RESEARCH ARTICLE Legume Research- An International Journal, Volume 49 Issue 5: 830-836 (May 2026)

Quantification of Gain in Knowledge Level of Farmers about Improved Production Technology of Arid Legumes in Hyper Arid Western Rajasthan

D. Kumar[1], K. Shiran[1], R.S. Mehta[1], A. Patidar[1], S.C. Meena[1], B.L. Manjunath[1], M. Patidar[1], Charu Sharma[2], Deepak Chaturvedi[2], Ajay Kumar[3]

10.18805/LR-5377

ABSTRACT

Background: Jaisalmer, being a hyper-arid desert region, is prone to extremes in terms of temperature. The temperature varies greatly from day to night in both summer and winter. In present scenario of agriculture where the role of extension is changing from increasing production to increase the farmers income and from package of practice oriented to farmer problem oriented extension. Knowledge level of the farmers of the targeted village about legumes is observed quit low. Farmers are less educated which is also a contributing factor towards less knowledge level of the farmers. Knowledge level is the key component in adoption of improved technology.

Methods: A number of 200 farmers has been selected under Schedule Cast Sub Plan comprising both male and female farmers as beneficiary. Arid legume (Moong bean, moth bean and guar bean and chickpea) seed has been distributed among them at the rate of 1 kg seed to each farmer free of cost. Same number of the farmers has been selected as control group from same village. Jaisalmer is selected because Central Arid Zone Research Institute - Regional Research Station - Jaisalmer is located in the Jaisalmer. Basanpeer Village is selected because Scheduled Cast Sub Plan could be implemented in Scheduled Cast dominated village farmers only. Here 200 farmers of the village both male and female has been selected, all belong to Scheduled Cast category. Data has been collected with the help of the interview schedule. It is found that the knowledge

Result: Level of the beneficiary farmers was quite high as compared to knowledge of the non-beneficiary farmers. The greater knowledge of improved arid legume production technology among the selected farmers might be due to the reason that the trainings, field day and demonstration were organized for the beneficiary farmers by the scientists. This knowledge level will be used for breeding guar (cluster bean) for high galactomannan gum content (>35%), improve meal quality and high seed protein content (25-27%) with increased proportion of amino acids and improved cooking quality of cowpea and moth bean grains.

Key words: Arid legume, Beneficiary, Knowledge, Schedule cast sub plan.

INTRODUCTION

Agriculture extension is playing an important role in present scenrio facing the farmers of doubling the income in very brief period (Qamar, 2005; Mahmudul Haq, 2012). Jaisalmer, being a hyper-arid desert region, is prone to extremes in terms of temperature. The temperature varies greatly from day to night in both summer and winter. Aldosari (2013) in this village arid legume, Chickpea, Moong bean Moth bean and Isabgoal are grown in winters while Bajara Moong been, Moth bean and Guar bean are grown in the rainy season. Size of the land holding varies from 50-100 hactres. Climate of Jaisalmer is suitable for growing of the legume crop. SCSP programme has been implemented in the Basanpeer village of this district, under this programme seed has been distributed as the free input among the 100 beneficiary selected farmers , selection of the village has been done because all the farmers of the village belongs to the SC community. The research intended to identify the level of knowledge of farmers about improved legume practices. Other than farmers chickpea is also grown in khadins. Moong bean also be grown in intercropping with the guar bean. While chickpea is grown as sole crop only. Breeding guar (cluster bean) for high galactomannan gum content (>35%), improve meal quality and high seed protein content (25-27%) with increased proportion of amino acids and improved cooking quality of cowpea and moth bean

[1]ICAR- Central Arid Zone Research Institute, Regional Research Station, Jaisalmer-345 001, Rajasthan, India.
[2]Krishi Vigyan Kendra, Jaisalmer-345 001, Rajasthan, India.
[3]ICAR- Central Arid Zone Research Institute, Jodhpur-342 001, Rajasthan, India.

Corresponding Author: D. Kumar, ICAR- Central Arid Zone Research Institute Regional Research Station, Jaisalmer-345 001, Rajasthan, India. Email: dkdkdangi@gmail.com

How to cite this article: Kumar, D., Shiran, K., Mehta, R.S., Patidar, A. Meena, S.C. Manjunath, B.L. Patidar, M. Sharma, C., Chaturvedi, D. and Kumar, A. (2026). Quantification of Gain in Knowledge Level of Farmers about Improved Production Technology of Arid Legumes in Hyper Arid Western Rajasthan. *Legume Research.* **49(5):** 830-836. doi: 10.18805/LR-5377.

Submitted: 09-07-2024 **Accepted:** 10-12-2024 **Online**: 19-06-2025

grains. Knowledge level of the farmers will be used for development of short duration, fast growing, determinate and high yielding varieties of cluster bean for grain, gum and vegetable purposes. Breeding for stable and broad-based genetic resistance to bacterial blight against *Alternaria leaf spot diseases* of cluster bean. Breeding of photo and thermo-insensitive varieties of arid legumes for long range planting dates and year round production. Almost 100 FLD has been conducted on arid legume at different location in Jaisalmer.

MATERIALS AND METHODS

Selection of the state Rajasthan was done because Centerl Arid Zone Research Institute is located in this state while Jaisalmer is selected because Centerl Arid Zone Research Institute Regional Research Stational - Jaisalmer is located in the Jaisalmer (Map 1, Flow chart 1). Village Basanpeer was selected because Scheduled Cast Sub Plan could be implemented in Scheduled Cast dominated Village farmers only. Here 200 farmers of the village both male and female has been selected, all belong to Scheduled Cast category. 100 Non beneficiary 100 beneficiary farmers have been selected among the Scheduled Cast farmers both male and female.

The mean and SD of all the respondent's knowledge scores were computed for classifying the knowledge in different categories. Based on the mean knowledge score and standard deviation of all the farmers has been categorized under three knowledge level categories which are as follows:

Less knowledge level = Score below (Mean - SD)

Moderate knowledge = Scores from (Mean - SD) to (Mean + SD)

High knowledge level = Scores above (Mean + SD) Davis, (2008).

With small modification knowledge test developed by Chaturvedi (2000) was used for judging the knowledge level of farmer's 'Z' test was used to find out the significant difference between sample mean for the large sample size (*i.e.*>30). Schedule developed has been used for data collection from the farmers.

Formula for Z test is under

$$Z\ Test = (\bar{x} - \mu) / (\sigma / \sqrt{n})$$

Here,

$\bar{x}$ = Mean of sample.

μ = Mean of population.

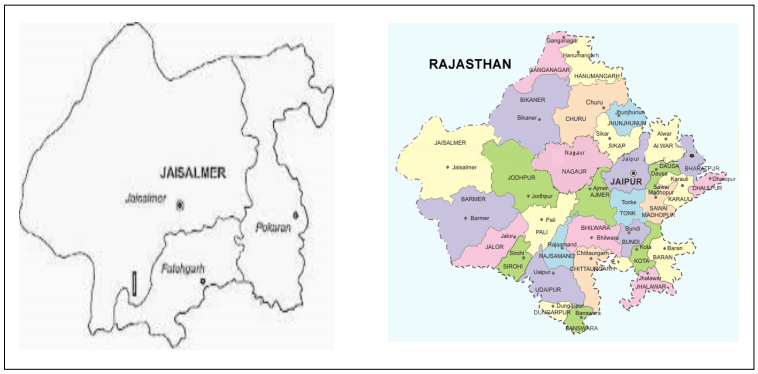
σ = Standard deviation of population.

$\sqrt{n}$ = Number of observation.

Pearson correlation coefficient and spearman correlation coefficient has been used to correlate knowledge level with the independent variable.

Pearson correlation coefficient

For two variables X and Y, the Pearson correlation coefficient (rXY), named after the english mathematician and



Map 1: Rajasthan and Jaisalmer.

Rajasthan-Purposely – CAZRI is located

↓

Jaisalmer – RRS - CAZRI is located

↓

Basanpeer – Randomly selected among the SC populated villages

↓

200 farmers randomly selected

↓

(100 beneficiary farmers and 100 Non beneficiary farmers Total = 200)

Flow chart 1: Sampling plan for study.

biostatistician Karl Pearson, is a statistical measure of the degree of linear correlation between these two variables and is defined as follows.

$$Rxy = cov(x,y)/\sigma x \cdot \sigma y$$

Where

Cov(x, y) = Covariance between x and y.

$\sum\chi$, σy = Standard deviation of x and standard deviation of y.

Spearman correlation is known as Spearman's "rank correlation" coefficient since it is found by calculating the Pearson correlation on the ranked data within two features. Spearman's correlation is often denoted by the Greek letter ñ and it provides a measure of the strength and direction of a monotonic association between ranks of the two features. It is sometimes used as an alternative to the Pearson correlation coefficient since it is less sensitive to outliers due to the utilization of ranks rather than actual data values in the calculation and can capture the strength of monotonic relationships beyond linear associations (Conover, 1999).

Spearman's rank correlation coefficient is given by the formula

$$p = 1 - \frac{6\sum_{i=1}^{n} D_i^2}{n(n^2 - 1)}$$

Where,

$D_i = R_{1i} - R_{2i}$.

R_{1i} = Rank of i in the first set of data.

R_{2i} = Rank of i in the second set of data.

n = Number of pairs of observations.

RESULTS AND DISCUSSION

Front line demonstration

Among the 100 farmers was organized by the central arid zone resesarch institute scientists under Scheduled Cast Sub Plan for arid legumes for package of practices. Birner *et al.* (2006). Actual 100 farmers selected most of them belong to middle ag.e category. Most of them were uneducated, income of most of them was belong to higher level, herd size is big, milk production liter per cattle, milk sale is maximum to cooperatives, followed by private companies (Picture 2). Extension contact maximum to agriculture officer, mass media exposure maximum to newspaper followed by T.V. (Mahmud, 2012). Maximum income is there in flush season (Rivera *et al.,* 2001). The data about the knowledge level of both benefited and non-benefited farmers included in Table 1 shows that calculated 'Z' value was higher than the tabulated value at 1% level of significance in all the package of practices of arid legume production (Picture 1) (Rivera and Crowder, 2002).

Picture 1: Traditional fields of arid legumes.

Picture 2: Traditional field and khadin of Basanpeer.

Table 1: Comparative analysis of knowledge level between beneficiary and non-beneficiary farmers regarding improved arid legume technology.

Package of practices	Beneficiary		Non-beneficiary		Z-value
	(n_1-50)	(n_2-50)	(n_1-50)	(n_2-50)	
	Mean	SD	Mean	SD	
A. Soil and field preparation	8.55	0.89	7.67	0.77	1.376
Summer weather deep ploughing	9.27	0.95	2.2	0.87	
Land leveling	8.28	0.87	8.0	0.55	
Application of FYM	5.27	0.96	2.27	0.55	
Soil mulch	3.52	0.45	1.97	0.39	
Application of FYM	2.12	0.59	1.0	0.47	
FYM incorporation	2.12	1.37	1.0	0.98	
Green manuring.	5.71	0.39	3.0	0.28	
Bund making	3.52	0.36	2.0	1.07	
Plasticulture	3.52	9.27	1.0	8.22	
Pesticide application	2.52	1.87	2.0	0.22	
Manure (DAP/MOP)applying	4.42	0.08	2.0	0.07	
B. High yielding varieties	9.55	0.22	5.99	0.17	1.094
Farmers selected	5.52	0.57	3.0	0.57	
Market.	3.67	0.58	2.0	0.47	
Government.	8.92	1.87	5.0	0.87	
C. Sowing of seed and spacing	8.22	0.69	7.57	0.57	1.4005
Time of sowing	7.32	1.57	1.10	0.55	
Seed treatment	5.27	1.27	2.20	0.17	
Seed spacing	9.79	0.57	4.40	0.55	
D. Seed treatment	8.78	0.87	7.55	0.67	1.295
Treatment with pesticides	3.73	0.69	2.0	0.53	
Treatment with insecticides	4.57	0.58	2.07	0.35	
Treatment of legume seed	6.82	0.69	2.07	0.52	
Physical treatment	2.37	0.55	1.07	0.98	
Water socking of seed	3.39	0.98	2.07	0.37	
Seed grading	3.98	0.69	2.07	0.57	
Seed cleaning	2.97	0.38	1.07	0.22	
E. Organic manure and fertilizer application	8.97	0.47	5.55	0.37	1.572
FYM application rate	3.37	0.88	2.27	0.35	
Goat manure	2.29	1.76	1.10	0.15	
Chick manure	6.27	1.55	1.07	0.55	
Cow dung	5.52	3.99	0.07	3.8	
Compost manure	3.32	3.5	2.27	3.6	
Green manure	2.62	0.57	2.07	0.98	
Neem manure	2.29	3.5	1.07	0.22	
F. Fertilizer management	3.55	0.57	2.57	1.2	1.739
NPK application rate	5.32	2.5	3.07	0.22	
Micronutrient application rate	6.82	1.5	4.07	0.50	
Granular fertilizer application rate	7.97	2.5	3.07	1.78	
Slow release fertilizer application	8.87	0.57	3.07	0.55	
Other fertilizer application	9.93	1.7	5.00	0.56	
Time of fertilizer application	4.57	1.87	2.70	0.48	
G. Weed management	4.83	0.02	3.51	0.57	1.387
Physical	4.32	1.57	2.7	0.47	
Manual	6.32	1.22	3.2	1.00	

Table 1: Continue....

Table 1: Continue...

Chemical	6.32	1.79	4.7	1.87	
Biological	8.87	1.88	4.8	1.97	
H. Plant protection	9.97	0.87	5.9	0.80	0.601
Pathogen	9.7	0.53	6.8	0.44	
Mildew	1.27	0.22	.02	0.57	
Root rot	3.97	1.97	1.87	0.47	
Insect	6.9	1.87	5.07	0.67	
Pod borer	6.9	0.87	5.7	0.66	
Trips	5.5	4.87	3.8	2.8	
Caterpillar	6.87	0.27	5.7	0.47	
Jessed	6.67	0.37	5.8	0.44	
I. Control					
J. Physical /manual	8.9	0.22	7.5	0.19	
Biological	3.9	0.23	2.9	0.22	
Crysoperlla	8.77	0.57	6.87	0.37	
Green less wing	9.93	0.49	6.87	0.39	
K. Harvesting	8.93	0.39	5.29	0.02	0.601
Storage	2.27	0.93	1.9	0.47	
Marketing	9.87	0.52	6.9	0.50	
L. Threshing	10.2	0.49	8.2	0.39	1.776
Manual	7.83	0.55	3.38	0.57	
Mechanical	9.12	0.56	3.1	0.47	
M. Storage	10.2	0.49	9.3	0.50	0.324
Gunny bag	2.27	0.79	1.9	0.75	
Open store	4.87	0.47	3.2	0.37	
Godown.	9.4	0.55	8.9	0.47	
Cold storage	8.7	0.78	6.7	0.28	
Overall					

* Significant at 0.01 level of probability.

Sources of agricultural information:

Means that the knowledge level of farmers towards package of practices of arid legumes agricultural extension depends on the sources of information of agricultural, because, if the farmers use more sources of information about the package of practices of arid legumes, it will lead to the increase knowledge (Anderson and Feder, 2004).

Average production

Level of knowledge to farmers towards the package of practices of arid legumes, not depend on average production for farmers, but depends on other variables (Rivera and Qamar, 2003). This calls for rejection of null hypothesis and acceptance of alternate hypothesis leading to conclusion that there is a significant difference in knowledge level of beneficiary and non-beneficiary respondents regarding to all eleven practices of mungbean cultivation In other words, there is no similarity between the level of knowledge of beneficiary and non-beneficiary farmers regarding arid legume production technology. (Rajasthan Agriculture Statistics at a Glance (2016-17).

Correlation of socioeconomic variable with the knowledge level: soil preparation is better with the uneducated experienced old aged, high yielding varieties are used by the farmers who are educated, young, comparatively higher money possession and right spacing of the seed and was implemented by the people who are young and literate (Alex, 2002) (Table 1).

Right kind of the seed treatment was made by the literate and the higher extension contact person (Garforth, 2011) Organic manure was used by the farmers who were aware about the organic manuring .Chemical fertilizers are more used by the farmers who are better educated and knowledgeable (Altalb, 2015).

Manual weed management is done by the old age farmers and chemical weed management and chemical weed management by the young and literate farmers, Davis, (2008) plant protection through chemical is done by the young and progressive farmers manual threshing is done by old and uneducated farmers while mechanical threshing is used by the illiterate farmers (Altalb, 2015).

The higher knowledge level of improved legume production technology among the beneficiary in comparison of non-beneficiary farmers is due to the reason that the trainings/FLD/field days were given to the beneficiary farmers by the Regional Research Station Jaisalmer they were also provided necessary guidance, by scientists and Subject Matter Specialist of Krishi Vigayan Kendra

Table 2: The distribution of farmers into different categories according to the independent variables and its relationship with knowledge.

Categories	Number	Percentage %	Value of pearson correlation coefficient	Value of spearman correlation coefficient
1. Age				
30-40	18	18		0.482
41-51	75	75		
51-61	7	7		
sum	100	100		
2. Education				
Primary	19	19		0.110
Secondary	61	61		
Higher	20	20		
sum	100	100		
3. Size of farm (hectare)				
1-25	82	82		0.17211
26-50	12	12		
51-75	6	6		
Sum	100	100		
4. Sources of information				
15-60	7	7		**0.036
61-105	89	89		
106-151	4	4		
Sum	100	100		
5. Average yields				
3.5-5.1	14	14		- 0.05811
5.2-6.8	71	71		
6.9-8.6	15	15		
Sum	100	100		

** p<0.05 (**) Significant at level of probability (0.05).

Jaisalmer and RRS - CAZRI (Altalb *et al.,* 2015) whereas, the trainings were not organized on the field of non-beneficiary farmers they were not provided any type of guidance and training by the SMSs and Scientists. This might have result ending higher level of knowledge of beneficiary farmer in comparison to non-beneficiary farmers (Table 2) (Kebede, 2008). The findings are in conformity with the findings of Bareth (1991); Chand (1993).

CONCLUSION

It is concluded that the beneficiary farmers were having higher overall and practice wise knowledge about improved arid legume technology. Whereas non-beneficiary farmers were having lesser knowledge about it. This is due to the fact that beneficiary farmers were might have learned about improved arid legume production Technology through field days, trainings, farmers fairs, exhibitions ,tours and literature through the intervention of the scientist of the KVK and CAZRI-RRS Jaisalmer. Knowledge level of the farmers can be improved through training, research, farmer interface meeting etc. Knowledge level of the farmers is directly correlated with the independent variable knowledge level of the farmers will be used for Breeding arid legumes for imparting multiple disease resistance by exploiting alternate sources of resistance. Refinement of crop management technology for low inputs in mixed cropping system. Integrated nutrient management for exploring the possibility of exploiting high inputs supplies under rain fed situations of arid and semi-arid regions. Correlation of socioeconomic variable with the knowledge level, soil preparation is better with the uneducated experienced old aged, high yielding varieties are used by the farmers who are educated, young, comparatively higher money possession and right spacing of the seed and was implemented by the people who are young and literate.

Conflict of interest

All authors declared that there is no conflict of interest.

REFERENCES

Aldosari, H. and Mekheimer, M. (2013). The bandwagon effect in the adoption of E-learning systems in language learning-an appraisal. *GSTF Journal on Computing.* **2(4):** 61-81.

Alex, W.Z. (2002). Rural Extension and Advisory Services, Rural Development Strategy Background: World Bank, USA.

Altalb A.T. (2015). The comparison between agricultural extension in Poland and in Iraq: conference for current issues moved by young scientists, Poland, Krakow, A special issue of the Conference. pp. 25-30. www.doktorant.com.pl.

Altalb, A.T. (2015). Models and methods that use in agricultural extension, conference for current issues moved by young scientists, A special issue of the Conference, Krakow, Poland. *International Journal of Agricultural Extension and Rural Development Studies.* **3(1):** 21-29. February 2016. Published by European Centre for Research Training and Development UK (www.eajournals.org).

Altalb, A., Filipek, T. and Skowron, P. (2015). The role of agricultural extension in the transfer and adoption of agricultural technologies. *Asian Journal of Agriculture and Food Science.* **3(5):** 500-507.

Anderson, J. and Feder, G. (2004). Agricultural extension: Good intentions and hard realities. *The World Bank Research Observer.* **19(1):** 41-60.

Bareth, L.S. (1991). Technological constraints in adoption of improved pulse production techniques in agro-climatic zone IV A and B of Rajasthan. Ph.D. Thesis, R.A.U., Campus-Udaipur.

Birner, K., Davis, J., Pender, E., Nkonya, P., Anandajayasekeram, J., Ekboir, A., Mbabu, D., Spielman, D., Benin, H. and Cohen, M. (2006). From "best practice" to "best fit : A framework for designing and analyzing pluralistic agricultural advisory services Worldwide, International Food Policy Research Institute, Washington, Discussion Papers.

Chand, S. (1993). An impact study in relation to adoption of improved practices the farmers in Bharatpur district (Raj.). M.Sc. (Ag.) Thesis, R.A.U, Campus-Udaipur.

Chaturvedi (2000). The effects of household food production strategies on the health and nutrition outcomes of women and young children: A systematic review Paediatr. *Perina Epidemiol.* **26(s1):** 205-222.

Conover, W.J. (1999). Practical nonparametric statistics. Third Edition, John Wiley and Sons, New York. **23(1):** 919-631.

Davis, K. (2008). Extension in sub-saharan Africa: Overview and assessment of past and current models and future prospects. *Journal of International Agricultural and Extension Education.* **15(3):** 15-28.

Garforth, C. (2011). Rural people's organizations and agricultural extension in the upper north of Thailand: Who Benefits? *Journal of International Development.* John Wiley and Sons, Ltd. **6(6):** 707-720.

Kebede, B.G. (2008). Agricultural extension and its impact on food crop diversity and the livelihood of farmers in Guduru, Eastern Wollega, Ethiopia, A thesis in agriculture extension, the degree of Master of Science in Management of Natural Resources and Sustainable Agriculture (MNRSA), Norwegian University of Life Sciences, Norway.

Mahmudul, A. (2012). The agricultural extension contact in Bangladesh. *Agrárinformatika/Journal of Agricultural Informatics.* **3(2):** 29-36.

Qamar, M. (2005). Modernizing National Agricultural Extension Systems, Food and Agriculture Organization of the United Nations, Research Extension and Training Division Sustainable Development Department, United Nations.

Rajasthan Agriculture Statistics at a Glance (2016-17).

Rivera, W.M. and Qamar, M.K. (2003). Agricultural Extension, Rural Development and the Food Security Challenge, FAO, Extension, Education and Communication Service; Research, Extension and Training Division, Rome.

Rivera, W.M.K. and Crowder, L.V. (2002). Agricultural and Rural Extension: Options for Institutional Reform in the Developing Countries, Education and Communication Service, Research, Extension and Training Division. Sustainable Development Department, Food and Agriculture Organization of the United Nations, Rome.

Rivera, W.M. Qamar, M.K. and Crowder, L.V. (2001). Agriculture and Rural Extension World Wide: Options for Institutional Reform in the Developing Countries. FAO, Extension, Education and Communication Service; Research, Extension and Training Division, Rome.