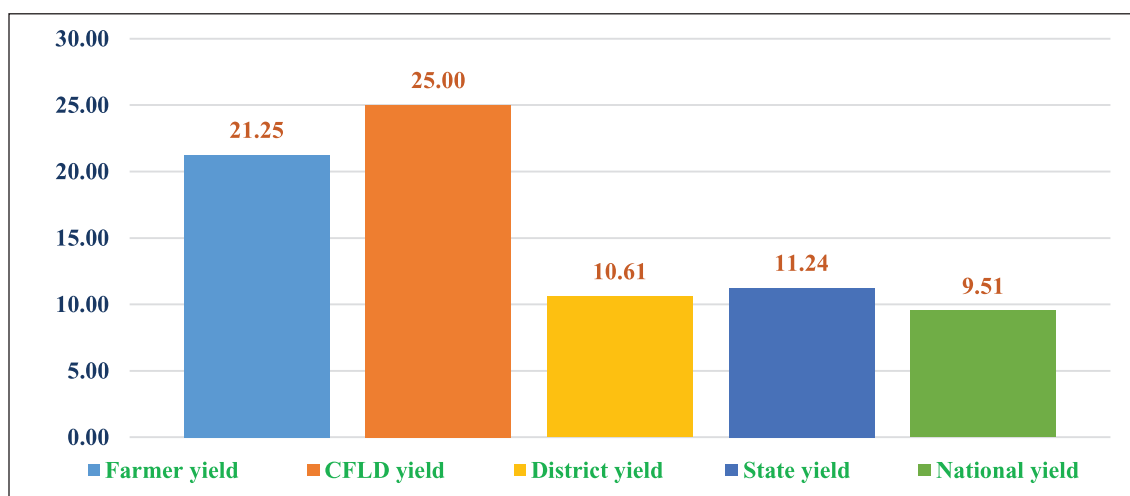


Fig. 14 Comparative average yield (q/ha) of chickpea in Jamnagar district of Gujarat

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities etc. also organized.
- Local agricultural departments and progressive farmers were invited for sharing their field experiences.
- Regular following visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and also ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Chickpea.
- Balanced and need based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- Weeds management by manually hand weeding at 25 DAS minimized the weed population.
- All partner farmers kept factsheets during crop season and all relevant observations were filled by them. Thereby farmers have become empowered to provide feedback to scientific community and sustainability of technology packages to farmers and other extension personal.

6. Farmer's feedback

- Farmers showed interest to follow the all components of crop improvement like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM and IPM.
- Farmer prefer high yielding chickpea variety GG-5 and promotes this variety to other farmers.
- He kept 30-35% produce of CFLD as seed and for farmer to farmer exchange in village & neighboring villages.



KRISHI VIGYAN KENDRA BUNDI (RAJASTHAN)

Sh. Shambhu Lal S/o Sh. Heera Lal Gurjar

Village-Bagali Tehsil- Bundi
District-Bundi (Rajasthan)



1. Technology demonstrated

Variety: GNG-1958

Seed rate: 75 kg seed/ha.

Seed treatment

- Carbendazim 1g/kg followed by Chlorpyrifos 25 % EC 6 ml/kg seed.

Weed management

- Spraying of pre emergence herbicide- Pendimethalin 1 kg a.i./ha.

Insect/pest management

- Spraying of Profenophos @1.0l/ha against defoliators and leaf eating caterpillar.

2. Performance of technology

- The average yield of chickpea CFLD was obtained 26.00 q/ha, where as in farmer's practices yield 19.50 q/ha.
- The average yield of chickpea CFLDs was 25.00% higher than farmer's practices.
- The net income of CFLDs was Rs. 89626.00, while farmer's practices net income was Rs. 63490.00. Thus, farmers got Rs. 26136.00 per ha. additional income through CFLDs.
- B:C ratio of CFLDs was recorded 3.94 as compared to farmer's practices 3.39.

Table 15 Performance of chickpea production technology in Bundi during rabi 2018-19

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	19.50	26600.00	90090.00	63490.00	3.39
CFLD	26.00	30494.00	120120.00	89626.00	3.94
% Increase	33.33	14.63	33.34	41.16	16.22



Field visit at farmer's field

3. Yield

- The average yield of CFLDs was 26.00 q/ha, which was 10.91 q/ha higher than average district yield (15.09 q/ha), 16.89 q/ha higher than state average yield (9.11 q/ha) and 15.37 q/ha higher than national average yield (10.63 q/ha).

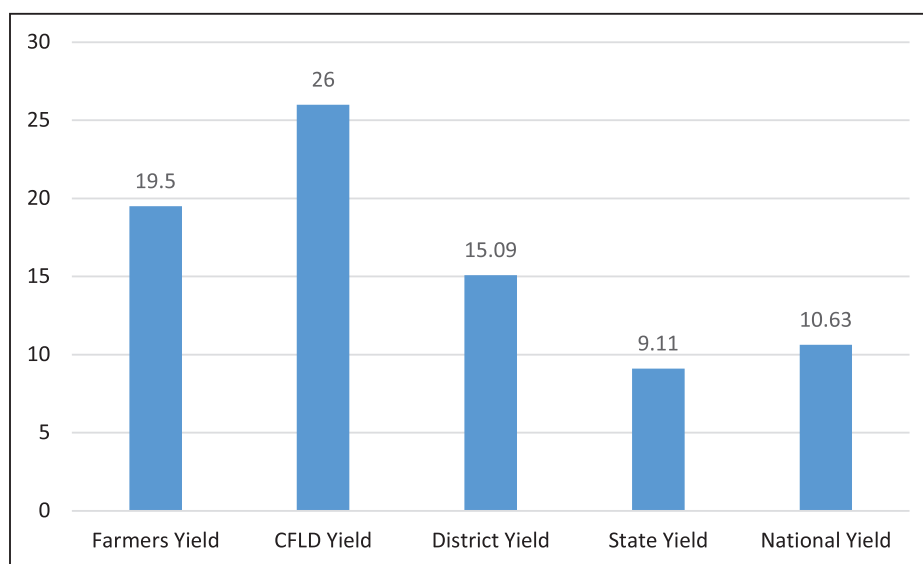


Fig. 15 Comparative average yield (q/ha) of chickpea in Bundi district of Rajasthan

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/consultancy, extension activities etc. also organized.
- Local agricultural departments and progressive farmers were invited for sharing their field experiences.
- Regular following visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and also ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- Timely sowing and recommended crop geometry managed the yield of Chickpea.
- Balanced and need based use of fertilizers helped in increasing the yield.
- Seed treatment and timely use of fungicides and insecticides helped in disease and insect management.
- Weeds management by manually hand weeding at 25 DAS minimized the weed population.
- All partner farmers kept factsheets during crop season and all relevant observations were filled by them. Thereby farmers have become empowered to provide feedback to scientific community and sustainability of technology packages to farmers and other extension personal.

6. Farmer's feedback

- Farmers showed interest to follow all components of crop improvement like; crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM and IPM.
- Farmer prefer high yielding chickpea variety GNG-1958 and promoted this variety to other farmers.
- He kept 30-35% produce of CFLD as seed and for farmer to farmer exchange in village & neighboring villages.

KRISHI VIGYAN KENDRA, HISAR (HARYANA)

Sh. Narender S/o Sh. Bhoop Singh

Village- Chirod

District- Hisar (Haryana)



1. Technology demonstrated

Variety: CSJ-515

Seed rate: Proper seed rate i.e. 37.5-45 Kg/ha and 25% more seed under late sown conditions.

Nutrient management

- Seed treatment with Rhizobium culture & PSB culture @400ml/ha and basal dose of 32.5 Kg Urea & 250 Kg SSP or only 87.5 Kg DAP per ha at time of sowing. Apply 10 Kg Zinc Sulphate before last ploughing under Irrigated conditions.

Weed management

- Manage the weeds by two weeding & hoeing at 30 DAS & 50 DAS.

Disease management

- Seed treatment with Carbendazim (2.5g/kg seed) or Trichoderma viride @4 gm/kg seed + Vitavax@1 gm/kg seed.
- *Management of wilt:* Avoid sowing before 10 October. Maintain proper moisture in field. Seed treatment with Bavistin @ 2.5g/kg seed has been found effective for management of wilt.

Insect management

- *Management of termite:* Seed treatment with Chlorpyrifos @15ml/kg seed.
- *Management of Pod borer:* Spraying of quinalphos 1000 ml or 375 ml Remon (Novaluron 10 EC) per ha with 375 ml water when one larva spotted in one-meter plant row length.

2. Performance of technology

- The average yield of chickpea CFLDs was 20.5 q/ha, whereas farmer's practice was 16.8q/ha.
- The average yield of chickpea CFLDs was 22% higher than farmer's practices.

- The net income of CFLDs was Rs. 68045.00, while farmer's practices net income was Rs. 50780.00. Thus, farmers got 33% per ha. additional income through CFLDs.
- The B:C ratio of CFLDs was recorded 3.71 as compared to farmer's practices 3.19, which is lower from CFLDs.

Table 16 Performance of chickpea production technology in Hisar during rabi 2018-19

Practice used	Average Yield (q/ha)	Average Gross cost (Rs/ha)	Average Gross income (Rs/ha)	Average Net income (Rs/ha)	B:C ratio
Farmer practices	16.8	25000.00	73880.00	50780.00	3.19
CFLD	20.5	24005.00	89050.00	68045.00	3.71
% Increase	22.02	-3.98	20.53	34.00	16.30



Field day organized at farmer's field

3. Yield

- The yield of CFLDs was observed 20.50 q/ha, which was 3.70 q/ha higher than farmer practice.
- The average yield of CFLDs was 20.5 q/ha, which was 3.96 q/ha higher than average district yield (16.54 q/ha), 6.65 q/ha higher than state average yield (13.85 q/ha).

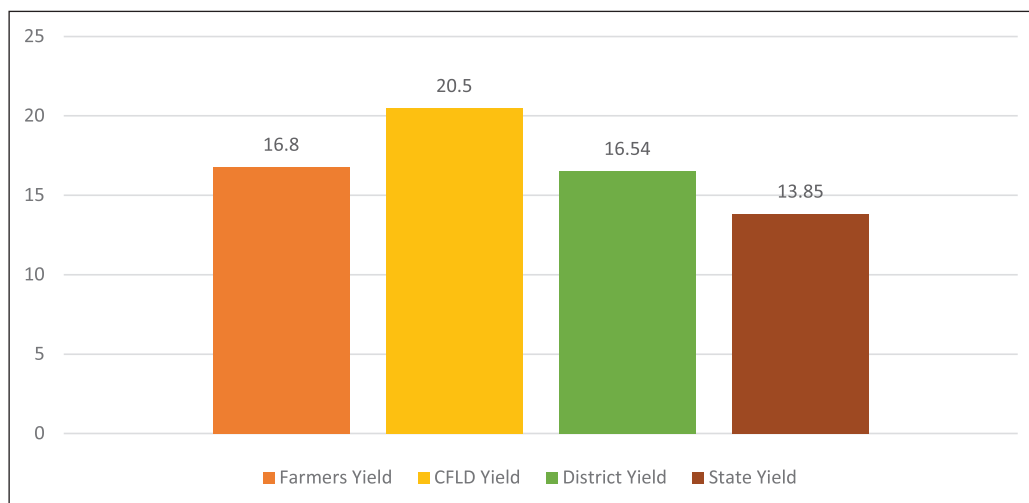


Fig. 16 Comparative average yield (q/ha) of chickpea in Hisar district of Haryana

4. Institutional involvement

- ICAR-ATARI Zone-II, Jodhpur, organized workshop cum training programs and group meetings for nodal officers of all KVKs and trained them through technical session and field visits.
- Nodal officers of KVKs imparted the training for farmers before and implementation of CFLDs, timely field visits made by Subject Matter Specialists, telephonic advisory/ consultancy, extension activities etc. also organized.
- Local agricultural departments and progressive farmers were invited for sharing their field experiences.
- Regular following visits before sowing, after 20 days sowing, to assess crop stands at the time of insect pest management and maturity stage and also ascertain farmer reaction for application of accepted technologies and reason for rejection.

5. Success point

- High yielding variety of chickpea gave maximum yield.
- Timely sowing and recommended crop geometry managed the yield of chickpea.
- Balanced and need based use of fertilizers helped in increasing the yield.
- Weeds management through timely weeding and hoeing minimized the weeds population.
- Seed treatment and timely used of fungicides and insecticides helped in disease and insect management.

6. Farmer's feedback

- The farmer showed interest in follow all parameters of crop improvement like; Crop geometry, optimum seed rate, timely sowing, seed treatment, INM, IWM, IDM and IPM.
- Farmers' prefer high yielding chickpea variety i.e., CSJ-515. Farmers also promoted this variety to other farmers.
- He kept 30-35% produce of CFLD as seed and for farmer to farmer exchange in village & neighboring villages.





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