

## **DETERMINANTS OF SOYBEAN ADOPTION IN NIGER STATE, NIGERIA**

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### **ABSTRACT**

This study was carried out in 1998 cropping season. The objective was to assess the extent of adoption of soybean production among farmers in Niger State. A sample of 150 farmers selected randomly from four local government areas provided information used for the study. Both descriptive statistics and linear multiple regression were employed in analysis of data. Results of the study showed that the adoption rate was 47 per cent. The proportion of land devoted to soybean by adopters was 10 per cent. Regression analysis of the determinants of soybean production adoption showed farm size and literacy level to be positively related to adoption while farming experience was negatively related to it. The findings suggest the need to focus research goals on how to improve the adoption rate achieved so far and intensifying training on soybean production. Policies that would make land as well as credit available and accessible to farmers should also be designed.

### **INTRODUCTON**

The need for protein in the diet of man cannot be over empha-

sized. However, high cost of production has made protein from animal sources unaffordable for the average Nigerian. In view of the growing evi-

dence of morbidity and mortality arising from protein calories malnutrition in Nigeria (Igbedioh, 1990), there is need to supplement protein requirement of Nigerians with relatively inexpensive plant protein (Weingartner, 1987). Soybean popularly nicknamed "poor man's meat" contains about 40 per cent protein and 20% oil. The nutritional quality of soybean protein is nearly as good as meat proteins (Mijindadi, 1987). Soybean oil, which constitutes more than 50% of the world's edible vegetable oil trade, is rich in essential fatty acids and devoid of cholesterol (Ogundipe and Weingartner, 1992). It is also an excellent source of calcium, iron and vitamins such as thiamin, riboflavin and niacin (Mijindadi, 1987).

In view of the need to improve the nutritional status of Nigerians, efforts have been made to increase its production in the country.

Such efforts led to the development of high yielding adapted varieties such as Samsoy 1, Samsoy 2, TGX306-036, TGM344, TGX536-02D, TGX923-2e, M35, etc, which were released to farmers.

As part of the efforts of ad-

vancing soybean production and utilization in Nigeria, the National Cereals Research Institute (NCRI), Badeggi, in collaboration with the International Development Research Center (IDRC), Canada and International Institute for Tropical Agriculture (IITA), Ibadan, embarked on extension programme on soybean production and utilization in Niger State between 1990 and 1994. It is therefore, considered in order at this stage to assess the extent of adoption of its production.

### *Objectives*

Adoption studies carried out so far were on technology packages on such crops as cocoa, yam, rice, groundnut, cowpea, sorghum, millet and fishing techniques. None of the adoption studies were specifically directed to soybean production. The objectives of this study, therefore, were:

- i. to determine farmers rate of adoption of soybean production;
- ii. to determine factors that influence farmers' adoption; and

- iii. to make appropriate recommendations.

### ***Areas of Study and Methodology***

#### **Study Area**

Niger State is situated in the southern guinea savannah, between latitude 8° 11" to 11° 20" N and between longitude 4° 30" to 7° 15" E. The mean annual rainfall is about 1200mm. Rainfall has an irregular pattern of distribution. Rain often starts in May and ends in October. The months of June through September have most of the rainfall. The dry season starts in November and ends in April. The mean relative humidity ranges from 80 per cent (June to September) to 60 per cent (January to February). Major crops grown in the area include sorghum, millet, cowpea, groundnut, rice, maize, sugar cane, yam, sweet potato, cassava and vegetables such as okra, eggplant, choko and amaranthus. Soybean is relatively new crop in the area.

The choice of Niger state as study area was influenced by the presence of National Cereals Research Institute, from where the soybean production technologies emanate. Some

farmers in the area have, at one time or the other, acquired knowledge of soybean production.

#### ***Data Collection Procedure***

Data used in this study were primary data collected by means of structured questionnaires that were administered by trained enumerators during 1998 cropping season. Four local government areas (LGAs) were purposively selected based on their previous history of soybean production. These LGAs were: Gbako, Lavun, Paikoro and Gurara. Three villages were purposively selected in each of the four LGAs and 15 farmers were randomly selected from each of the villages for interview. A total of 180 farmers were interviewed, but only 150 questionnaires were found suitable for use in the analysis. The data collected from the farmers include those on their socio-economic characteristics, adoption of soybean and constraints to adoption of soybean production.

#### ***Analytical Model***

In Nigeria, many researchers including Jagne and Patel, (1981), Monu and Omole

(1983), Osuji, (1983); Onyenwaku and Mbuba, (1991) and Chikwendu, et al, (1996) have investigated factors related to adoption of improved farm practices. The isolated variables included:

- i. Socio-economic characteristics (Age, household size, level of education, income, etc).

**Institutional factors** (extension contact, farm size, access to credit, tenurial status, membership of farmers' organization, etc). i. Characteristics of the innovation itself (relative advantage, compatibility, complexity, divisibility and communicability).

- ii. Characteristics of the change agents themselves (personality, techniques of communication, amount of participation obtained and the use of the traditional culture).

How these factors influence the adoption of soybean production is yet to be investigated. The analytical tools used in this study were: simple descriptive statistics, and ordinary least square linear multiple regression technique. The regression model is expressed as:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + U$$

Where;

$X_1$  = Age of farmers measured in years

$X_2$  = the number of household members involved in farming

$X_3$  = Farm size measured in hectares

$X_4$  = Farming size measured in hectares

$X_5$  = Literacy level, measured in number of years spent in school.

$X_6$  = Extension contact, 1 if a farmers as contact with extension agent, 0 otherwise

$X_7$  = Tenancy status of the farmers, 1 if the farmer owns the land, 0 otherwise

$X_8$  = Membership of cooperative society or farmers associa-

**Table 1: Socio-economic Characteristics of the Sampled Farmers in Niger State (1998).**

Socio-economic Char-	Frequency	Percentages
<b>Age Distribution (years):</b>		
20-29	21	14
30-39	36	24
40-49	66	44
50-59	24	16
60 and above	3	2
<b>Farm Size (hectares):</b>		
Less than 1.0	10	7
- 1.9	56	37
- 2.9	80	53
- 3.9	4	3
<b>Levels of Education</b>		
No formal education	40	27
Primary	72	48
Secondary	15	10
Tertiary	2	1
Adult	21	14

tion. 1 for members, 0 otherwise

$X_9$  = Credit availability, 1 if a farmer uses credit in his farming operation, 0 otherwise.

$Y$  = The proportion of land area devoted to soybean production

$B_0$  = Constant value

$B_1, b_2, b_3, \dots, b_9$  are the coeffi-

cients of regression

U=error term

Y was regressed against the selected independent variables in order to determine factors influencing adoption. All the independent variables except age are expected to be positively related to adoption.

## RESULTS AND DISCUSSION

### *Socio-economic Characteristics*

The household size ranged between 3 to 11 average size of 6 members. All the farmers sampled were above 20 years of age. The mean age of the sampled farmers was 40 years. Farm size holding of the sampled farmers ranged between 0.8 and 3.3 with an average of 2 hectares. Majority of the sampled farmers attended primary school, while only 27% had no formal education. 62 per cent of sampled farmers were owner cultivators while 30% were tenants. Some socio-economic characteristics of the sampled farmers are shown in Table 1.

### *Adoption of Soybean Production*

Out of 150 farmers interviewed, 70 (47%) grow soybean. The proportion of land area devoted to soybean production by adopters was 10% of their total farm land area. Some reasons given for adoption by adopters are shown in Table 2.

Majority of farmers sampled cultivate soybean for economic reason, closely followed by advice from extension agents. Out of the 70 soybean growers, only 10 were aware of the varieties of soybean they cultivate, however, samples of soybean grain collected indicated that farmers in the area cultivate improved varieties mainly Samsoy 2 and TGX 923-2E.

Eighty farmers (53%) were not growing soybean among the sampled farmers. Table 2 shows the reasons given for non-adoption. Lack of market, inadequate seeds supply, complex and tedious processing and poor relative prices constitute major constraints to soybean adoption among farmers sampled in the state.

**Table 2: Distribution of the farmer's technical efficiency indices Gombe State Nigeria**

Efficiency Class Index	Number of Farmers	Percentage of
0.0-0.10	0	
0.11-0.20	1	0.8
0.21-0.30	0	0
0.31-0.40	2	1.6
0.4-0.50	7	5.7
0.51-0.60	18	14.6
0.61-0.70	23	18.7
0.71-0.80	52	42.3
0.81-0.90	20	16.3
0.91-1.00	0	0
Mean=0.69		
Total	123	100.0

***Factors Affecting Adoption of Soybean Production***

Table 3 shows the results of the regression analysis of the determinants of soybean production adoption. The coefficient of farm size is statistically significant at 1% and positively related to adoption of soybean. This implies that the level of adoption increases correspondingly with increase in farm size. This may be attributed to the fact that owners

of large farms usually have more resources than small scale farmers, hence large scale farmers were expected to have funds to acquire new technologies as improved seeds, fertilizer, chemical, etc. These findings are in contrast with the results of Jagne and Patel, (1981) and Onyenwaku and Mbuba, (1991) which showed that farm size was negatively related to adoption of groundnut and yam mini set respectively.

**Table 3: Estimates of Determinants of Soybean Adoption in Niger State 1998.**

Variables	Regression Coefficient	T-ratio
Age of farmers (X <sub>1</sub> )	-0.826	0.274
Household size (X <sub>2</sub> )	-0.109	0.129
Farm size (X <sub>3</sub> )	0.157	4.461*
Farming experience (X <sub>4</sub> )	-0.101	3.629*
Literacy level (X <sub>5</sub> )	0.155	2.765**
Extension contact (X <sub>6</sub> )	0.352	0.924
Tenancy status (X <sub>7</sub> )	0.495	1.161
Membership of society (X <sub>8</sub> )	0.169	0.417
Credit availability (X <sub>9</sub> )	0.324	0.587
Intercept	0.196	1.685
R <sup>2</sup>	0.354	

\* = Significant at 1%, \*\* = Significant at 5%

The coefficient of farming experience is negative and significant at 1%. Thus an inverse relationship exists between farming experience and adoption of soybean production. This is probably because farm-

ers who have over the years gained experience in production of a particular crop may find it difficult to switch to a new one no matter the perceived benefits. This finding complies with that of



Chikwendu, *et al*, (1996).

The coefficient of literacy level is positive and significant at 5% showing direct relationship with adoption. This result conform to those of Jagne and Patel, (1981), and Osuji, (1983). This may be due to the fact that education improves the ability to assess new information and makes a farmer more receptive to advice from extension agency.

## CONCLUSION

The main aim of this study was to determine level of adoption, and identify factors influencing adoption of soybean production in Niger State. The result showed that adoption rate in the State was 47%. The proportion of land area put to soybean cultivation by adopters was 10% of their total farm land area. Regression analysis of the determinants of adoption showed that farm size, farming experience and literacy level were statistically significant either at 1% level.

These findings suggest the need to focus research goals on how to improve the adoption rate achieved so far. To this end, there is need to de-

sign policies that would make land available to farmers in the area as farm size was found to show positive and significant relationship with adoption. This measure will entail greater credit extension to farmers to enable them hire additional labour needed for land expansion. Since the rate of adoption is positively and significantly related to level of education, training on soybean production should be intensified to cover a larger group of farmers in the state. This calls for the need to increase the number of extension workers in the study areas. Adequate fund should therefore be provided for extension activities on soybean production in the area. Improved seeds of soybean should also be produced in adequate quantity to meet farmers' demand at the right time. There is need to guarantee efficient market and fair prices for soybean in the state. Further research should also be focused on easier way of processing soybean.

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