P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating (2025): 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 9; September 2025; Page No. 371-376

Received: 05-07-2025
Accepted: 07-08-2025

Indexed Journal
Peer Reviewed Journal

Extent of adoption of recommended interventions for chickpea by the chickpea growers

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DOI: https://www.doi.org/10.33545/26180723.2025.v8.i9f.2429

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Abstract

Food security, a critical issue in India, demands consistent efforts in improving the availability, accessibility, and affordability of nutritious food. The National Food Security Mission (NFSM) was launched to address declining yield growth and ensure sustainable agricultural productivity. This study evaluates the impact of NFSM interventions on the adoption of chickpea production technology in the Ajmer district of Rajasthan, a major chickpea-producing region. A total of 400 farmers—200 beneficiaries and 200 non-beneficiaries—were surveyed across six Panchayat Samitis to assess the extent of adoption of recommended practices such as high-yielding varieties, field preparation, seed treatment, and plant protection measures. Results indicated that 24.8% of growers showed a high level of adoption, with beneficiary farmers demonstrating significantly greater adoption levels (64.19 Mean Percent Score) compared to non-beneficiaries (48.90 MPS). Practice-wise analysis revealed statistically significant differences in eight out of nine practices, confirming the positive influence of NFSM support. The findings emphasize the importance of targeted extension programs and structured policy interventions in enhancing technology adoption and achieving food security goals.

Keywords: Food security, NFSM, chickpea, adoption, production technology

Introduction

Food security is a multidimensional concept that ensures all individuals have access to adequate, safe, and nutritious food at all times to lead an active and healthy life. It encompasses three fundamental components: availability, accessibility, and affordability. Availability refers to the consistent production of food within the country, imports when necessary, and buffer stock maintenance. Accessibility implies the physical and economic reach of food to every individual, and affordability ensures that individuals have the economic means to acquire adequate and nutritious food for a balanced diet.

Over the past several decades, India has faced significant challenges in maintaining its food grain production. During 1986-1997, the annual growth rate in food grain production was recorded at 2.93%, which declined to 0.93% between 1996 and 2008. This downturn was not only due to a reduction in the area under cultivation but more critically due to a decline in crop yields. Yield growth fell sharply from 3.21% to 1.04% over the same period, raising concerns about future food security, especially given the rising population and growing consumption needs. NFSM is unique in that it sets quantifiable targets and focuses on districts with high yield potential but currently low productivity. It provides direct support to farmers in the form of quality seeds, soil amendments (like gypsum, lime, and micronutrients), modern farm machinery, and pest management tools. Furthermore, it emphasizes farmer education and awareness through Farmer Field Schools (FFS) and on-field demonstrations to improve knowledge and adoption of modern farming techniques.

In the state of Rajasthan, NFSM is actively implemented across several districts under various components: 13 districts for wheat, 33 for pulses, and 12 for coarse cereals. The pulse component, especially, has received considerable attention because a significant proportion of India's population remains untouched by the benefits of the Green Revolution and continues to suffer from protein-energy malnutrition. Among the pulse crops, chickpea (*Cicer arietinum* L.), also known as Bengal gram or gram, holds a prominent place due to its adaptability, high protein content (17-21%), and substantial agronomic and nutritional value. Chickpea serves not only as a primary dietary source of protein for India’s predominantly vegetarian population but also plays an important ecological role. It enhances soil fertility through biological nitrogen fixation, improves phosphorus availability, and supports sustainable cropping systems through intercropping and crop rotation. Rajasthan is a key contributor to India's chickpea output. In 2021-22, it cultivated chickpea over 22.52 lakh hectares, producing 26.50 million tonnes with a productivity of 1177 kg/ha. Specifically, Ajmer district cultivated chickpea over 1.95 lakh hectares, yielding 2.10 million tonnes at an average productivity of 1074 kg/ha.

Methods and Materials

The present study was conducted in Ajmer district of Rajasthan (Fig.3.1). Ajmer district has been selected purposely as it in having maximum production of chickpea crops in Rajasthan state during 2019-20. There are eleven

Panchayat Samiti in Ajmer district. Out of which the demonstrations on Chickpea were conducted in six Panchayat Samities under National Food Security Mission. Thus, all the Panchayat Samities having demonstrations of Chickpea have been selected for the study. Therefore, six Panchayat Samiti namely Shreenagar, Silora, Kekri, Arai, Sarwar and Bhinay were taken for the study.

Table 1: Selection of Panchayat Samiti in Ajmer district

S. No.	Panchayat Samities	No. of Beneficiary (Chickpea)
1.	Shreenagar	300
2.	Silora	200
3.	Kekri	500
4.	Arai	200
5.	Sarwar	500
6.	Bhinay	300
Total		2000

Table 2: Village wise Details of selected respondents

S. No.	Panchayat Samiti	Name of Villages	No. of Respondents	
			Beneficiaries	Non-Beneficiaries
1.	Shreenagar	1- Tihari	15	15
		2- Lavera	15	15
2.	Silora	1- Bhadun	10	10
		2- Patan	10	10
3.	Kekri	1- Manda	25	25
		2- Baghera	25	25
4.	Arai	1- Mundoti	10	10
		2- Laxmipura	10	10
5.	Sarwar	1- Tantoti	25	25
		2- Banti	25	25
6.	Bhinay	1- Bubkiya	15	15
		2- Chanpaneri	15	15
Total		12	200	200

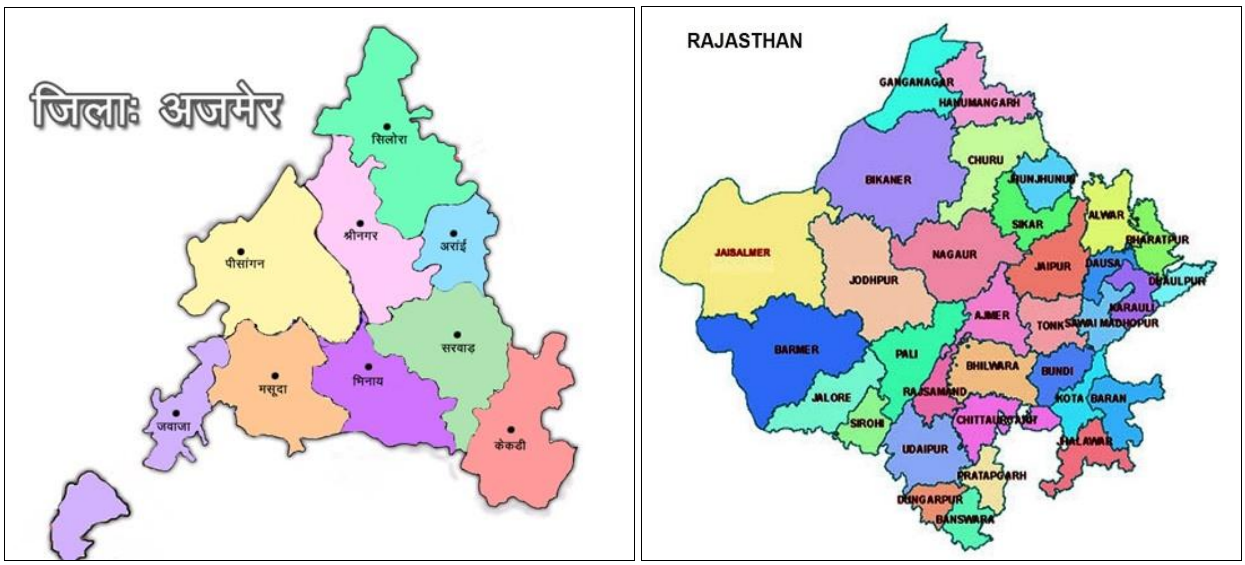

Fig 1: District wise map of Rajasthan and Block wise map of Ajmer district

Table 3: Major aspects of knowledge level measurement and their scores distribution (Chickpea)

S. No.	Aspect	No. of Questions	Maximum Score
1	Field preparation	3	7
2	Use of high yielding varieties	9	12
3	Seed sowing, Seed rate and spacing	4	4
4	Seed treatment	2	4
5	Manure and fertilizer application	9	11
6	Irrigation management	2	3
7	Weed management	3	4
8	Plant protection measures	7	13
9	Harvesting, threshing and storage	4	6
Total		43	64

Results and Discussion

National Food Security Mission offers assistance to determine the adoption level of recommended chickpea technologies introduced to beneficiary growers in Ajmer, Rajasthan, under the National Food Security Mission (NFSM). The NFSM supports growers by providing assistance for inputs like high-yielding varieties, soil amendments, micronutrients, farm machinery and integrated pest management among the beneficiary growers of Ajmer district of Rajasthan.

Distribution of chickpea growers according to their level of adoption about chickpea production technology

To get an overview of adoption level, the growers were divided into three categories as presented in table 4.17. Table depicts that 53.0 per cent of the total growers were in the medium level of adoption group, whereas, 24.8 per cent growers were in high level of adoption group and remaining 22.3 per cent chickpea growers were observed in the low level of adoption about recommended chickpea production technology Dhayal *et al.*, (2019) [4], Dwivedi *et al.*, (2015) [6] and Tripathi *et al.*, (2015) [15].

Table 4: Distribution of chickpea growers according to their level of adoption about chickpea production technology (N=400)

S. No.	Adoption Level	Non-beneficiary growers		Beneficiary growers		Total	
		F	%	F	%	F	%
1.	Low (<39.44)	58	29.0	31	15.5	89	22.3
2.	Medium (39.44 to 73.72)	116	58.0	96	48.0	212	53.0
3.	High (>73.72)	26	13.0	73	36.5	99	24.8
	Total	200	100.0	200	100	400	100

f = Frequency,% = per cent mean 56.58 S.D. 17.14

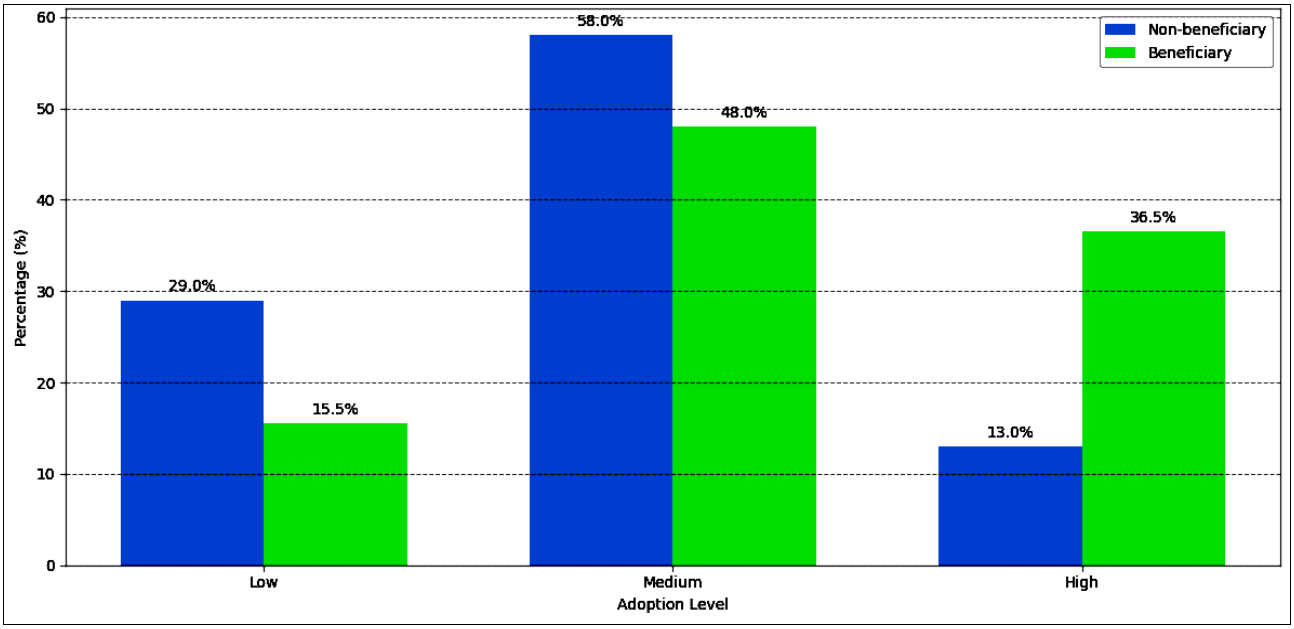

Fig 2: Comparison of Adoption levels between beneficiary and non-beneficiary chickpea growers

Further, among the categories of chickpea growers, it was observed that 48.0 per cent beneficiary growers and 58.0 per cent non-beneficiary growers were in medium level of adoption category. Whereas, 15.5 per cent beneficiary growers and 29.0 per cent non-beneficiary growers were noted in the low level of adoption category. Likewise, 36.5 per cent and 13.0 per cent beneficiary and non-beneficiary growers possessed high level of adoption, respectively about recommended chickpea production technology (Fig. 2). Thus, from the above results, it can be concluded that beneficiary chickpea growers had more adoption about recommended chickpea production technology than non-beneficiary chickpea growers in the study area Rai *et al.*, (2020) [11].

Practice wise extent of adoption among chickpea growers

The production technology as field preparation, use of high yielding varieties, seed sowing seed rate and spacing, seed treatment, manure and fertilizer application, irrigation management, weed management, plan protection measures and harvesting, threshing and storage were introduced under National Food Security Mission in the study area. The study made an effort to assess the intervention-wise extent of adoption among chickpea growers. The results of the same have been given in table 4 Choudhary *et al.*, (2017) [3], Dhyani *et al.*, (2016) [5] and Sirohiya *et al.*, (2018) [13].

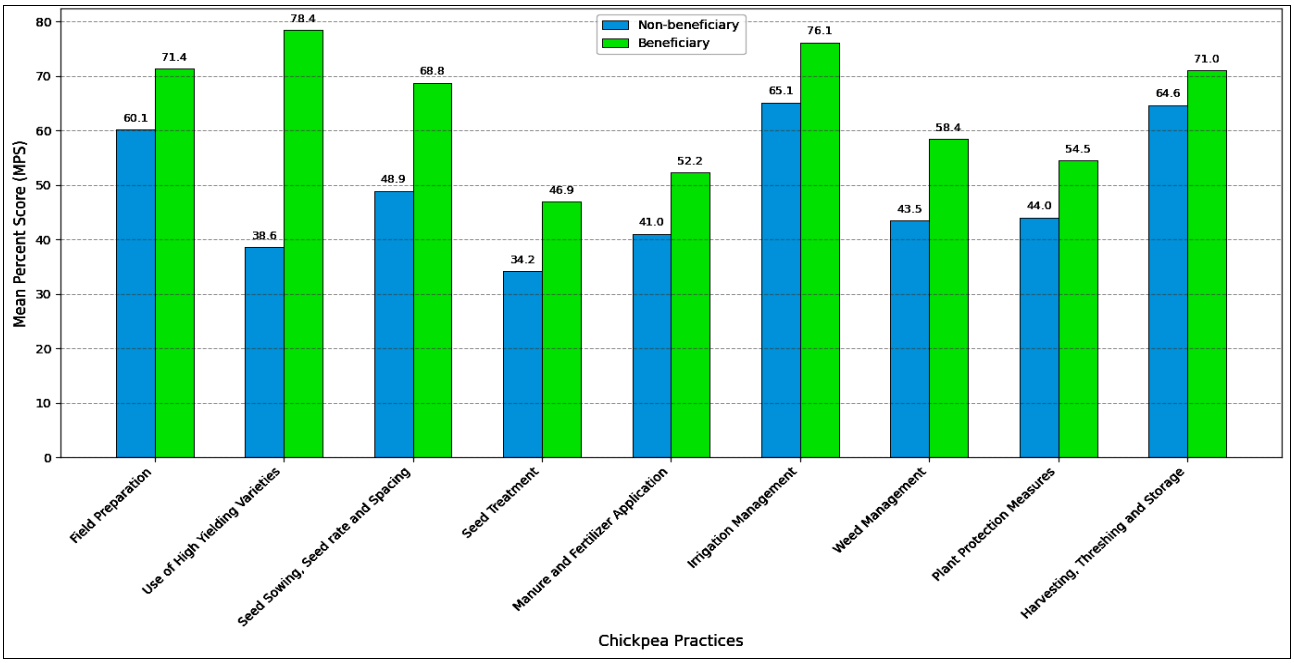

Fig 3: Comparison of chickpea practices adoption between beneficiary and non-beneficiary chickpea growers

The adoption level of beneficiary and non-beneficiary growers with regard to package of practices of chickpea production technology were measured in terms of Mean Percent Score (MPS). The data presented in table 4 shows that beneficiary growers had very good adoption level (>70 MPS) regarding practices like use of high yielding varieties, irrigation management field preparation and harvesting, threshing & storage with 78.42, 76.13,71.38 and 71.00 MPS, respectively. Moreover, beneficiary chickpea growers also had good adoption level regarding practices like seed sowing, seed rate & spacing, weed management, plant protection and manure and fertilizer with 68.75, 58.40, 54.50, and 52.25 MPS, respectively. They had low adoption level in practices like seed treatment 46.93 MPS. In case of non-beneficiary chickpea growers, the high adoption level was observed regarding practices like irrigation management and harvesting, threshing & storage with 65.13 and 64.63 MPS, respectively. They had low adoption level regarding field preparation, seed sowing, seed rate & spacing, use of high yielding varieties, weed management, manure and fertilizer, plant protection, and seed treatment with 60.13, 48.92, 44.00, 43.50, 41.00, 38.58 and 34.21 MPS, respectively (Fig. 3).

The overall extent of adoption of the beneficiary growers (64.19 MPS) was higher than the non-beneficiary growers (48.90 MPS). The value of calculated rank correlation (r_s) was 0.49 which is positive and significant at 1 per cent level of significance, leading to conclusion that there was a similarity in rank assignment pattern of adoption level of beneficiary and non-beneficiary growers about Chickpea production technology, though there was a difference in the magnitude of MPS of beneficiary and non-beneficiary growers Tidke *et al.*, (2018) [14], Salunkhe *et al.*, (2019) [12] and Pandey *et al.*, (2021) [8].

Table 5: Practice wise adoption level of beneficiary and non-beneficiary growers about chickpea production technology (N=400)

S.N.	Chickpea Practices	Non-beneficiary growers		Beneficiary growers		Pooled	
		MPS	Rank	MPS	Rank	MPS	Rank
1.	Field Preparation	60.13	III	71.38	III	65.75	III
2.	Use of High Yielding Varieties	38.58	VIII	78.42	I	58.50	IV
3.	Seed Sowing, Seed rate and Spacing	48.92	IV	68.75	V	58.83	V
4.	Seed Treatment	34.21	IX	46.93	IX	40.57	IX
5.	Manure and Fertilizer Application	41.00	VII	52.25	VIII	46.63	VII
6.	Irrigation Management	65.13	I	76.13	II	70.63	I
7.	Weed Management	43.50	VI	58.40	VI	50.95	VI
8.	Plant Protection Measures	44.00	V	54.50	VII	49.25	VIII
9.	Harvesting, Threshing and Storage	64.63	II	71.00	IV	67.81	II
	Over all	48.90	-	64.19	-	56.55	-

Practice wise comparison between beneficiary and non-beneficiary growers about extent of adoption of chickpea production technology

The variation or similarity in the adoption of recommended chickpea production technology between beneficiary and non-beneficiary growers, was assessed through 'Z' test. The results are presented in table 5. The data related to extent of adoption of both beneficiary and non-beneficiary growers incorporated in the table 6. Shows that calculated 'Z' value was higher than the tabulated value at 1 per cent level of significance 'Z' test analysis of the adoption of chickpea production technologies revealed a significant difference between beneficiary and non-beneficiary growers. Chandawat *et al.*, (2014) [2], Parmar *et al.*, (2017) [9], Raghuwanshi *et al.*, (2017) [10].

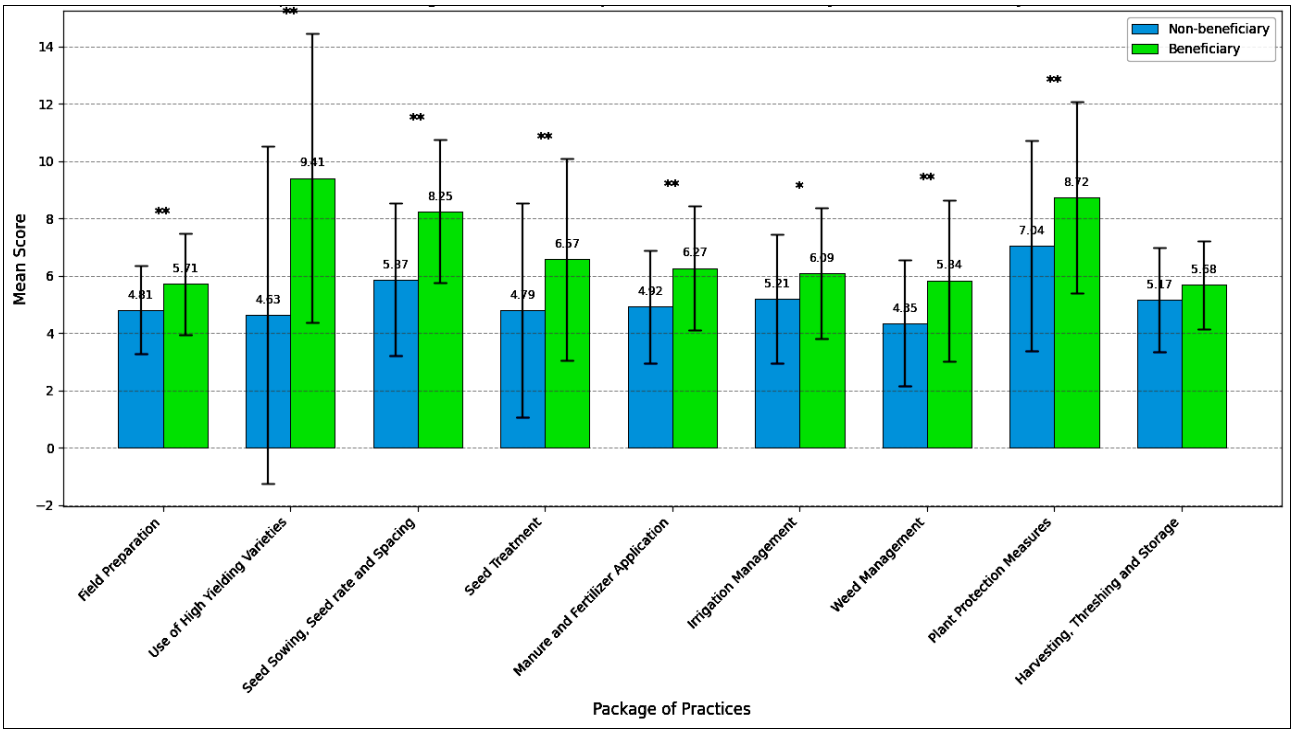

Fig 4: Comparison of package of practices adoption between beneficiary and non-beneficiary growers

Table 6: Practice wise comparison between beneficiary and non-beneficiary growers about extent of adoption of chickpea production technology (N=400)

S. No.	Package of practices	Nom-beneficiary growers (n=63)		Beneficiary growers (n=63)		Z' Value
		Mean ±	S.D.	Mean ±	S.D.	
1.	Field Preparation	4.81	1.53	5.71	1.76	3.65**
2.	Use of High Yielding Varieties	4.63	5.89	9.41	5.04	5.94**
3.	Seed Sowing, Seed rate and Spacing	5.87	2.65	8.25	2.49	6.35**
4.	Seed Treatment	4.79	3.74	6.57	3.51	3.33**
5.	Manure and Fertilizer Application	4.92	1.97	6.27	2.15	4.63**
6.	Irrigation Management	5.21	2.25	6.09	2.28	2.61*
7.	Weed Management	4.35	2.19	5.84	2.81	4.07**
8.	Plant Protection Measures	7.04	3.67	8.72	3.34	3.21**
9.	Harvesting, Threshing and Storage	5.17	1.81	5.68	1.54	2.23^{ns}
	Overall	5.14	2.83	6.89	2.75	4.00

** Significance at 1 percent level * Significance at 5 percent level

At a 1% level of significance, beneficiary growers demonstrated a notably higher adoption rate across seven practices. Furthermore, a significant difference at the 5% level was observed in one additional practice. Overall, these eight practices indicate a substantial gap in adoption levels, with beneficiaries showing greater uptake of recommended technologies. The only exception was in harvesting, threshing, and storage, where no significant difference was found. The mean adoption scores further confirmed that beneficiary growers had a higher overall adoption of the recommended chickpea production technology. These findings are consistent with previous research by Sarada and Kumar, Sirohiya *et al.* (2012) [13], Gabhane *et al.*, (2019) [7] and Vashishtha *et al.* (2010).

Conclusion

The findings revealed that majority of the total chickpea growers were in the medium level of adoption group, followed by high and low level of adoption about recommended chickpea interventions. In case of beneficiary growers, a significance difference was found among three categories of adoption *i.e.*, low, medium and high with 15.5, 48.0 per cent and 36.5 per cent, respectively. Findings indicate that there was a significant difference in level of adoption between beneficiary and non-beneficiary growers about recommended chickpea interventions. The beneficiary growers had more adoption than non-beneficiary growers in all recommended chickpea interventions. Thus, the NFSM played a significant role in enhancement of adoption among beneficiary growers. Majority of the farmers were medium adopters of the chickpea production technology under NFSM. There was significant difference between the beneficiaries and non-beneficiaries with regard to adoption of package of practices of chickpea cultivation. Beneficiaries were found adopting the practices at higher rate as compared to the non-beneficiaries.

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