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Social aspects of sustainability of groundnut production in semi arid eastern plains of Rajasthan

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ABSTRACT

The importance of sustainability is increasing due to scarce natural resources and growing scientific innovations in agriculture sector. The present study, especially focuses on initiatives, where different social and technical aspects were analyzed on the sustainability of groundnut production in Semi Arid Eastern Plains of Rajasthan, where 200 groundnut producing farmers were identified by using simple random and proportionate sampling methods from Jaipur and Dausa districts of Rajasthan. The results of study revealed that majority of the respondents possessed medium level of knowledge (65.5%) and adoption (68.0%) about sustainable groundnut production. The knowledge level about selection of land and field preparation, improved varieties, sowing, seed rate, seed treatment, irrigation, harvesting and storage was high in order, while it was comparatively low in case of fertilizer application and plant protection measures. Whereas, aspect wise adoption level of seed rate, improved varieties, seed treatment, irrigation, spacing, weed control, harvesting and storage was comparatively high. It was low in case of fertilizer application and plant protection measures about sustainable groundnut production. The correlation analysis revealed that the social aspects, viz. land holding, socio economic status, education, family education, economic motivation, source of information utilized, change proneness and attitude towards sustainable groundnut production having significant positive relationship with knowledge and adoption level of sustainable groundnut production.

Key words: Adoption, Groundnut, Knowledge, Social aspects, Sustainability

Oilseed, the raw materials for crops occupy an important position in economic system of India, next only to food grain accounting for about 13 per cent of cultivated area and 5 per cent of the gross national product and 10 per cent of the value of all agricultural products. These are highly paying crops of the dry regions. India is the second largest producer of groundnuts in the world. Groundnuts in India are available throughout the year due to a two-crop cycle harvested in March and October. The major growing states are Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, Madhya Pradesh, Odisha, and Uttar Pradesh. The country has exported 509664.85 MT of groundnut having worth of ₹ 3187.69 crores during the year 2013-14 to Indonesia, Malaysia, Philippines, Vietnam and Thailand (www.apeda.gov.in).

The high input technology and technological innovations favoured an over exploitation of biological resources and weakening of the traditional approaches causing total marginalization of poor, small and marginal farmers. The area and production of groundnut in last one decade remained varied which can be due to a number of problems which have arisen, i.e. degradation/depletion of soil fertility, increased epidemic of insect, pest and disease, infestation of weeds, decline in water table etc. In addition of above physical and technical constraints, the farmers have experienced a continuous escalation in cost of production in relation to income, resulting in decrease in relative returns. All these factors might threaten the economical and physical sustainability of this crop. Keeping in view the depletion of natural resources, environmental pollution and limitation of sustainable agriculture, it becomes essential to know the association between knowledge level of farmers with different aspects of sustainability of groundnut production. The knowledge emanating from this research would help farmers and extension workers to arrest declining trend of sustainable groundnut production.

MATERIALS AND METHODS

The study was conducted in agro-climatic zone IIIa (Semi Arid Eastern Plains) of Rajasthan state, which is having highest area (109896 ha) and production (148423 tonnes) of groundnut. Zone IIIa having geographical area of 2.96 million ha spread over Ajmer, Jaipur, Dausa and Tonk districts of Rajasthan. The rainfall in this zone ranges 500 mm to 700 mm. Out of these four districts two were selected, viz. Jaipur and Dausa due to their highest area and production under groundnut. Based on maximum

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acreage under groundnut cultivation five tehsils (blocks), viz. Jaipur, Chomu, Amber and Phagi in Jaipur district and Sikrai in Dausa district were selected. In Rajasthan, every Tehsil consists of Gram Panchayats and every Gram Panchayat consists of Villages, whereas each Gram Panchayat is having more than one village. Two Gram Panchayats from each Tehsil and two villages from each Gram Panchayat were selected randomly. A sample of 200 groundnut growers (Farmers cultivating groundnut for last 5 years on a minimum land size of ½ acre) was selected by using proportion probability sampling technique.

The knowledge level of the farmers about sustainable groundnut production was measured with the help of a knowledge test. The respondents were assigned knowledge score on their performance in the test. The adoption level of the farmers about ten different items of sustainable groundnut production was measured. The respondents were assigned adoption score on the basis of their performance in the test. The scoring was given as 2 for full adoption, 1 for partial adoption and zero for non-adoption. In case, where there was no provision for partial adoption, one score was assigned for adoption and zero for non-adoption. On the basis of mean and Standard Deviation of knowledge level and adoption score, the selected farmers were classified in to three categories, viz. low, medium and high.

Correlation coefficient test was used to ascertain the extent of association of knowledge level and other indepent factors. To discern comparative influence of knowledge and adoption level with other independent factors multiple regression technique was used.

RESULTS AND DISCUSSION

Knowledge level of farmers about sustainable groundnut production

The results reveled that the knowledge score of the farmers ranged from 6 to 40 having mean knowledge score of 25.72 against maximum possible knowledge score of 40. In terms of percentage, the mean score was 64.30 which mean that farmers' knowledge was of good level, standard deviation of the sample was 8.44 and coefficient of variation was 32.82 which imply that there was somewhat variation among them with respect to their knowledge level.

The majority (68.5%) of the farmers possessed medium level of knowledge, whereas 16 percent were under category of high knowledge. Thus it was clear that more than 80 per cent of the farmers had medium to high level of knowledge. Only 15.5% of the respondents fell under the low knowledge level category.

Agronomic aspect wise knowledge level of farmers about selection of land and field preparation, improved varieties, sowing, seed rate, seed treatment, irrigation, harvesting and storage was high, while it was comparatively low in case of fertilizer application and plant protection measures. Though, the extension workers have to pay attention in educating the farmers about all the aspects of sustainable groundnut production, but they need to make more efforts to educate the farmers about fertilizer application and plant protection measures. These results are having conformity with the studies of Shivran (2002), Jyothi and Anand (2013), and Rao and Sridhar (2014).

Knowledge level of farmers on major aspects of sustainable groundnut production: It was presumed that the knowledge of farmers might not be uniform on all the aspects of sustainable groundnut production technology. Therefore, All the practices were grouped into ten major categories to see the variation in knowledge on different aspects of sustainable groundnut production technology.

The Table 1 shows that the knowledge level about selection of land and field preparation, improved varieties, sowing, seed rate, seed treatment, irrigation, harvesting and storage were of high order, while it was comparatively low in case of fertilizer application and plant protection measures, i.e. 58.46 and 57.11 per cent.

Association between farmers knowledge level about sustainable groundnut production with different social aspects

The correlation analysis revealed that the land holding, socio-economic status, education, family education, economic motivation, source of information utilized, change proneness and attitude were found positively and significantly associated with knowledge about sustainable groundnut production at one per cent level of probability. It means that these variables were contributing towards the knowledge level of farmers in positive terms.

Further these findings revealed that social aspects, viz. Social participation and risk orientation of the farmers were positive and non-significantly related with the knowledge level of farmers about the sustainable groundnut production. But age was negatively and non-significantly related with the knowledge level of farmers about the sustainable groundnut production.

It is explicit from the data in Table 3 that all the eleven

Table 1 Knowledge level of farmers on major aspects of sustainable groundnut production (N = 200)

Aspect	Maximum possible score	Mean knowledge score	Percentage (%)
Selection of land and field preparation	3	2.03	67.67
Improved varieties	2	1.28	64.00
Sowing	4	3.00	75.00
Seed rate	1	0.80	80.00
Seed treatment	3	2.57	85.67
Fertilizer application	13	7.60	58.46
Irrigation	2	1.35	67.50
Plant protection measures	9	5.14	57.11
Harvesting	2	1.33	66.50
Storage	1	0.62	62.00
Overall	40	25.72	68.39

Table 2 Relationship between independent variables and knowledge of farmers about sustainable groundnut production (N = 200)

Independent variables	Coefficient of correlation 'r' values
Age	–0.111
Land holding	0.241**
Socio-economic status	0.272**
Education	0.343**
Social participation	0.121
Family education	0.264**
Risk orientation	0.012
Economic motivation	0.234**
Source of information utilized	0.267**
Change proneness	0.295**
Attitude	0.808**

** Significant at 0.01 level of probability

social aspects taken together explained the variation in the knowledge of farmers to the extent of 88.90 per cent. The respective 'f' value (significant at 1 per cent level) at 11 and 188 degree of freedom was 7.68530 for the farmers. Thus, the results showed that all the eleven selected independent variables had accounted for a significant amount of variation in knowledge of farmers about sustainable groundnut production.

Further, the 't' test of significance indicated that coefficient of regression (b value) was found positively significant at 1 per cent level of probability for educations, source of information utilized, change proneness and attitude; while socio-economic status was found positively significant at 5 per cent level of significance. The results also depicted that coefficient of regression (b-value) were non-significantly for age, land holding, social participation, family education, risk orientation and economic motivation.

Table 3 Coefficient of multiple determination and partial regression of independent variables on knowledge of farmers about sustainable groundnut production (N = 200)

Independent variables	b-value (Reg. Cof.)	s-error of b	t-value
Age	0.042934	0.029510	1.455
Land holding	0.263198	0.166795	1.578
Socio-economic status	0.134277	0.061661	2.178*
Education	0.754652	0.257191	2.934**
Social participation	0.566770	0.487895	1.162
Family education	0.110205	0.111088	0.992
Risk orientation	-0.048728	0.061489	0.792
Economic motivation	0.337504	0.198972	1.696
Source of information utilized	0.066771	0.024402	2.736**
Change proneness	0.553245	0.199278	2.776**
Attitude	0.631198	0.426780	14.790**

Determination coefficient $R^2 = 0.88908$. Multiple correlation R = 0.94291. F-calculated = 7.68530 d.f. 11 188. *Significant at 0.05 level of probability. **Significant at 0.01 level of probability.

The depth analysis of the relationship between dependent and independent variables portrayed that education, source of information utilized, change proneness, attitude and socio-economic status of the farmers were the most important variables among all the eleven agronomic aspects which were predictors of knowledge of farmers about sustainable groundnut production. Before this study similar results were also reported by Shivran (2002), Shashekala *et al*. (2012), Jyothi and Anand (2013) and Rao and Sridhar (2014).

These results reveals that education which is an integral part of extension is major social aspect which decides the accessing of knowledge and its impact on adoption. The study area having medium level of education of farmer and surrounded with five KVKs, which gives a support to get knowledge from different crop improvement programmes and analyze it in their behavioral process of adoption. Source of information is used to decide the authenticity of information and help in changing the attitude of farmers. If a farmer having high socio-economic status, it is always helpful in getting information on priority and accesses their usefulness according to their requirement. So, these results are useful for extension system and agricultural development agencies the state to prepare and implement groundnut development schemes or assets distribution for sustainable production of the crop.

Adoption level of farmers about sustainable groundnut production

The results revealed that adoption score of the farmers ranged from 8 to 35 with a mean adoption score of 20.265, which depicts that the farmers on an average had a medium adoption level of sustainable groundnut production technology. The results of standard deviation (5.37) and coefficient of variation (26.50%), is also indicated that the sample is considerably homogenous and there is no wide variation among farmers with respect to their adoption level.

Most of the farmers (68%) belonged to the medium level of adoption category. It is further noted that 20% of the respondents fell under the high category. However, only 12 per cent of the respondents were under the low level of adoption category. Thus, it is obvious that more than 85 per cent of the farmers had medium to high level of adoption about sustainable groundnut production technology.

The plausible reason for having fallen under the medium category by the majority of the respondents might be due to lack of proper knowledge for application of insecticides, fungicides, fertilizers and other technical knowledge constraints.

Aspect wise adoption level of farmers about seed rate, spacing, weed control, irrigation, improved varieties, seed treatment, harvesting and storage was high, whereas it was

comparatively low in case of fertilizer application and plant protection measures. Though, the extension workers have to pay attention for providing training and educating the farmers about all the aspects of sustainable groundnut production, but they need to make more efforts to educate the farmers about fertilizer application and plant protection measures. The findings of present studies were in conformity with the findings of Khan and Chauhan (2005), Singh *et al.* (2013) and Chand and Meena (2014).

Adoption level of farmers on major aspects of sustainable groundnut production technology: The results in Table 4 reveals that the adoption level was highest (73.00%) in case of seed rate, followed by adoption level of improved varieties, seed treatment, irrigation, spacing, weed control, harvesting and storage. It was comparatively low in case of fertilizer application and plant protection measures, i.e. 55.83 and 50.58 per cent.

Association between farmers adoption level about sustainable groundnut production with different social aspects: The Table 5 shows that land holding, socio-economic status, education, source of information utilized, change proneness, attitude and knowledge were found positively and significantly associated with adoption about sustainable groundnut production at one per cent level of significance. Whereas, family education, economic motivation were positively and significantly related with adoption level of farmers about the sustainable groundnut production at five per cent level of probability. It means that these variables were contributing towards the adoption level of farmers in positive terms.

Further the findings revealed that independent variables, viz. social participation and risk orientation of the farmers were positively and not significantly related with the adoption level of farmers about the sustainable groundnut production. But age was negatively and not significantly related to the adoption level of farmers about the sustainable groundnut production.

A close study of the data in Table 6 elucidated that all the twelve social aspects taken together explained to the extent of 85.83 per cent of the variation for the adoption level in the recommended practices in sustainable groundnut production of farmers. The respective 'f' value was 6.5837 at 12, 187 degree of freedom which was significant at 0.01 level of probability. Thus, the results implied that the entire twelve variables had accounted for a significant amount of variation in the adoption level in sustainable groundnut production.

Further, it was also observed that 't' test of significance expressed coefficient of regression 'b' value were positively significant for socio-economic status, source of information utilized, change proneness, attitude

Table 4 Adoption level of farmers on major aspects of sustainable groundnut production (N = 200)

Aspect	Maximum possible score	Mean adoption score	Mean score (%)
Adoption of improved varieties	2	1.200	60.00
Seed rate	2	1.460	73.00
Seed treatment	3	1.760	58.67
Irrigation	2	1.220	61.00
Spacing	2	1.300	65.00
Fertilizers application	12	6.700	55.83
Weed control	2	1.230	61.50
Plant protection measures	6	3.035	50.58
Harvesting	2	1.200	60.00
Storage	2	1.160	58.00
Overall	35	20.265	60.36

Table 5 Relationship between with different social aspects and adoption level of farmers about sustainable groundnut production (N = 200)

Independent variables	Coefficient of correlation 'r' values
Age	-0.060
Land holding	0.236**
Socio-economic status	0.289**
Education	0.303**
Social participation	0.084
Family education	0.158*
Risk orientation	0.082
Economic motivation	0.153*
Source of information utilized	0.286**
Change proneness	0.268**
Attitude	0.773**
Knowledge	0.734**

*Significant at 0.05 level of probability. **Significant at 0.01 level of probability

Table 6 Coefficient of multiple determination and partial regression of independent variables on adoption of sustainable groundnut production by the farmers (N = 200)

Independent variables	b-value (Reg. Cof.)	s-error of b	t-value
Age	0.016649	0.019175	0.868
Land holding	0.195836	0.108379	1.807
Socio-economic status	0.120734	0.040066	3.013**
Education	0.423641	0.167116	2.535*
Social participation	0.472000	0.317022	1.489
Family education	-0.043983	0.072182	-0.609
Risk orientation	0.018213	0.039954	0.456
Economic motivation	0.056305	0.129287	0.436
Source of information utilized	0.048527	0.015856	3.061**
Change proneness	0.354958	0.129486	2.741**
Attitude	0.264837	0.041092	6.445**
Knowledge	0.202538	0.047742	4.242**

Determination coefficient R^2 = 0.85835. Multiple correlation R = 0.92647. F-calculated = 6.58374 d.f. 12 187. *Significant at 0.05 level of significant. **Significant at 0.01 level of significant.

and knowledge at one per cent level of probability similarly, educations, was positively significant at 0.05 level of probability. On the contrary, coefficient of regression (b-value) were non-significant for age, land holding, social participation, family education, risk orientation and economic motivation.

These results have similarity with findings of Bhimawat and Gupta (2005), Singh *et al*. (2013), Pokar *et al*. (2014), and Sumathi (2014).

The results of the analysis were indicative of the fact that socio-economic status, source of information utilized, change proneness, attitude, knowledge and education of the farmers were the most important predictors of the adoption level in sustainable groundnut production.

The above results expressed that socio-economic status of a farmer affects the adoption level as a major social aspect, which decides the living standard and ability of access the information of a farmer in his society. Source of information utilized is the authentication against the usefulness of improved groundnut practices and its adoption indicates the farmers' proneness to change. Education improves the knowledge and develops a positive attitude, where extension agencies can convince the farmer with their directive efforts. These results are in line of extension research process of adoption, which can play a leading role in development and implantation part of different schemes and programmes for sustainable groundnut production.

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