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Economic Benefits of Food Legume Cultivation in Benue State-Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author JCU designed the study and wrote the protocol. Author DPA performed the statistical analysis and wrote the first draft of the manuscript. Authors JCU and EAW managed the analyses of the study. Author EAW managed the literature searches. All authors read and approved the final manuscript.

Review Article

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ABSTRACT

There has been an increased advocacy on food legume cultivation as an economical and sustainable means of soil fertilization due to the inherent problems of inorganic fertilizers such as unavailability, high cost, environmental hazards and soil degradation. This study was therefore undertaken to assess the effect of food legume cultivation on farmers' output, income, household inventory and inorganic fertilizer usage. The study adopted "adopters and non-adopters"method in assessing the effect of food legume technology adoption on farmers'welbeing. The study which was carried out in 2007 & 2009 respectively employed multi-stage sampling techniques in selecting 300 respondents and data were collected using structured questionnaire. Simple descriptive statistics, correlation and t-test were used to analyse the data. The result of correlation analysis shows that a significant positive relationship exist between age, household size, farming experience, quantity of inorganic fertilizer used and the number of legumes planted by farmers. The result shows that a significant positive difference (t = 7.04, 2.84, 2.33, 4.09 and 2.62; P = .05) was found between household inventories of the cultivators and non-cultivators of legume crops in terms of household ownership, quality of roof, wall, water source and possession of phone. Similarly, the mean aggregate crop yield of adopters

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was found to be significantly higher (t = 2.055; *P* = .05) than that of the non-adopters. Also, non-adopters used a significantly higher (t=2.007; *P* = .05) quantities of inorganic fertilizers than the adopters. The major constraints of food legume production includes pests and diseases, drought, erosion and tediousness involved in the farm work. The study concludes that cultivation of legume crop by farmers improved their aggregate crop outputs, income and livelihood. The study recommends increased awareness campaign on the cultivation of food legume crops, adequate and regular supply of production and marketing inputs to ensure sustainability of the technology.

Keywords: Soil fertility; food legume; household inventories; benefits; adopters.

1. INTRODUCTION

Low soil fertility has been identified as a fundamental biophysical constraint to agricultural production in Sub-Sahara Africa [1,2]. Soil degradation has progressively increased over the years resulting in decline in overall farm productivity and household income. Africa today faces a soil fertility crisis. African soils are losing an estimated $4 billion worth of soil nutrient yearly [3]. Three-fourth of the farm land in Sub-Sahara Africa is plagued by severe nutrient depletion, and 46% of the African continent suffers from desertification [3]. With this problem of low soil fertility, an easy option available for farmers include tradional bush fallowing which population explosion has made inappropriate as a method of soil fertility restoration. Nigeria is one of the countries in Sub-Sahara Africa where self-sufficiency in food production remains a critical challenge even in the absence of wars and natural disasters [4]. This is because of the drastic reduction in fallow periods and the almost continuous cropping without soil fertility restoration which has depleted the nutrient base of most soils. Incidentally, the countries that have the highest nutrient loss rates are the ones where fertilizer use is low and soil erosion is high.

The use of, and over-dependence on external inputs such as inorganic fertilizers as the soil restorative measure is not only unsustainable but have problems associated with environmental “unfriendly”. While fertilizer application is one of the easiest and fastest means of restoring soil fertility, its negative effects on environment has been of great concern. Not only is inorganic fertilizer unavailable at the planting season, when available is sold at high price often unaffordable by most farmers.

However, recent studies have shown that the integration of legumes into the cropping system has been demonstrated to have positive results in soil fertility increment and soil amelioration. Available research has further shown that legumes have the ability to enhance nitrogen fertility through biological Nitrogen-fixation and Nitrogen-transfer and most often with the exertion of N- sparring effects [5].

Legumes are widely used for food, fodder, shade, fuel, and timber, as cover crops and for green manure. They are a feature of cropping systems (in rotation or intercropping), grazing systems (including extensive grazing of natural vegetation, intensive pastoral type of agriculture and cut/carry systems), plantation systems (legume cover crops are grown in the inter-row space of tree crops such as coffee, tea, rubber and oil palm), and agro-forestry systems. There are other benefits from using a legume on a cropping system that should be figured into any comparison with fertilizer-N but unfortunately, they are often omitted because of difficulty in quantifying them. Legumes may have long-term benefits on some soils that again are difficult to convert into monetary value. Usually legume rotations, compared to continous grain cropping result in enhanced soil organic matter content and mineralizable N. This provides not only better control of N availability but also improved soil structure, less energy for cultivation and less erosion [6]. Thus, the overall advantages of any legume technology according to [7] is to increase yield, improved resource use efficiency, crop diversification and reduction of environmental pollution.

Since majority of Nigerian farmers cannot afford the exorbitant price of inorganic fertilizer, which is most times unavailable, there is thus the need for farmers to adopt a cheap and convienient cropping system that ensures food sufficiency and soil fertility. Again, increasing agricultural productivity by the use of such easily accessible renewable natural resources with little or no dependence on external inputs (e.g. inorganic fertilizers) would not only assure a stable productive environment, but would create a high motivating factor for technology adoption. Under this circumstances, increasing agricultural production would become an effective way of achieving higher income. Also, there is abundant evidence on the ability and willingness of resource-poor farmers to respond to new agricultural technology provided that it is socially and economically beneficial to them, does not contain an unacceptable level of risk and does not require complementary inputs which are not obtainable or which they have impeded access to. This is tune with the current global concern and approach to sustainable agricultural production systems [8].

Food legumes, known as pulses confer special dietary and agricultural benefits that make them particular valuables. legumes are rich in fibre and contains two to four times the protein of cereals- hence the nickname, “the poor man’s meat”. Legumes and cereals eaten together supply complementary amino acids- the building blocks of protein- thus providing better nourishment than if either type of food were eaten alone. In the case of the use of food legumes which serves the dual purpose of staple food production and soil improvement factors, it is perceived that they fit appropriately into farmers preferences and aspirations especially with respect to increased output with minimal or no risks. These food legumes (Bambaranut, Pigeon pea, groundnut, soyabeans and cowpea) when cultivated guarantees not only enough food for the increasing populace but also helps in fertilizing and nourishing the soil. However, review of recent literature has shown the existence of little work in the area of the effect of food legume cultivation on farmers’wellbeing. Thus, the major objectives of this study are:

1. Determine the relationship between selected farmers’socio-economic characteristics and level of food legume crop cultivation;
2. Assess the difference in household inventory, inorganic fertilizer usage and annual farm income of adopters and non-adopters of food legume technology.
3. Identify the major constraints to food legume production in the study area.

2. METHODOLOGY

2.1 The Study Area

The study area is Benue State, in the middle belt zone of Nigeria located between latitude 8-10ºN and between longitudes 6-8ºE. It has a total landmass of about 33,955 km^2 with 23 Local Government Areas. Furthermore, the State is politically and agriculturally divided into three zones: A, B & C with a population of 4,219,244 people and 413,159 farm families [9,10]. The State is bounded by Nasarawa State in the North, Taraba State in the East, Cross-River in the South, Enugu State in the Southwest, Ebonyi State in the South Central, Kogi State at the West and at the Southeast by Cameroon Republic. Benue State derives its name from the River Benue; the second largest river in Nigeria. The main source of livelihood of the people is agriculture, hence the state slogan- “food basket of the nation”. This is due to the fact that the state is endowed with rich fertile land and favourable climatic conditions suitable for agricultural production.

2.2 Sampling Technique

An awareness compaign for food legume cultivation was carried out in Benue state and it has demonstration sites at two LGAs in Benue State namely Ogbadigbo and Makurdi. The study was carried out in two phases; first baseline survey was done in 2007 and subsequently after the legume awareness intervention, another survey was carried out in 2009. The survey involved a multi-stage sampling techniques which involves first; purposive selection of the two LGAs (Ogbadigbo and Makurdi) and three communities from the LGAs where demonstration plots of legume technology were sited. Having obtained the sampling frame, 39.4% of the farmers in each community were drawn using simple random sampling technique which gave a total of 300 respondents. The respondents comprised adopters and non-adopters of food legume technology. Data for this study was collected by the use of a well-structured questionnaire administered to the farmers in the study area. Primary data was supplemented with secondary data from farmers’ records, internet.

2.3 Data Analysis

Descriptive statistics, correlation and t-test of mean difference were used to analyse the data. For the measurement of household inventory, each inventory in the farmers’ house was assigned index equivalent to its quality and standard for instance in toilet facilities measurement: bush=1, bucket system= 2, pit latrine= 3 and water cistern/closet=4; in cooking fuel measurement: firewood=1, kerosine stove= 2, Gas =3, Electricity = 4; in Roofing measurement: Raffia leaves=1, Thatch=2, Corrugated iron zinc=3, Aluminium = 4, Asbestos =5 etc. In order to obtain uniform unit of meeasurement of farmers’output across crops, conversion factors were applied to obtain their grain equivalent. Following [11,12], 5 dry weight of tuber crops is equivalent to 1 dry weight of grain (i.e ratio 5:1) and 7 dry weight of vegetable crop is equivalent to 1 dryweight of grain (i.e ratio 7: 1).

2.3.1 T-test analysis

The t-test of means analysis was used to compare the means of these attributes of farmers: household inventory, annual farm output, annual income, quantity of inorganic fertilizer per hectare used by farmers that cultivate food legume crops and those that do not cultivate (adopters and non-adopters). The programme emphasized the use food legume crops instead of inorganic fertilizer for soil fertility restoration. It is expected that the programme should translate into incremental output, income otherwise it amounts to economic and social losses. Test of hypotheses employ mostly critical t-values for small sample sizes ($n<30$) while critical Z values are mainly used for large samples ($n>30$). As sample size increases, t-distribution tends towards standard normal (Z) distribution [13].

3. RESULTS AND DISCUSSION

3.1 Relationship between Farmers Socio-economic and Production Characteristics and the Number of Legume Crops Planted

The socio-economic characteristics examined are age, household size, annual income, farming experience, farm size and bags of fertilizer used by respondents in the last planting season. The result presented in Table 1 revealed that at 5% level of significance, a significant relationship exist between age, household size, farming experience, quantity of inorganic fertilizer used and the number of legumes planted by the respondents. Furthermore, the relationship between farmer's age, household size and farming experience and farm size were found to have significant positive relationship with the number of legume crop planted by a farmer.

Table 1. Result of correlation analysis between socio-economic and production variables and the number of legume crops planted by farmers

Variables	Correlation coefficient
Age	.357**
household size	.382**
Income	-.099
Farming experience	.456**
Quantity of inorganic fertilizer	-.127*
Farm size	.644**

Dependent variable: Number of legume crop planted.
***. Significant at the 0.01 level, *. Significant at the 0.05 level*

The implication of the results is that as one advances in age, the number of legume crops planted also increases. This is likely due to the fact that as one gets older, there is the tendency for one to be more knowledgeable about the crops that improve soil fertility while at the same time provide foods and cash income. Also the positive relationship between farmers' household size and number of legume crop planted is likely due to the fact that the higher the household size, the higher the availability of family labour a farmer has to diversify into the cultivation of more legume crops. The positive relationship between farming experience and the number of legume crops a farmer plants is in line with the expectation that the more experienced a farmer is in farming, the more potentials he has to differentiate crops that give highest income, best as food, increases soil fertility and high yield and therefore the tendency to plant them based on his needs. This is in line with the findings of [14] that legumes have the potentials to sustain soil fertility in small holder farming system. Farm size has a positive relationship with the number of legumes planted. This means that as the farm size increases, the number of legume crops planted by farmer increases.

In contrast, the quantity of inorganic fertiliser used by a farmer was found to be negatively related to the number of legume crop planted by the farmers. Although the result might appear too obvious and unnecessary but during the course of the study, it was gathered that inorganic fertilizers are applied to all crops including legumes especially when it is available or the soil fertility is too low to initiate germination. However, no significant relationship was found between annual income and the number of legume crop planted by a farmer. The result showed a negative relationship probably because farmers with high income level tend to go for inorganic fertilizer since they can readily afford it. The negative relationship between quantity of inorganic fertilizer used and the number of legumes crops planted is expected since the higher the quantity of legume crop planted, the lower the quantity of inorganic fertilizer needed, as a farmer will expect the legume crop to add to the soil fetility rather than demanding soil additives.

3.2 Difference in Household Inventory, Fertilizer usage and Annual Farm Income of Adopters and Non-adopters of the Food Legume Technology

Analysis of impact of the technology based on cultivation and non-cultivation of legume crop carried out indicated that among the 300 respondents sampled, only about 15 respondents do not plant any of the food legume crops. Even with all the awareness that has been created, some farmers still do not plant any of these legume crops. This agrees with the statement of some authors: "despite the positive benefits, the success rate in achieving effective adoption of soil-improving and forage legumes in sub-Sahara African has been low" [15,16,17].

Table 2 presents the descriptive and t-test of means difference of household inventories and production characteristics of adopters and non-adopters. The result of the t-test of means difference revealed a significant increase in the household inventory indices (t = 7.40, 2.84, 2.33, 4.09 and 2.62 respectively, P = .05) of cultivators of food legumes in the areas of house ownership, quality of roof, wall, water source and possession of mobile phones. Although, there was an observed improvement in the adopters' source of light, methods of refuse disposal, quality of floor, increase in the number of room occupied, possession of Television, Tape recorder and Radio, there was no statistical difference between the two groups. This result implies that as a result of adoption of food legume, farmers might have used the money they would have spent in procuring inorganic fertilizer to buy other facilities in the house.

However, the adoption of food legume crops as soil fertility restoration agent have not made a positive impact in the areas of toilet facilities, cooking fuel and means of transportation. This may be attributed to the fact that these facilities: Toilet, cooking fuel and means of transportation may not be the priority of these farmers as there are abundance of bushes and commercial transportation systems in the villages where these farmers reside.

Furthermore, the result showed that the mean quantity of inorganic fertilizer used by the non-adopters was significantly higher (t = 2.007; P = .05) than that used by the adopters. This implies that with the cultivation of food legumes, there will be less demand for inorganic fertilizer thereby saving the money and time that would have been used in procuring inorganic fertilizer. Similarly, the result revealed that the mean annual income of adopters (₦340,100) is higher than the mean annual farm income of non-adopters (₦323,850) although no statistical significance was found. This result implies that the integration of these legume crops into the farming system of these farmers have impacted positively on the farmers. With the increase in their income level, they were able to acquire more household properties. This result can be likened to the regression result got by [18], which clearly indicates that application of integrated soil fertility management options significantly improve relative efficiency of farmers.

Table 2. Descriptive and inferential statistics of household inventories and production attributes of adopters and non-adopters

Household inventories	Descriptive statistics				Inferential statistics		
	Categories of farmers	**Mean**	**Standard deviation**	**Mean difference**	**Df**	**t-values**	**Sig. (2-tailed)**
House	Adopters	5.6491	.82418	1.64912	298	7.400*	.000
Ownership	Non-adopters	4.0000	1.13389		14.789		
Roof	Adopters	2.7123	.50493	.37895	298	2.837*	.005
	Non-adopters	2.3333	.48795		15.620		
Wall	Adopters	4.6877	1.32581	.82105	298	2.326*	.021
	Non-adopters	3.8667	1.45733		15.245		
Floor	Adopters	1.8737	.43384	.00702	298	.062	.951
	Non-adopters	1.8667	.35187		16.325		
Number of	Adopters	3.8316	2.33008	.36491	298	.597	.551
Rooms	Non-adopters	3.4667	1.80739		16.550		
Toilet	Adopters	1.8316	1.15356	-.36842	298	-1.203	.230
	Non-adopters	2.2000	1.20712		15.376		
Refuse	Adopters	1.3298	.48570	.12982	298	1.016	.311
Disposal	Non-adopters	1.2000	.41404		16.097		
Water	Adopters	3.3930	1.37890	1.45965	298	4.090**	.000
Source	Non-adopters	1.9333	.25820		78.820		
Light	Adopters	2.2982	.56184	.16491	298	1.124	.262
	Non-adopters	2.1333	.35187		17.993		
Cooking	Adopters	1.4000	.56419	-.46667	298	-2.980*	.003
Fuel	Non-adopters	1.8667	.99043		14.482		
Means of	Adopters	1.6491	1.48574	-.28421	298	-.727	.468
Transport	Non-adopters	1.9333	1.27988		16.052		
Radio	Adopters	.9404	.29062	.00702	298	.092	.927
	Non-adopters	.9333	.25820		15.926		
Television	Adopters	.6982	.79179	.29825	298	1.426	.155
and Tape Recorder	Non-adopters	.4000	.73679		15.751		
Cell Phone	Adopters	.7649	.42480	.298	298	2.621*	.009
	Non-adopters	.4667	.51640		15.014		
Inorganic	Adopters	50.1508	120.9294	-62.960	298	-2.007*	.046
Fertilizer (kg/ha)	Non-adopters	113.11	41.48200		29.039		
Annual	Adopters	3.4010E5	3.44088E5	16241.70	298	.180	.858
farm income (₦)	Non-adopters	3.2385E5	2.75212E5		16.393		

*Note: Number of adopters equals 285; Non-adopters equals 15 * Significant at 5%*

3.3 Difference in Crop Yields of Adopters and Non-adopters of Food Legume Technology

Table 3 presents the results of the descriptive statistics and t-test of mean difference of participant and non-participant farmers. The result revealed the participant farmers'mean output of maize, yam, sweet potato and okro as 351.77kg/ha, 1249.10kg/ha, 165.94kg/ha, and 128.56kg/ha respectively while the non- participant farmers corresponding values are 158.22kg/ha, 49.333kg/ha, 61.67kg/ha, and 59kg/ha respectively. The result of the t-test of means of difference affirmed a positive significant difference (t= 2.97, 2.018, 2.978 and 2.134 respectively; *P* = .05) between adopters and non-adopters outputs of maize, yam, sweet potato and okro respectively. Similarly, the mean output of adopters'millet, cocoyam, pepper and tomato are higher than that of the non-adopters although no significant difference was found between them. However, the mean output of non-adopters' crop like rice, sorghum, cassava and melon were higher than that of the adopters. This may be attributed to shortage of labour to cater for the increased farm enterprises of adopters of the legume technology.

Table 3. Descriptive statistics and independent t-test of means of crop output of adopters and non-adopters of the legume intervention

Crops	Descriptive statistics				Inferential statistics		
	Catergories of farmers	**Mean output (kg/ha)**	**Standard deviation**	**Mean difference**	**Df**	**t-values**	**Sig. (2-tailed)**
Rice	Adopters	3.8963E2	681.89289	-237.48070	298	-1.335	.183
	Non-adopters	6.2711E2	411.19355	-237.48070	18.327		
Maize	Adopters	3.5177E2	250.94366	193.54596	298	2.970*	.003
	Non-adopters	1.5822E2	103.48753	193.54596	23.893		
Millet	Adopters	2.4564E2	208.63187	57.31053	298	1.048	.295
	Non-adopters	1.8833E2	154.93493	57.31053	16.792		
Sorghum	Adopters	1.5003E2	184.92517	-6.83509	298	-.142	.887
	Non-adopters	1.5687E2	111.03787	-6.83509	18.367		
Yam	Adopters	1.2491E3	2298.8714	1199.8076	298	2.018*	.044
	Non-adopters	49.3333	44.99471	1199.8076	287.840		
Cassava	Adopters	1.6501E3	2944.5741	-131.67695	298	-.172	.863
	Non-adopters	1.7818E3	1201.1467	-131.67695	24.138		
Cocoyam	Adopters	1.9475E2	283.52357	50.33421	298	.677	.499
	Non-adopters	1.4442E2	217.32899	50.33421	16.614		
Sweet potato	Adopters	1.6594E2	134.21441	104.27368	298	2.978*	.003
	Non-adopters	61.6667	79.67942	104.27368	18.473		
Okro	Adopters	1.2856E2	125.81292	69.48947	298	2.134*	.034
	Non-adopters	59.0667	24.97561	69.48947	70.196		
Pepper	Adopters	58.4761	44.82558	5.02947	298	.425	.671
	Non-adopters	53.4467	42.43204	5.02947	15.690		
Melon	Adopters	1.1749E2	99.31925	-69.97895	298	-2.587*	.010
	Non-adopters	1.8747E2	147.78308	-69.97895	14.673		
Tomato	Adopters	64.3930	108.04397	31.32632	298	1.117	.265
	Non-adopters	33.0667	39.62046	31.32632	26.900		
Aggregate crop yield (in grain equivalent)	Adopters	1.8427E3	1238.9316	660.83425	298	2.055*	.041
	Non-adopters	1.1818E3	476.67641	660.83425	25.566		

*Note: Number of adopters equals 285; Non-adopters equals 15 * Significant at 5%*

Using the earlier stated conversion factor of tuber and vegetable crops to grain equivalent, the aggregate crop yield of adopters and non-adopters were obtained. The result of t-test of mean difference further revealed that the mean aggregate crop yield of adopters is significantly higher ($t= 2.055$; $p \leq 0.05$) than that of the non-adopters. This result further confirmed the earlier result that the programme has impacted positively on the overall crop yield of participant farmers.

3.4 Constraints/Problems of Legume Production in Benue State

Table 4 shows the major constraints of food legume production in the study area. These include pests and diseases problems (53.3%), low soil fertility (16.0%), inadequate time to plant food legume (14.33%), inadequate finance (14.33%), tediousness of cultivating legume crops (13.3%), storage problem (9.0%), competition for sunlight with other crops (9.0%), low extension patronage (5.3%), inadequate rainfall (4.67%), inadequate knowledge of farming techniques (3.33%), unfavourable soil conditions (2.67%) and poor market for the product (1.0%). This result is in line with the findings of [19] who identified pests and diseases, lack of market for sale of produce, low soil fertility, inadequate finance and poor extension services as problem of legume farmers in Zimbabwe. The result implies that majority of the farmers were confronted with pest and diseases problem. An important component of the pests and diseases problem according to the respondents was the problem of striga weed control. Other components of this problem include destruction of legume seeds before germination by soil borne pests; attacks on legume seedlings by the wild animals; and, attacks on cowpea, groundnut and bambaranut by aphids in the dry spells.

Table 4. Problems associated with food legume crop cultivation

Problems	Frequency	Percentage	Rank
Weeds and pests	160	53.3	1
Low soil fertility/low yield	48	16.0	2
Inadequate finance /inputs	43	14.3	3
Inadequate time	43	14.3	3
Difficulty in planting /tedious work involved	40	13.3	5
Storage problem	27	9.0	6
Over crowding /competition	27	9.0	6
Poor Extension services	16	5.3	8
Inadequate rainfall/Drought	14	4.67	9
Inadequate knowledge of farming techniques	10	3.3	10
Unstable soil conditions	8	2.67	11
Poor market/Low prices	3	1.0	12

Multiple responses recorded

Low soil fertility ranked second among the problem of legume farmers in the study area. According to the respondents, most of the farmlands are low in soil fertility and crops do not grow well without fertilizer or manure. Even when some of them are fertile enough to support the germination of these crops, unfavourable soil situations such as waterlogging and sticky soils are other problems for the crop. The study found that the reason why pigeon pea is not usually planted among the Tivs could be attributed to the water-logged nature of their soil.

Finance is another constraint to legume production in the study area. Low farm income as well as the reluctancy of formal financial institutions to grant loans were identified as problem of getting appropriate fund for legume crop cultivation especially during harvesting when heavy financial outlay is required due to the urgency of the operation. In addition to the problems above, the problem of food legume crops competing with other crops in terms of over-shadowing leading to low yield of these crops.

Furthermore, problem of drought was reported by many farmers. The likely consequence of this problem is low germination and subsequently low yield. This is because legume-rhizobium symbosis is particularly sensitive to drought [20]. The stress factor associated with drought may also impair the development of root hairs and the site of entry of rhizobia to the host thus leading to low yield.

Inadequate storage facilities was reported by many farmers as constraint to legume crop production. According to the respondents most legumes are prone to weevil attacks when harvested and this problem are complicated by inadequate storage facilities especially in the harvest period. The likely consequence of this situation is that farmers are forced to sell at the same time leading to low prices and poor income for the farmers.

Low extension services was observed in most of the communities sampled. The situation may make it difficult for the transmission of new technologies and techniques of production to the farmers in these areas. Consequently, technical efficiency of legume crop production may be low among the farmers since, according to [21], extension services increases the technical efficiences of production. Low exposure to extension services was found to manifest in farmers' low knowledge of improved farming techniques in the study area. For instance, many farmers were found to be deficient in the knowledge of when to intercrop, how to process, when to market and how to utilize.

Poor marketing opportunities were cited by farmers as reason for not planting some legumes especially soybean. This situation is further worsened by lack of market for these crops in the nearby communities, non commercial utilisation of these produce by many people, poor storage facilities and poor market access infrastructure (good road and transport facilities).

4. CONCLUSION AND RECOMMENDATION

Legumes have a central role to play in a productive and sustainable agriculture.The integration of food legumes into the mixed and intercropping systems of farmers as alternative source of soil fertility has many potential benefits to farmers. This study has revealed the inherent benefits of food legumes as improvement in household inventories, reduced use of inorganic fertilizers, increased yield and subsequently increase farm income. This supports the assertion made by [22] that as there is high demand worldwide for legumes, the farmes who grow these crops can get sustainable income along with providing nutritional security for human health and sustainable soil health for increased productivity. Food legumes not only guarantes food security but preserves the soil and the environment. However, problems of weed and pest infestation, low soil fertility, tediousness involved in carrying out the farm operations, drought and erosion are the major challenges in food legume cultivation in the study area.

The study recommends increased awareness for food legume cultivation among rural farmers. This can be achieved through the use of trained Extension agents. Therefore, extension services should be made more proactive to ensure more coverage and effectiveness. Production inputs and mechanisation facilities should be made available to farmers timely. Viable markets for sale of surplus produce should also be facilitated which will ensure not only the profitability but the sustainability of the technology.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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