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Usage of soybean waste recycling among rural farmers in Kwara state, Nigeria

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Abstract

This study assesses the usage of soybean waste recycling among rural farmers in Kwara State, Nigeria. The specific objectives were to examine the soybean farmer's level of awareness on soybean waste recycling and identify the level of usage of soybean waste recycling in the study area. Data were collected through interview schedule and analysed using both descriptive and inferential statistics such as Frequency, Percentage, Mean, Standard Deviation and Pearson Product Moment Correlation. The findings of the study were that: The mean age of the respondents was 43.51 years. Most of the respondents (62%) were males, (80.9%) married, (75.1%) had formal education with an average household size of 6 persons and 16.37 years of farming experience. All (100%) of the respondents indicated awareness of soybean waste recycling and no respondent indicated unawareness. The analysis conducted on the level of usage of soybean waste recycling in the study area shows that majority (65%) had a moderate usage of soybean waste recycling. This study recommends promoting the usefulness of soybean waste to farmers. Additionally, this study suggests establishing partnerships between agricultural institutions and farmers to facilitate the adoption of soybean waste utilization practices.

Keywords: Soybean; Usage; Waste recycling; Rural Farmers

1 Introduction

According to the Federal Ministry of Agriculture and Rural Development, the agricultural sector generates about 90% of the non-oil export revenues, employs about one-third of the total labour force and provides a livelihood for the bulk of the rural population [1]. The sector currently contributes 26% to the Gross Domestic Product (GDP), with crop production accounting for an estimated 85% of this total, livestock contributing 10% with the remainder made up by forestry and fisheries [2]. Although, the country's economy now relies heavily on the petroleum sector (which generates three quarters of government revenues and more than 90% of foreign exchange earnings), agriculture continues to play an important role in the economy [2].

One of the major food problems in Nigeria is the gross deficiency in protein intake, both in quantity and quality [3]. Although, protein in human diet is derived from both plant and animal sources, the declining consumption of animal protein due to its high prices requires alternative sources [4]. Soya bean provides a cheaper and high protein rich alternative substitute to animal protein. It is an important crop in the world and has been the dominant oilseed since the 1960s [5].

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Soybean waste (SW) is a by-product of soybean processing for tofu, soya milk and soya sauce production etc., soybeans seed coat (also known as Soy hulls) is by-product of soybean processing for soybean oil and soybean meal. It represents about 8 to 10% of weight of the soybean grain [6]. The soybean hulls consist mainly of highly digestible fibre and are low in starch content. The nutritional value of the hulls is quite good. The nutrients in soybean hulls are highly digestible. Soybean residues (SBR) are cheaper and represent unutilized protein sources.

The impact of agricultural wastes on the environment depends not only on the amount generated but also on the disposal methods. Some of the disposal practices pollute the environment [7]. For example, agriculture waste burning which is a common practice not only in Nigeria but in other under developed countries; is a source of atmospheric pollution. It releases pollutants such as carbon monoxide, nitrogen dioxide, carbon smoke etc. these pollutants are accompanied by the formation of ozone and nitric acid hence contributing to acid deposition thereby posing risk to human and ecological health [8].

In developing countries like Nigeria, where agricultural wastes have been regarded as total wasteful resources and abandon carelessness which now resulting into environmental pollution. Most farmers depend solely on conventional feedstuffs for feeding their animals which are very costly compared to agricultural waste that are less costly. Moreover, agricultural wastes are generally known to be rich in organic nutrients, highly digestible fibre and cheaper. Therefore, it is needful to utilize the agricultural wastes massively and effectively for economic gain among rural farmers. Hence, there is a need to raise the awareness of rural farmers and guiding them towards the usage of recycling soybean waste materials which can preserve the environment and raise standard of living. This study hopes to fill this research gap by assessing the usage of Soybean waste recycling among rural farmers in Kwara State. The specific objectives are to examine the soybean farmers level of awareness on soybean waste recycling, as well as identify the level of usage of soybean waste recycling among rural farmers in the study area.

Therefore this study will also add to other studies assessing the usage of Soybean waste recycling among rural farmers forming references for future research.

1.1 Hypotheses of the Study

The following hypotheses were tested in the study.

$H0_1$: Some selected socio-economic characteristics of the respondents do not affect the level of usage of soybean waste recycling.

2 Material and methods

The study was conducted in Kwara State, Nigeria. The state like other North Central states is experiencing lesser rainfall with an annual rainfall range of 1000 mm to 1,500 mm. The months of December and January coincide with the cold and dry harmattan period. Average maximum temperatures vary between 300˚C and 350˚C. The area is located within the Guinea Savanna [9].The State which was created in 1967 covers eight percent of the total land area of Nigeria. The predominant agricultural system is a combination of bush fallow and mixed cropping with emphasis on subsistence crop cultivation.

A multi-stage sampling technique was used to select respondents for the study. In the first stage, three (3) ADP (zone A, zone B and zone C), zones were purposively selected out of the four (4) zones in the state due to their high level of soybean cultivation.

At the second stage, two (2) local governments were randomly selected from each zones A, B and C. (Zone A: Kaiama and Barutten LGAs, Zone B: Edu and Pategi LGAs and Zone C: Moro and Asa LGAs) making sum of six (6) local governments, on the basis of high level of soybean production. Information on the number of the total soybean farmers in each zone was obtained from Kwara ADPs. This was used in preparing the list of the soybean farmers that formed the sampling frame from which the random selection of soybean farmers was carried out.

The third stage involved random sampling method which was used to select the respondents in each local government. Out of the one thousand, one hundred and twenty-two (1122) Soybean farmers registered in Kwara ADP (Zones: A, B and C), 20% were randomly selected from the total population of soybean farmers in each of the selected Local governments, 52 respondents from Barutten, 49 respondents from Kaiama, 35 respondents from Edu, 36 respondents from Pategi, 30 respondents from Moro and 23 respondents from Asa local government. Thus the sample size comprised two hundred and twenty-five (225) respondents.

The data was collected through personal interview of the respondents with the aid of well- structured interview schedule for unlearned respondents and questionnaire for the learned ones. The questionnaire comprised of three (3) sections, labelled A to C. Section A of the instrument drew information on the socio-economic characteristics of the respondents. Section B drew information on the level of awareness on soybean waste recycling. Section C drew information on the level of usage of soybean waste recycling among rural farmers in the study area.

The independent variables include the soybean farmers' socio-economic characteristics and level of awareness on soybean waste recycling. The dependent variables were level of usage of soybean waste recycling.

The dependent and independent variables were measured based on the set objectives.

Objectives 1

The socioeconomic characteristics of the respondents was captured by describing the farmer' social, technical and economic characteristics. This was measured as follows;

- Age of respondents in years.
- Gender measured as Male (1) or Female (0).
- Marital Status is measured was Single (5), Married (4), Widowed (3), Divorced (2) or Separated (1).
- Education level measured as No formal (4), Primary (3), Secondary (2) or Tertiary education(1).
- House hold size was measured by numbers.
- soybean farming experience measured in years.
- Membership of soybean Association of Nigeria measured as Yes (1) or No (0).
- Source(s) of capital measured as Micro-finance Banks (5), Personal Savings (4), Cooperative Societies (3), Family and Friends (2) or Government Credit Scheme (1).
- Annual net-income from the soybean waste recycling business measured in Naira.
- Formal course on soybean waste recycling measured as Yes (1) or No (0).

Objective 2

To determine the awareness level of the soybean farmers on the usage of soybean waste recycling. This was measured as follows;

- Awareness of the soybean waste recycling measured as Yes (1) or No (0).
- How long they have known about soybean waste recycling measured in years.
- Whether they are into soybean waste recycling business measured as Yes (1) or No (0).
- How long they have been into soybean waste recycling business measured in years.
- The types of soybean waste they recycled measured as Straw (5), Husk (4), Tofu curd (2), Residue after oil extraction or Residue after milk extraction (1).

Objectives 3

The level of usage of soybean waste recycling was measured by allowing the respondents to choose from list of options on various uses of soybean waste recycled. In order to measure the level of usage of soybean waste recycling (dependent variable), 5 items were presented to the respondents based on 4-point Likert type scale of Always used = (4) often used= (3) rarely used= (2) and Never used= (1).

Most of the data were presented in tabular and descriptive forms. Descriptive statistics such as simple frequency tables, percentage, pie-chart, mean etc., were used to explain the results of findings while inferential statistics such as Pearson Product Moment was used to test the hypotheses.

Table 1 Summary of analytical tools for the study

S/N	Objectives/hypotheses	Analytical tools used for data Analysis
1	Objective 1,2,	Descriptive statistics such as Frequency counts , Percentages, pie-chart and mean
2	Objective 3	Frequency counts, Percentages, mean, Likert type scale, and rank
3	Hypothesis 1	Person product moment correlation

Source: Researcher, 2020.

Pearson product moment correlation was used to measure the research hypothesis. It is a measure of linear correlation between two variables X AND Y (i.e the covariance of the two variables divided by the product of their standard deviation). The formula for PPMC test is

Pearson Correlation Coefficient Value

$$r = \frac{\mathrm{N}\sum xy - (\sum x)(\sum y)}{\sqrt{(N\sum x^2 - (\sum x)^2)(\mathrm{N}\sum y^2 - (\sum y)^2)}}$$

$N = number\ of\ pairs\ value$/sample size
$x, y = individual\ sample\ point$
$\sum xy = sum\ of\ the\ products\ of\ paired\ value$
$\sum x = sum\ of\ x\ value$
$\sum y = sum\ of\ y\ value$
$\sum x^2 = sum\ of\ squared\ x\ value$
$\sum y^2 =$ sum of squared y value

3 Results and discussion

3.1 Socio-economic Characteristics of Respondents

The socioeconomic characteristics of the respondent were presented in Table 2. From the table, majority of the respondents (62.0%) were male while 38 percent of the respondents were female. This could be attributed to tediousness attached to soybean waste recycling. Adisa and okunade reported that most farm activities are energy demanding, hence men tend to be more involved in the production [10].A higher proportion (85.8%) of the respondents fell in the active age bracket of 26-55years. This implies most of the soybean farmers were in their productive age and this is expected to have a positive influence on their soybean waste recycling. This is in line with the findings of Adeola which reported that young people tend to withstand stress, put more time in agricultural operations which can lead to increased output [11].

Table 2 Distribution of Respondents by Socio-economic Characteristics in the Study Area

Variables	Category	Frequency	Percentage (%)	Mean
Sex	Male	140	62	43.5
	Female	85	38	
Age(years)	≤ 25	10	4.4	
	26-35	38	16.9	
	36-45	81	36.0	
	46-55	74	32.9	
	>55	22	9.8	
Marital status	Single	19	8.4	
	Married	182	80.9	
	Divorced	11	4.7	
	Widowed	13	6	
Household size	≤3	52	23.1	6
	4-8	126	56.0	
	9-13	40	17.8	
	>55	7	3.1	
	No formal	56	24.9	

Educational level of household head	Primary	42	18.7	
	Secondary	84	37.3	
	Tertiary	43	19.1	
Farming experience (years)	≤5	16	7.1	16.37
	6-10	41	18.2	
	11-15	60	26.7	
	>15	108	48.0	
Source of capital	Government credit scheme	4	1.8	
	Family& friends	8	3.5	
	Cooperative society	40	17.8	
	Personal Savings	171	76.0	
	Microfinance Bank	2	0.9	
Group membership	Member	203	90.2	
	Non-member	22	9.8	
Annual net income from soybean waste recycling business	>#100,000	157	69.8	#106,240
	#75,001-100.00	37	16.4	
	#50,001-#75,000	10	4.4	
	≤# 50,000	21	9.4	
Formal training on soybean waste recycling	Yes No	216 9	96.0 4.0	

Source: field survey, 2020

Information on marital status reveals that majority of the respondents (80.9%) were married. This implies that the married ones were more involved in farming because of their need to supplement the family's means of livelihood. This conforms to the study of Olaniyi et al. [12] which identified marital status as on one of the factors that affect adoption and new technologies like recycling soybean waste.

Further analysis revealed that 56% of the households had 4 to 8 persons in their household. The Mean household size was 6 Persons. The implication is that the household size may likely enhance the family labour supply on the farms. This corroborates with the finding of Adegbite et al. [13], that the larger the household size, the higher the likelihood of sustainable labour efficiency on farmers‟ farm, given the constant labour supply.

With regards to their educational status, table 2 shows that (24.9%) of the respondents had no formal education, (18.7%) respondents had primary education, (37.3%) respondents had secondary education and (19.1%) respondents had tertiary education. This implies that majority (84%) of the respondents had western education, meaning that they are literate. Illiteracy is believed to have a negative implication on efficient use of productive resources and adoption of farm innovation. Educational attainment is very important because it could lead to awareness of the possible advantages of modern farming techniques thereby increasing household productivity. According to Esturk and Oren [14], educated farmers like the soybean farmers can easily access information from various sources on the use and how to recycle soybean waste and can generate knowledge out of those.

Information on farming experience shows that the majority (48%) of the respondent had above 15 years of soybean farming experience. The mean farming experience of the respondents was 16.37 years. Farming experience is used as a measure of management ability, the more experienced the farmer is, the more his ability to make farm decisions. This result shows that most of the respondents had long years of farming experience, implying that such farmers are likely to make decisions that would increase their output and income. The length of time of farming business and experience in farming activities can enhance the tendency to adopt innovation and new technology [15].

Further analysis conducted on the respondents' source of capital shows that that majority (76.0%) of the respondents had their start-up capital through the Personal saving. Others are Family and friends (3.5%), Cooperative society (17.8%), Government credit scheme (1.8%) and Micro finance (0.9%) respondents. This implies that the major source of finance was through personal savings, 76.0%. This could negatively affect farmers especially when there is need to buy new farm inputs.

Analysis on group membership of the respondents reveal that most of the farmers (90.2%) were members of soybean association while (9.8%) of the farmers are not registered members of soybean association. Membership of cooperative organization is important because it affords the farmers the opportunities of sharing information on modern agricultural production practices. Mgbada [16] asserted that farmers who belong to social organisations were better informed than those who do not belong.

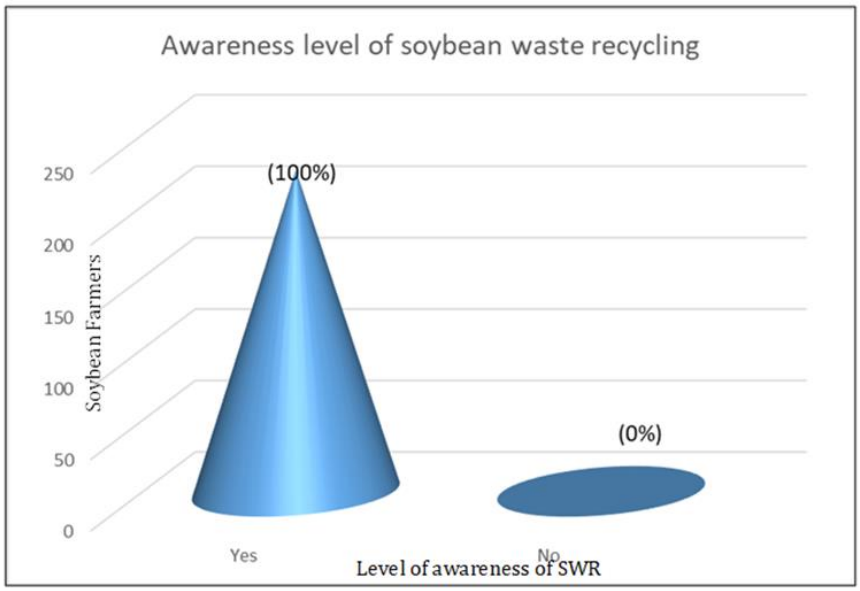
Data in table 2 shows that majority (69.8%) of the respondents were within the range of #100,000 above, (16.4%) of them falls in the range #75,001 to #10,000. (4.4%) of the respondents falls in the range #50,001 to #75,000 and about (9.4%) of the respondent earn less than #50,000. The mean income was #106,240, which implies that most of the farmers in this survey are not poor. According to Kabuli et al. [17], majority of the soybeans adopting households were in the highest income bracket and asset ownership compared to the non-adopting households. This is an indication that soybean waste recycling has the potential to increase per capita income of farmers.

Table 2 further reveals that most of the farmers (96.0%) do not have formal training on soybean waste recycling while just 4.0% of them had undergone formal training. This implies that most of the respondent did not have training on soybean waste recycling which could negatively affect them in getting information on the ways to recycle the soybean waste and its usage.

3.2 Awareness of Soybean Waste Recycling

The awareness of soybean farmers on soybean waste recycling (SWR) in the study area have been categorised according to awareness level, how long they know about soybean waste recycling, level of soybean waste recycling business, how long the respondent been into soybean waste recycling business and types of the soybean waste the respondents recycled.

3.2.1 Awareness level of soybean waste recycling strategy

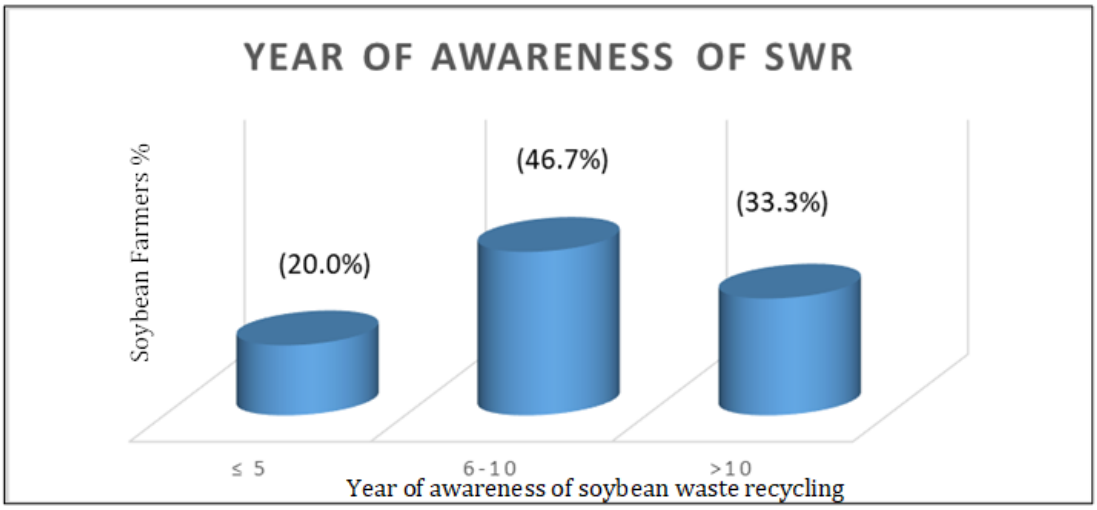


Source: Field Survey, 2020

Figure 1 Distribution of the soybean farmers based on the level of soybean waste recycling

Result presented in figure 1 shows that (100%) of the respondents indicated awareness of soybean waste recycling and no respondent indicated unawareness. This implies that all the respondents in the study are aware of soybean waste recycling. Farmer's awareness has substantial influence on the usage of soybean waste recycling.

3.2.2 Year of awareness of soybean waste recycling

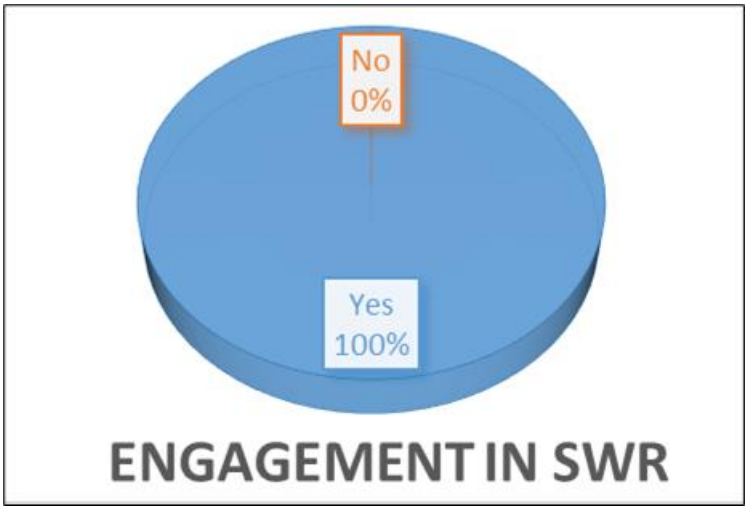


Source: Field Survey, 2020; Minimum=2 years Maximum=22 years Std. Deviation=4.37 Mean=10.39

Figure 2 Distribution of the soybean farmers based on the year of awareness of soybean waste recycling

Data in figure 2 shows that (20.0%) respondents had less than 5 years' awareness, (46.7%) respondents had 6 to 10 years' awareness and (33.3%) had above 10 years' awareness. The mean year of awareness was 10.39 years. This implies that most respondents had above 10 years' awareness of soybean waste recycling.

3.2.3 Engagement in soybean waste recycling

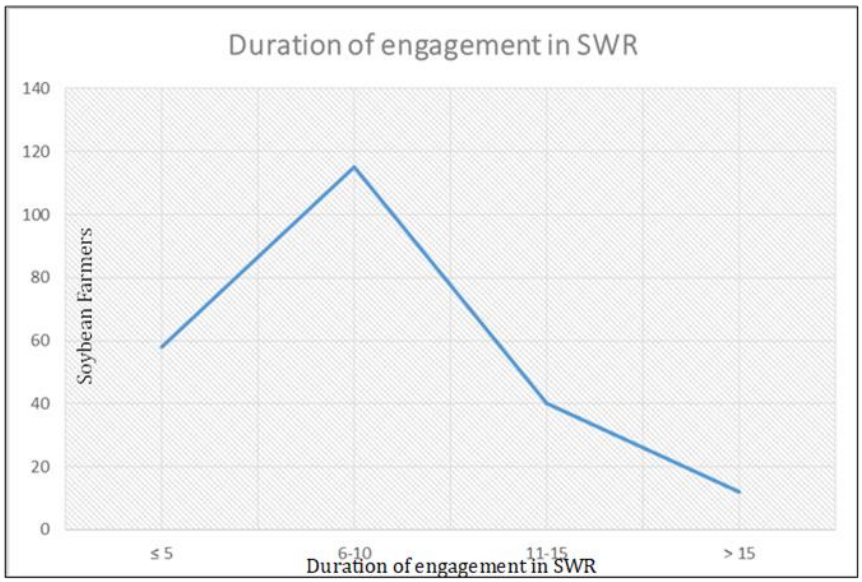


Source: Field Survey, 2020

Figure 3 Distribution of the soybean farmers based on the engagement in soybean waste recycling

Result presented in figure 3 shows that (100%) of the respondents indicated engagement in soybean waste recycling. This implies that all the respondents in the study engaged in soybean bean waste recycling. According to Hait and Tare [18], recycling of organic waste as compost in agricultural field comes with multiple benefits like sustainable alternative to chemical fertilizers.

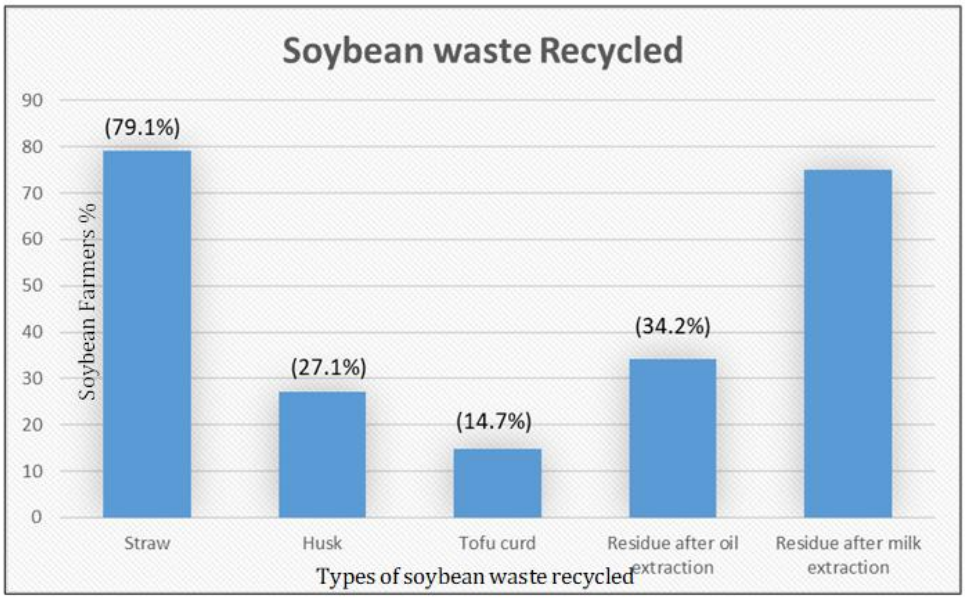
3.2.4 Duration of engagement in soybean waste recycling



Source: Field Survey, 2020; Minimum=2 years Maximum=20years Std. Deviation=4.18 Mean=9.25

Figure 4 Distribution of the soybean farmers based on the duration of engagement in soybean waste recycling

3.2.5 Types of soybean waste recycled by the respondents



Source: Field Survey, 2020

Figure 5 Distribution of the soybean farmers based on the types of soybean waste recycled

As shown in the result presented in figure 5, majority of the (79.1%) respondents recycled straw and (75.1%) respondents recycled residues after milk extraction while (34.2%) respondents recycled residue after oil extraction, (27.1%) respondents recycled husk, (14.7%) respondents recycled tofu curd. This implies that majority of respondents in the study area were involved in recycling straw and residue after soy milk extraction. Zhu et al. [19] in their findings were able to discover that soybean straw is mainly used for animal feedstock, burned for rural energy, or disposed of arbitrarily in the field.

3.2.6 Level of usage of soybean waste recycling

Table 3 shows the level of usage of soybean waste recycling by soybean farmers in Kwara State. The usage of soybean waste recycling is for animal feed, manure, fuel, home consumption and soap making.

Table 3 Distribution of the soybean farmers based on the level of usage of SWR

Usage	Always used F (%)	Often used F (%)	Rarely used F (%)	Never used F (%)	MS
Animal Feed	187(83.1)	38(16.9)	0(0)	0(0)	3.83
Manure	77(34.2)	81(36.0)	57(25.3)	10(4.4)	3.00
Fuel	29(12.9)	35(15.6)	121(53.8)	40(17.8)	2.24
Home consumption	7(3.1)	129(57.3)	85(37.8)	4(1.8)	2.62
Soap making	59(26.2)	26(11.6)	24(10.7)	116(51.6)	2.12

Source: Field Survey, 2020. Key: Always used=4 Often used=3 Rarely used=2 Never used=1

Result in table 3revealed that majority (83.1%) of the respondents always used soybean waste recycling for animal feed. The usages mean score was 3.83. This implication of the finding is that SWR was popular among farmers since a greater proportion of the respondents were using it for animal feed. This is in line with the finding of Ojebiyi et al.[20], which discovered that the importance of soybean residue in monogastrics particularly poultry and rabbit has been recognized by farmer because of its relatively high content of protein and energy, (34%) of the respondents always used soybean waste recycling for manure, (36.0%) respondents often used SWR for manure, (25.3%) respondents rarely used SWR for manure. The usage mean score was 3.00. While majority (53.8%) respondents rarely used SWR for fuel. The usage mean score is 2.24. This may be due to inadequate knowledge of how to recycle fuel from soybean waste and inadequate equipment for processing the fuel. Hossain and Maze [21] reported that biodiesel could be obtained under optimum conditions and catalyst concentrations from completely waste oil (soybean oil) which considered as recycled of waste cooking oil.

Furthermore, (57.3%) respondents often used SWR for home consumption. The usage mean score is 2.62. This implies that majority of the respondent uses SWR for home consumption. According to Johnson et al. [22], soybean hulls flour may be incorporated into human foodstuffs without adversely affecting quality and also described as a potential source of functional food [23]. While (51.6%) of the respondents never used soybean waste recycling for soap making. The usage mean score is 2.12. This may be due to inadequate equipment for processing soybean waste into soap.

Table 4 Categorisation of the soybean farmers based on their level of usage of SWR

Level of usage	Frequency	Percentage	Mean
Low (less than 2.00)	8	3.6	
Moderate (2.00 to 3.00)	147	65.3	2.76±0.49
High (greater than 3.00)	70	31.1	

Source: Field Survey, 2020. Minimum=1.60 Maximum=3.80 Std. Deviation=0.49 Mean=2.76

The data in Table 4 reveals that majority (65.3%) use soybean waste recycling (SWR) at a moderate level, (31.1%) use it at a high level,whilejust (3.6%) use it at low level. This implies that Majority of the respondents in the study area are using soybean waste recycling. Schieber et al. [24] reported that the utilization of by-products (soybean waste) from the food industry has become widespread.

3.3 Result of Test of Hypothesis

Hypothesis One: Some selected-economic characteristics of soybean farmers do not affect the level of usage of soybean waste recycling. This was tested using person product moment correlation (PPMC) with Age, Household size, Farming experience, Annual net income, Educational status and group membership.

Table 5 Result of Correlation Analysis between Socio-economic characteristics and usage level of soybean waste recycling

Socio-economic characteristics	r-value	p-value	Decision
Age	-0.178	0.008	Not significant
Household size	0.143**	0.033	Significant
Farming experience	-0.027	0.683	Not significant
Annual income	0.019	0.780	Not significant
Level of education	-0.202	0.002	Not significant
Group membership	-0.137	0.542	Not significant

Source: Field survey, 2020; **. correlation is significant at the .05level (2-tailed)

The result of the analysis in table 5 shows that only household size was found to have significant effect to the level of usage of soybean waste recycling at a significant level of 0.05 While Age, education level, farming experience, Annual income and group membership were not significant. The independent variables were important in predicting the level of usage of soybean waste recycling therefore, the r-column shows value for each predictor to indicate their contribution to the dependent variables. Implying that Household size (r= 0.143) had significant effect to the level of usage of soybean waste recycling. The larger the household sizes the more the tendency in using soybean waste recycling this is because most of the recycling farming activities are carried out by household members. Adejare and Arimi [25] asserted that farming activities in Nigeria are mostly carried out by the household members.

Similarly, Age (r= -0.178), Farming experience (r= -0.027), Annual income (r=0.019) Education status (r= -0.202) and group membership (r= -0.137) had no significantly effect on the uses of soybean waste recycling in the order indicated.

4 Conclusion

Based on the results, the study concluded that the majority of rural soybean farmers are involved in using soybean waste recycling which result in sustaining a good environment and reduce damage done to environment. On the basis of the findings, it is recommended that imposing a ban on burning of soybean waste may not be fruitful unless rural farmers are enlightened with the negative effects of it on human, animal and soil health, crop biodiversity, the micro and macro environment, etc. Also, this study recommends promoting the usefulness of soybean waste to farmers. Lastly, this study suggests establishing partnerships between agricultural institutions and farmers to facilitate the adoption of soybean waste utilization practices.

Compliance with ethical standards

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Disclosure of conflict of interest

All authors declare that they have no conflict of interest

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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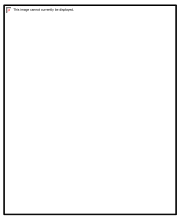
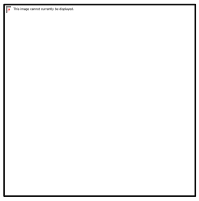
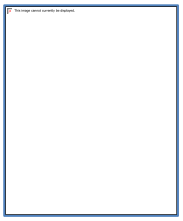
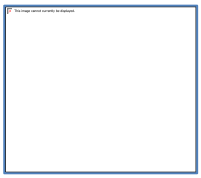
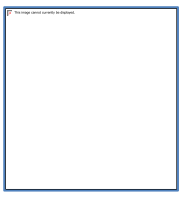
Authors short Biography

	**OLUWASEYI MARIA ABIODUN** Oluwaseyi is a dynamic professional in the agricultural sector, currently serving as a Management Development Officer at the Agricultural and Rural Management Training Institute (ARMTI). With a robust educational background and a hands-on approach to agricultural development, she is a key player in promoting sustainable farming practices and advancing the growth of the agricultural community.
	**JAMIU OLAKUNLE JIMOH** JAMIU OLAKUNLE JIMOH, a distinguished professional, holds a Bachelor of Agriculture degree from the prestigious university of Ilorin and furthered his education with a Masters in Agricultural Economics from the same university. Currently serving as a Senior Management Development Officer (SMDO) at the Agricultural and Rural Management Training Institute (ARMTI), Jamiu is passionate about contributing to the agricultural sector's growth. Beyond his professional pursuits, he finds joy in the realms of reading, writing and exercise.
	**OLANIRAN VICTOR OLAGOKE** Olaniran Victor Olagoke is a dedicated academic professional with a strong background in microbiology and agricultural extension. He holds a Post Graduate Diploma in Agricultural Extension & Rural Development, a Master of Science in Microbiology, and a Bachelor of Science in Microbiology. Some of his specialized skills include agricultural & microbiological research, project management, training and consultancy.
	**OYEKUNLE OPEYEMI, OYEWALE** OYEKUNLE OPEYEMI OYEWALE, a profound academic researcher pursued his National Diploma in Civil Engineering at OSCOTECH, Esa-Oke, Osun State, and later earned a Bachelor's degree in Agricultural and Environmental Engineering from FUTA. His academic pursuits continued with an MSc in Renewable Energy from Unilorin. Oyewale has diverse professional experience, serving as a project construction supervisor and data analyst at LADWAL Ventures LTD. Currently, he contributes to research, training, and consultancy services as a Management Development Officer at ARMTI, Ilorin.
	**SIJUWADE ADEBUKOLA ADEBAYO** SIJUWADE is a dedicated and passionate lecturer at the Department of Agricultural Extension, University of Ilorin. With a strong background in Agriculture and a PhD specializing in Agricultural Extension, Dr. Sijuwade is committed to advancing knowledge in agricultural practices and rural development.