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Economics and adoption of recommended cultivation practices by cowpea growers

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Abstract

The study was conducted during 2018-19 in Mandya district of Karnataka State, India. A pre-tested interview schedule was used to collect the data from 90 cowpea growing farmers through personal interview method. The collected data was tabulated and analyzed using percentages, correlation and regression. As high as 64.45 per cent of cowpea growers belonged to medium level adoption category, 21.11 per cent had high adoption and 14.44 per cent belonged to low adoption category. Majority of cowpea growers fully adopted recommended cultivation practices such as; time of sowing, inter cultivation and post-harvest management practices. Further, majority of cowpea growers partially adopted application of recommended quantity of FYM, time of application of FYM / compost, recommended quantity of seed rate, recommended spacing, application of recommended quantity of nitrogen, phosphorus and potassium fertilizers, hand weeding, recommended plant protection measures, recommended harvesting time, recommended yield and recommended storage practices. In addition, majority of cowpea growers not adopted recommended varieties and seed treatment with bio-fertilizers. The return per rupees of expenditure was 1.21.

Keywords: Cowpea, adoption, recommended cultivation practices, relationship, constraints

1. Introduction

Cowpea is an important food legume and it is adapted to wide range of soils, rainfall situations and fits as a niche crop in multiple and intercropping systems. It is the most versatile pulse crop because of its smoothening nature, drought tolerance and multiple uses such as green vegetable, food legumes to tackle malnutrition as it is rich in proteins and vitamins. It is also used as hay, silage, pasture, fodder, soil cover and green manure. It has the ability to withstand drought, which make it suitable for drought-prone areas with low rainfall. An age old practice of mixed cropping of cowpea for vegetable purpose with widely spaced crop such as cotton, pigeon pea, maize, sorghum, pearl millet, sunflower, castor and plantation crops or its cultivation in cropping system. It is now being practiced with improved package of practices in terms of spacing, choice of appropriate varieties, nutrient management, weed management and plant protection measures. It has resulted in enhanced productivity and profitability. Besides effective use of crop diversification with vegetable cowpea for improving productivity, resource-use efficiency, soil and human health. In traditional cropping systems, cowpea is usually intercropped or mixed crop with other crops for vegetables and grain purpose. Under rain fed areas, it is usually grown as sole crop for grain purpose. Now we have multiple cropping system especially under assured rainfall and irrigated areas. Mixed/intercropping with these crops is common feature under rain fed areas to reduce the risk of crop failure under aberrant weather conditions. This indicates that cowpea production technologies have tremendous potential for high yield. Drought, low fertility more pests and disease attack are the main a biotic hindrances in realizing attainable yield levels. At present the global production of cowpea is 12.25 million hectares with the production of 5.4 million tones. In India cowpea is being grown in an area of 3.90 million hectares with production of 2.21 million tonnes. In Karnataka it is grown in an area of 0.84 lack hectares with production of 0.25lack tones. The cowpea productivity/ hectare in the world is 483, in India it is 321 and Karnataka it is 358. With this background the present study was undertaken with the following specific objectives.

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1. To analyze the profile characteristics of cowpea growers.
2. To study the Adoption of Specific Recommended Cultivation Practices by cowpea growers.
3. To know the Relationship between Profile Characteristics of cowpea growers and Adoption of recommended cowpea cultivation practices.
4. To Analyze the Economics of cowpea Cultivation; and
5. To document the Constraints expressed by cowpea growers.

2. Material and Methods

The study was conducted during 2018-19 in Mandya district of Karnataka State, The district was purposively selected because it is one of the major cowpea growing district in Karnataka. In the district Pandava Pura and K.R. Pet taluks were purposefully selected since these are major cowpea growing taluks. In each selected taluk, three villages were randomly selected. In each selected village the list of cowpea growing farmers was prepared in consultation with the officials of Karnataka State Department of Agriculture (KSDA) and Krishi Vigyan Kendra (KVK) Mandya. From, such a list 15 cowpea growing farmers were randomly selected

from each village. Thus, a total of 90 respondents constituted the sample for the study. The schedule was developed in consultation with scientists and extension workers. A pre-tested interview schedule was used to collect the data through personal interview method. The collected data was tabulated and analyzed using percentages, correlation and regression.

3. Results

3.1 Profile Characteristics of cowpea growers

The data in Table-1 reveals that as high as 63.33 per cent of cowpea growers belonged to middle age group, 45.56 per cent studied up to primary school, 38.89 per cent belonged to small family size group. 96.66 per cent were mainly depend on agriculture, 52.23 per cent possessed smaller livestock, 56.67 per cent were marginal farmers, 46.66 per cent had low level of annual income, 62.22 per cent had high level of farm experience, 45.56 per cent had medium level of economic motivation, 70.00 per cent had medium level of cosmopolitaness, 52.22 per cent had medium level extension contact, 36.66 per cent had medium level mass media participation, 41.11 per cent had low organizational participation and 47.78 per cent had low level of aspiration.

Table 1: Profile Characteristics Cowpea growers (N=90)

Sl. No	Variable	Characteristic	Respondents	
			Number	Per cent
1	Age	Young = (<30years)	13	14.44
		Middle = (30-50 years)	57	63.33
		Old = (>50 years)	20	22.23
2	Education	Illiterate	6	6.67
		Primary school	41	45.56
		High school	29	32.22
		PUC	9	10.00
3	Family size	Graduation and Above	5	5.55
		Small = (upto 4 members)	35	38.89
		Medium =(5-6members)	33	36.67
4	Occupation	Big =>(>6members)	22	24.44
		Agriculture	87	96.66
		Agriculture and subsidiary enterprises	3	3.34
5	Livestock possession	Small =(1-4 animals)	47	52.23
		Medium=(5-10 animals)	28	31.11
		Large=>(10 animals)	15	16.66
6	Size of land holding	Marginal= (<1hac)	51	56.67
		Small =(1-2hac)	26	28.89
		Big =>(2hac)	13	14.44
7	Annual income	Low =(< Rs. 35,000/-)	42	46.66
		Medium = (Rs. 35,000 -77,000/-)	30	33.34
		High= (>R.s 77,000/-)	18	20.00
8	Farming experience	Low=<(4.89 years)	13	14.44
		Medium=(4.89-6.87years)	21	23.34
		High=>(6.87years)	56	62.22
9	Economic Motivation	Low =(<20.08)	34	37.77
		Medium=(20.08-22.03)	41	45.56
		High (> 22.03)	15	16.67
10	Cosmopolitaness	Low =<(5.63)	6	6.67
		Medium=(5.63-10.47)	63	70.00
		High= (> 10.47)	21	23.33
11	Extension contact	Low=<(3.32)	32	35.56
		Medium= (3.32-5.63)	47	52.22
		High =(>5.63)	11	12.22
12	Mass media participation	Low=<(3.44)	28	31.11
		Medium= (3.44 - 5.07)	33	36.66
		High= (>5.07)	29	32.22
13	Organizational participation	Low=<(7.63)	37	41.11
		Medium= (7.63 -12.47)	29	32.22
		High =>(12.47)	34	37.77
14	Level of aspiration	Low=<(7.75)	43	47.78
		Medium =(7.75-9.53)	26	28.89
		High =>(9.53)	21	23.33

3.2 Overall Adoption of Recommended Cultivation Practices by Cowpea growers

The data in Table-2 reveals that as high as 64.45 per cent of cowpea growers belonged to medium level adoption category, 21.11 per cent to high adoption category and 14.44 per cent belonged to low adoption category.

Table 2: Overall Adoption of Recommended Cowpea Cultivation Practices by Cow pea growers (N=90)

Adoption categories	Number	Per cent
Low	13	14.44
Medium	58	64.45
High	19	21.11
Total	90	100.00

Mean=65.71; Standard deviation=9.36.

3.3 Adoption of Specific Recommended Cultivation Practices by cowpea growers

The results in Table-3 reveals that majority of cowpea growers completely adopted the recommended cultivation practices such as, time of sowing (92.22%), inter cultivation (62.23%) and post-harvest management practices (94.44 %). Further, majority of cowpea growers partially adopted the recommended cultivation practices such as, quantity of seed rate (87.78%), recommended spacing (81.11%), recommended quantity of FYM (53.33%), time of application of recommended FYM (74.45%), application of recommended quantity of fertilizers like nitrogen (74.45%), phosphorous (72.23%) and potash (70.00%), recommended plant protection measures (81.11%), recommended harvesting time and recommended yield (85.56%) and recommended storage practices (78.88%). In addition, majority of cowpea growers not adopted recommended cultivation practices such as recommended varieties (77.78%) and seed treatment with recommended bio-fertilizers (87.78%).

Table 3: Adoption of Specific Recommended Cultivation Practices by Cowpea growers (N=90)

Sl. No.	Recommended cultivation practices	Adoption level					
		Complete Adoption		Partial Adoption		Non-adoption	
		No.	%	No.	%	No.	%
1	Recommended varieties	20	22.22	0	0.00	70	77.78
2	Recommended quantity of FYM	24	6.67	48	53.33	18	20.00
3	Time of application of recommended FYM	23	25.55	67	74.45	0	0.00
4	Recommended quantity of seed rate	11	12.22	79	87.78	0	0.00
5	Seed treatment with bio-fertilizers	2	2.22	9	10.00	79	87.78
6	Time of sowing	83	92.22	0	0.00	7	7.78
7	Recommended spacing	17	18.89	73	81.11	0	0.00
8	Application of recommended quantity of fertilizers						
	a).Nitrogen	17	18.89	67	74.45	6	6.66
	b)Phosphorus	18	20.00	65	72.23	7	7.77
	c) Potash	17	18.89	63	70.00	10	11.11
9	Inter cultivation	56	62.23	34	37.77	0	0.00
10	Hand weeding	21	23.34	38	42.22	31	34.44
11	Plant protection measures	9	10.00	73	81.11	8	8.89
12	Recommended harvesting time	13	14.44	77	85.56	0	0.00
13	Post-harvest management practices	85	94.44	5	5.56	0.00	0.00
14	Recommended yield	13	14.44	77	85.56	0	0.00
15	Recommended storage practices	16	17.77	71	78.88	3	13.33

3.4 Relationship between Profile Characteristics of cowpea growers and Adoption of recommended cowpea cultivation practices.

The data in Table-4 reveals that there was a positive and significant relationship at one per cent level of probability between education, family size, annual income and economic motivation with their adoption of recommended cultivation practices by cowpea growers. Further, the variables such as

size of land holding, farming experience, extension contact and mass media participation had positive and significant relationship at five per cent level probability with their adoption of recommended cultivation practices by cow pea growers. On the other hand age, occupation, livestock possession, cosmopolitaness and organizational participation had nonsignificant relationship with their adoption of recommended cultivation practices by cow pea growers.

Table 4: Relationship between Profile Characteristics of Cowpea growers and Adoption of Recommended Cultivation Practices (N=90)

Sl. No.	Variables	Correlation coefficient 'r' value
1	Age	2.274NS
2	Education	1.178**
3	Family size	19.405**
4	Occupation	4.857NS
5	Livestock possession	6.096NS
6	Size of land holding	9.504*
7	Annual income	13.32**
8	Farming experience	10.917*
9	Economic Motivation	18.207**
10	Cosmopolitaness	7.983NS
11	Extension contact	8.288*

12	Mass media participation	8.261*
13	Organizational participation	1.699NS
14	Level of aspiration	9.28*

**=significant at 1% level; *=significant at 5% level and NS=Non-significant.

3.5 Contribution of profile characteristics of cowpea growers and their adoption of recommended cultivation practices

The Table-5 explains the contribution of independent variables on extent of adoption of recommended cultivation practices by cowpea growers to their adoption. The results accounted that independent variables *viz.*, education, family size, occupation, size of land holding, annual income,

cosmopolitanism, extension contact, and organizational participation had significantly contributed to the extent of adoption of recommended cultivation practices by cowpea growers. The R² value specified that all the 14 independent variables had contributed to the tune of 0.131 per cent of variation in extent of adoption of recommended cultivation practices by cowpea growers.

Table 5: Contribution of Profile Characteristics of Cowpea growers and Adoption of Recommended Cultivation Practices (N=90)

Sl. No.	Variables	B	Std. Error	't' value
1	Age	0.130	0.205	0.801
2	Education	0.080	1.448	0.499*
3	Family size	0.030	1.673	3.279*
4	Occupation	0.088	0.522	0.766*
5	Livestock possession	0.026	0	0.245
6	Size of land holding	0.101	1.989	0.864*
7	Annual income	0.045	1.419	0.393*
8	Farming experience	0.180	0.571	1.470
9	Economic Motivation	0.143	0.676	1.158
10	Cosmopolitanism	0.027	1.017	0.233*
11	Extension contact	0.230	1.032	2.021*
12	Mass media participation	0.036	0.833	0.308
13	Organizational participation	0.075	1.302	2.551*
14	Level of aspiration	0.105	0.530	0.904

R² = 0.131; * = Significant at 5% level and NS = Non-Significant.

3.6 Economics of cowpea Cultivation

A close look at Table 6 reveals that on an average the cost of cowpea production was Rs.18082 /-, the gross returns was Rs 39960.- and net returns was Rs. 21878 per/ ha. The return per rupee of expenditure was 1.21. The cost of land preparation was (21.02 %) ranked first, farm yard manure (16.03%)

ranked second, fertilizers (9.96%) ranked third, seeds(9.40%) ranked fourth, plant protection measures (9.12%) ranked fifth, inter cultivation (8.57%) ranked sixth, harvesting (7.75%) ranked seventh, sowing (7.37 %) ranked eighth, post-harvest management practices (6.08) ranked ninth and weeding (4.70%) ranked tenth.

Table 6: Economics of cowpea Cultivation hectare (N=90)

Sl. No	Items	Rupees	Per cent	Rank
I. Cost of production				
1	Land preparation	3800	21.02	I
2	Farmyard manure	2900	16.03	II
3	Sowing	1332	7.37	VIII
4	Seeds	1700	9.40	IV
5	Fertilizers	1800	9.96	III
6	Inter cultivation	1550	8.57	VI
7	Weeding	850	4.70	X
8	Plant protection measures	1650	9.12	V
9	Harvesting	1400	7.75	VII
10	Post-harvest management practices	1100	6.08	IX
Total		18082/-		
II. Returns				
1	Yield(quantals/ha)	7.82		
3	Gross Returns	39960@ Rs 5110 Per quintal		
4	Net Returns	21878		
5	Benefit - Cost Ratio	1.21		

3.7 Constraints expressed by cowpea growers

The major constraints expressed by cowpea growers in production of cow pea (Table-7) were low price (Rank I), non availability of recommended varieties (Rank II), non availability of high yielding varieties (Rank III), lack of

market information (Rank IV), lack of minimum support price (Rank V), non availability of micro nutrients in smaller quantities (Rank VI) and un scientific crop insurance (Rank VII).

Table 7: Constraints Expressed By Cowpea growers (N=90)

Sl. No	Constraints	Number	Per cent	Rank
1	Low price	87	96.66	I
2	Non availability of recommended varieties	81	90.00	II
3	Non availability of high yielding varieties	78	86.66	III
4	Lack of market information	76	84.44	IV
5	Lack of minimum support price	72	80.00	V
6	Non availability micro nutrients in smaller quantities	67	74.44	VI
7	Un scientific crop insurance	64	71.11	VII

4. Discussion

Majority of cowpea growers belonged to middle age group, mainly depend on agriculture, possessed smaller livestock (1-4 animals), marginal farmers, had medium level cosmopolitanism and medium level extension contact and high farming experience. The probable reasons for the above trend may be due to the fact that family size plays an controversial role under the existing situations, the agriculture may not give continuous income and it is a seasonal activity and depends on allied activities. The livestock possession is becoming a costly affair. Majority were marginal farmers due to fragmentation and separation of families. Low family income restricted them to have medium cosmopolitanism and extension contact. Isibor and Ugwumba (2014) reported that Adoption of cowpea production technologies is highly facilitated by the efforts of extension workers in introducing and demonstrating to the farmers on how to use the technologies. Tijjani *et al.*, (2015) [2] reported that cent per cent of the respondents indicated they had no contact with the extension agents but adopted the practice on their own or with the help of fellow farmers. The lack of farmers contact with extension agents negates the theoretical role of extension agencies supposed to play in technology diffusion and adoption.

Majority of cowpea growers belonged to medium adoption category followed by high to low adoption category. The possible reason may be that the cowpea crop is mainly grown as inter crop/ mixed crop and main crop mainly in dry land situations. Bashir, *et al* (2018) [3] revealed that 56.70% of the respondents were aware of the improved cowpea varieties, but are yet to start using it. Further, 26.70% and 5.30% were at the interest and evaluation stage. About 3.30% of the respondents were at the trial stage in the adoption of the technology and only 8.00% of the farmers had already adopted the technology. This means that majority of the respondents were yet to adopt the improved cowpea varieties. Majority of cowpea growers completely adopted, the recommended cultivation practices, time of sowing, inter cultivation, and post-harvest management, practices partially adopted the recommended quantity of seed rate, recommended spacing, recommended quantity of FYM, time of application of recommended FYM, application of recommended quantity of fertilizers like nitrogen, phosphorous and potash, recommended plant protection measures, harvesting time and recommended yield and recommended storage practices. On other hand, recommended varieties and seed treatment with recommended bio-fertilizers practices were not adopted. This is because of the reason that farmers more easily adopted low cost technologies, followed by medium cost and high cost technologies. Tijjani *et al.*, (2015) [2] revealed that 24.00 % of the respondents had planted the improved cowpea varieties and 26.00% had implemented the recommended seed rate, 32.70% have adopted recommended storage techniques and seed spacing practices respectively. Further, 23.30% and 22.60% have

adopted the improved methods of seed treatment and fertilizer application respectively. On the other hand, 21.30% and 20.00% had taken pest control measures and land preparation respectively, in addition farmers recorded the highest adoption level in harvesting 38.00%, weed control 35.30% and sowing date 33.30%.

There was a positive and significant relationship between education, family size, annual income and economic motivation with their adoption of recommended cultivation practices by cowpea growers. This may be because of the reason that the education widens their knowledge and it is one of the important factor in determining status of farmer's annual income and economic motivation encouraged the cowpea farmers to adopt more high yielding technologies. Agwu (2004) [4] of improved cowpea cultivation practices. Esther Wahaga (2019) [5] revealed that Farm size and household size were positively significant in determining to what an extent farmers would adopt improved varieties. Those with large farm sizes cultivated more than two varieties compared to those with smaller farm size. Farmers who had smaller farm sizes thoroughly considered all the varieties available to them and which ones could offer high yields while considering drought and pest and diseases.

The independent variables *viz.*, education, family size, occupation, size of land holding, annual income, cosmopolitanism, extension contact, and organizational participation had significantly contributed to the extent of adoption of recommended cultivation practices by cowpea growers. The R2 value specified that all the 14 independent variables had contributed to the tune of 0.131 per cent of variation in extent of adoption of recommended cultivation practices by cowpea growers. Yindau (2014) [6] revealed that years of farming experience was found to be important in influencing the likelihood of adoption of cowpea production technologies. The variables was found to be statistically significant at 1% level and positively related with likelihood of adoption. Most farmers fear trying improved technology because they do not have previous experience in applying the new technology and due the possible risk of failure. Bashir, *et al* (2018) [3] reported that the coefficient of multiple determinations (R2) was 0.79 implying that about 79% of the variations in the adoption of cowpea production technologies were explained by variables in the models.

On an average the cost of cowpea production was Rs.18082, the gross returns was Rs 39960/- and net returns was Rs. 21878 per/ ha. The return per rupee of expenditure was 1.21. The cost of land preparation was ranked first, farm yard manure ranked second, fertilizers ranked third, seeds ranked fourth, plant protection chemicals ranked fifth, inter cultivation ranked sixth, harvesting ranked seventh, sowing ranked eighth and post-harvest management practices ranked ninth. This is because of the reason that now-a-days majority of farmers were not rearing draught animals due to high maintenance cost and cowpea is being grown in marginal land with low investment mostly by marginal farmers. Usman

Shaba Mohammed *et al.*, (2014) reported that the rate of return on investment was 2.2, while gross ratio and operating ratio were 0.37 and 0.31 respectively. All the ratios were less than 1, indicates that cowpea farming is highly profitable and has great potential for increasing rural income.

The major constraints expressed by cowpea growers were low price, non availability of recommended varieties, non availability of high yielding varieties, lack of market information, lack of minimum support price, non availability of micro nutrients in smaller quantities and un scientific crop insurance. Mbavai (2015) [8] revealed that major constraints to the adoption of improved cowpea varieties were: non-availability of seeds, non-availability of fertilizer, high cost of fertilizer and diseases and pest control measures.

5. Conclusion

Majority of the farmers adopted recommended cowpea cultivation practices to a medium extent. This calls for intensive educational activities through training programmes, method demonstrations, and result demonstration, study tours to progress farmers' fields and research d, field day and success stories in electronic and print media. Further, majority of cowpea growers expressed low price and non-availability of high yielding varieties. Therefore, the government may take up necessary steps for scientific profitable crop insurance, minimum support price and daily market information in website. In addition, the research stations both private and government may concentrate to release more high yielding/ hybrids in cowpea.

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