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FARMERS' AWARENESS OF BIOFUEL CROPS AS ALTERNATIVE ENERGY SOURCE IN SELECTED VILLAGES OF KWARA STATE, NIGERIA

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ABSTRACT

The study examined farmers' awareness of biofuel crops as alternate energy source in selected villages of Kwara State, Nigeria. The objectives of this study were to identify farmers' level of awareness on the uses of biofuel crops as an alternative energy source, determine farmers' level of benefits derived from biofuel crops as an alternative source of energy and to identify the barriers to biofuel production as an alternative energy source. Bode Saadu and Osi were purposively selected for this study because of the fact that there are lots of farmers who are biofuel crops producers there. 50 respondents each were randomly selected among the farmers growing jatropha and cassava, respectively making a total sample size of 100 respondents. Interview schedule was carried out to obtain information from the farmers. Both descriptive and inferential statistics were used to analyze the data. The results showed that the major benefits of biofuel crops derived by the farmers are creation of employment (X^2 = 2.17), serving as a soil protector (X^2 = 2.04) and improving standard of living (X^2 = 2.20). The major uses of biofuel crop as alternative source of energy that farmers are aware of are fuel production with mean **(**X^2= 2.00), biodiesel (X^2 = 1.99). Barriers identified by the farmers include finance (100%), information (78%) and feedstock (58% among others. The study recommended that farmers should be adequately assisted financially and adequately provided with feedstock.

Keywords: awareness, cassava, jatropha, energy source, farmers, Nigeria

INTRODUCTION

Awareness of farmers on biofuel crop production is an important ingredient in rural development.The local oil production can strengthens supply of energy and provides employment and income opportunities for local population. Besides, Biofuel crop production can also bring about positive gender effects because women and children are more involved in agricultural production and fuel collection (UNDESA, 2007). Biofuels have become a leading alternative to fossil fuels because they can be produced domestically and are generally considered as offering many other benefits related to sustainability such as regional development, improved social structure and security of supplies (Demirbas and Demirbas, 2007). The steadily increasing trend of gasoline over the time strengthens the rationale for seeking a cheaper alternative (Msangi*et al*, 2007). Fossil fuel resources are decreasing day by day while the need for fuel is growing higher from time to time. The report from several literatures also confirmsthat fossil energy source is finite (Fluck, 1992; Jekayinfa and Bamigboye, 2004; Eleri*et al* 2005). Alamu*et al*, (2007) found out that in Nigeria, about 80 percent of its petroleum requirement are imported and is faced with increasing cost and uncertainty. Moreover, von Braun, (2007) in his report at the international conference on biofuels, Brussels, in USA showed that biofuel can create opportunity for the world's farmers which can be achieved through production and demand for varied agricultural products, thus, resulting into higher income for farmers. However, it was further reported through his findings that in many low-income developing countries, farmers are unaware of the prospects obtainable by biofuel production and thus risk missing out on the potential benefits. Awareness should thus be made available in an easily understandable language or style because if farmers are provided with the right information on farming activities and right inputs, they will be able to transform agricultural activities sustainably and will be able to take advantage of opportunities created by biofuels production. Therefore, all the stakeholders must come together to raise the awareness of these opportunities among farmers thereby increasing rural development in biofuel technologies (Braun and Pachauri, 2006). The study investigated farmers' awareness on biofuel crop production. The objectives of the study were to:

i. determine farmers' level of awareness on the uses of biofuel crops as an alternative energy source.
ii. determine benefits recognizedby farmers from biofuel crops as an alternative source of energy and
iii. identify the barriers to biofuel crop production as an alternative energy source.

METHODOLOGY

Study area

The study was carried out in Kwara state Nigeria.Kwara state, one of the 36 states in Nigeria was founded on 27th May, 1967. It is located between latitudes 7°45 and 9°30 and longitude 2°30 and 6°25 east on the prime meridian. The name Kwara was derived from the local name for River Niger, the longest river in Nigeria which is 1174.6km long (Adekunle, 2006). Kwara state is bounded in the north by Niger state, in the south by Oyo, Osun and Ekiti in the east and in the west by Benin Republic. It is situated in the NorthWestern Nigeria and because of this unique geographical location; the state is referred to as the 'gateway' between the north and the south of the country. The landscape is mainly plain to slightly gentle rolling lands. The rainfall is between1000mm and 1500mm annually while average temperature is between 30°C and 35°C. Kwara state covers the area of 36825 squarekilometers and has a population of about 2591555. The state is divided into 3 senatorial district which are Kwarasouth, Kwara central and Kwara north and it has 16 Local Government Areas. Agriculture is the main stay of the economy and 72% of the population is engaged in this sector. The state provides food crops such as maize, cassava, sweet potato, cassava, banana, cocoyam, onion, sweet potatoes, vegetables and livestock such as goat, sheep, cattle and poultry.The study was carried out in some selected villages surrounding Ilorin, kwara state. Ilorin metropolis consists of 3 Local Government Areas-Ilorin East, West and South. It is located on Latitude 8°30'N and Longitude 4°35'E. The city emerged as the Kwara State capital in 1967, during the creation of 12 states in Nigeria by the defunct military era. Both physical and structural expansion of the city started from this period and it is almost impossible to distinguish other three LGA'S that are parts of the mother town within the city center.

Population of the Study

The populations of the study were all farmers who are into biofuel crops production (Cassava and Jatropha).

Sampling Procedure and Sample Size

Ekiti and Moro local government were purposively selected because of large number of farmers that are into cassava and jatropha production. Four villages were selected from Ekiti local government which includes Osi, Koro, Owa-Otun and Isale Opin. 20 respondents were randomly selected from Osi while 10 respondents each were selected from Koro, Owa-otun and IsaleOpinto give a total of 50 Cassava growers. Also, three villages were selected from Moro local government which includes BielesinFallah, Olokiti and Alagbon. 30 respondents were selected from BielesinFallah while 10 respondents each were selected from Olokiti and Alagbon, respectively to give a total of 50 Jatropha growers. Therefore, 50 respondents each were randomly selected among the farmers growing Jatropha and cassava respectively to give a total sample size of 100 respondents.

Data analysis

Simple descriptive statistics involving frequency counts, percentages, ranking, 3 point Likert type scale and multiple regression was used to analyze the data. The respondents were asked to rate the uses using the 3 point Likert scale as follows; 1 (Not aware), 2 (Moderately aware), 3 (Aware) The actual mean is 2 due to the rating scale and a mean greater than 2 denoted a reasonable level of awareness while a mean less than 2 denoted level of unawareness by farmer towards alternate use of biofuel crops as energy source. Also, the respondents were asked to rate the benefits using the 3 point Likert scale as follows; 1 (Not aware), 2 (Moderately aware), 3 (Aware). The actual mean is 2 due to the rating scale and a mean greater than 2 denoted a reasonable level of awareness while a mean less than 2 denoted unawareness by the farmers towards benefits of biofuel crops as energy source.

Table 1. Distribution of Respondents by local government, villages and biofuel crops produced.

Local Government/Total Number of Respondents	Villages/ Number of respondents		Biofuel Crop produced
Ekiti 50 respondents.	Osi	20	Cassava
	Koro	10	
	Owa-Otun	10	
	IsareOpin	10	
Moro 50 respondents	BielesinFallah	30	Jatropha
	Olokiti	10	
	Alagbon	10	

RESULTS AND DISCUSSION

Farmers' level of awareness of uses of biofuel crops as alternate energy source

In table 2, farmers' response to the alternate uses of biofuel crops were rated on a 3-point scale. The results revealed an overwhelming level of unawareness by farmers towards biofuel crops as alternate energy source. All the means for the alternate uses were below the cut-off point of 2. The most prominent alternate uses of biofuel crops as ranked by the farmers were statements that biofuel crops can be used to produce fuel' (2.00) and 'biofuels like Jatropha can be used to produce biodiesel (1.99). This infers that farmers in the study areas are aware that fuels can be produced from biofuel crops (cassava and Jatropha) which can be used for transport but are not aware of the other uses. This findings support the report by Eickhout *et al*. (2008) who noted that cassava, jatropha among others are among the six crops that have the great potentials for biofuel production in African context.

Table 2. Distribution of the respondents by the level of awareness of uses of biofuel crops as alternate energy source (n=100)

Alternate uses of biofuel crops	NA	MA	A	Mean	SD
Biofuels crops can produce fuels	47 (47)	6 (6)	47 (47)	2.00	0.94
Wood can be burned to produce heat which can be used to run generator	54 (54)	8 (8)	38 (38)	1.84	0.95
Cassava can be used to produce ethanol	52 (52)	8 (8)	40 (40)	1.88	0.96
Jatropha can be used to produce biodiesel	50 (50)	1 (1)	49 (49)	1.99	0.99
Ethanol produced from biofuel crops can be used as internal combustion engines	56 (56)	5 (5)	39 (39)	1.83	0.96
Trees and grasses can be used as feedstock for ethanol production	66 (66)	12 (12)	22 (22)	1.56	0.83

Note: Not Aware =NA, Moderately Aware = MA, Aware = A, SD= Standard Deviation

Percentages are in parenthesis

Benefits of biofuel crops recognized by farmers as alternate energy source (social, environmental and economic)

In table 3, farmers' response to the benefit derived from biofuel crops were rated on a 3-point scale. The results revealed an overwhelming level of unawareness by farmers towards benefits of biofuel crops as another source of energy. All the means except two each were below the cut-off point of 2for social, environmental and economic benefits. The most prominent social benefits of biofuel crops as ranked by the farmers were statements that 'biofuel can create employment' (2.17) and 'biofuel can increase source of income' (2.19). This implies that farmers in the study areas are aware of the benefits that can increase the source of income so as to live above poverty and improve their livelihood. This is in support of the research findings of Thomas (2007) who reported that rural farmers benefit from the labour saving, employment and income generating impact of rural energy provision.

The most prominent environmental benefits of biofuel crops as ranked by the farmers were statements that 'Biofuels used for transport are clean burning' (2.00). The reason may be because they believe that this fuel will help them reduce air pollution and also improve their health because of the dangerous compounds associated with smoke expended from fossil fuel. 'Biofuel can protect the soil' (2.04). The reason may be because of the fact that farmers deal basically with soil for their livelihood; therefore, they tend to accept any innovation that has to do with the soil.

The most prominent economic benefits of biofuel crops as ranked by the farmers were statements that 'biofuel can improve standard of living (2.20) and biofuel crops can help reduce the cost incure by soil erosion by providing covers (2.18). This implies that farmers in the study areas are interested in anything that can boost their income and take them out of poverty and reducing the cost of erosion thereby retaining the nutrient composition of their soils.The findings agrees with Bebb*et al*. (2008) who observed that besides the macroeconomic benefits, the production of biofuel crops would

Table 3. Distribution of the respondents by the level of awareness of benefits of biofuel crops as alternate energy source(n=100)

Social benefits	NA	MA	A	Mean	SD
Biofuel crops like cassava and Jatropha can be used to generate electricity	49 (49)	6 (6)	45 (45)	1.96	0.97
Biofuel can create employment opportunity	30 (30)	23 (23)	47 (47)	2.17	0.86
Biofuels crops can increase source of income	30 (30)	21(21)	49 (49)	2.19	0.87
Biofuel from Jatropha and cassava can reduce woman's workload related to collecting fuel wood	42 (42)	25 (25)	33(33)	1.91	0.86
Biofuel crops can power information technology device like radio, television etc	52 (52)	19 (19)	29 (29)	1.77	0.87
Environmental benefits					
Biofuels can reduce greenhouse gas emissions	53 (53)	7 (7)	40 (40)	1.87	0.96
Biofuels are clean burning thereby improving human health	47 (47)	6 (6)	47 (47)	2.00	0.97
Biofuels provides soil and water friendly options in remote and fragile areas	57 (57)	13 (13)	30 (30)	1.73	0.89
Biofuels crops can serve as a soil protector	37 (37)	22 (22)	41(41)	2.04	0.89
Biofuels crops can reduce deforestation	50 (50)	5 (5)	45 (45)	1.95	0.98
Economic benefits					
Biofuel can foster investment on agriculture	49 (49)	19 (19)	32 (32)	1.83	0.89
Biofuels can make farmers enter market with higher prices	44 (44)	18 (18)	38 (38)	1.94	0.91
Biofuel crop can help reduce the cost incure by soil erosion by providing covers	25 (25)	32 (32)	43 (43)	2.18	0.81
Biofuel can improve standard of living	26 (26)	28 (28)	46 (46)	2.20	0.83
Biofuel can increase technology availability	51 (51)	12 (12)	37 (37)	1.86	0.92

Note: Not Aware =NA, Moderately Aware = MA, Aware = A, SD= Standard Deviation

Percentages are in parenthesis

Barriers to biofuel production by the farmers

Table 4 shows the barriers to biofuel production by the farmers. The result reveals that majority of the respondents showed that finance (100%), information (78%) and market (68%) are the major barriers to biofuel production. This implies that farmers lack enough capital to go into large scale production of biofuel. Besides, technical information on biofuel production is not adequate. Moreover, the few farmers that have gone into production of biofuel do not have steady market for the fuel. Land tenure system is another major constraint that will hinder large scale cultivation of this biofuel crops. Other challenges faced by the farmers are Feedstock availability (58%), storage availability (46%) and land (42%). This result is similar to the report of CCJDP (2006) which showed that low prices, unfair input and produce pricing mechanisms, punitive loan recovery methods among others are the challenges faced by biofuel crop growers which hinders the potentials to generate maximum benefits from biofuel production.

Table 4: Barriers to biofuel production by the farmers

Barriers	Yes	No	Rank
Financial	100 (100)	-	1st
Information	78 (78)	22 (22)	2nd
Market	68 (68)	32 (32)	3rd
Feedstock unavailability	58 (58)	42 (42)	4th
Lack of Storage facilities	46 (46)	54 (54)	5th
Land	42 (42)	58 (58)	6th

Hypothesis testing

There is no significant relationship between farmers' level of awareness and benefits derived from biofuel crops

Data in Table 5 reveals that there is significant relationship between farmers' level of awareness and benefit derived from biofuel crops with an F value of 10.165, P< 0.05 for social benefit, F value of 7.169, P<0.05 for environmental benefit and F value of 7.634, P<0.05 for economic benefit. This implies that when the farmers are well informed about the potentials and opportunities inherent in biofuel crops, they will be able to derive maximum benefits from it. However, if they are ignorant of the opportunities available to them, they will not enjoy the full benefits. Therefore, the null hypothesis stated is rejected.

Table 5: Regression analysis showing relationship between farmers' level of awareness and benefits of biofuel crops

Social benefit	Sum of square	df	Mean square	F	Sig.
Regression	7.567	5	1.513		
Residual	8.933	60	-.149	10.165	0.000
Total	16.500	65			
Environmental benefit					
Regression	6.957	6	1.159		
Residual	9.543	59	.162	7.169	0.000
Total	16.500	65			
Economic benefit					
Regression	6.415	5	1.283		
Residual	10.085	60	.168	7.634	0.000
Total	16.500	65			

CONCLUSION AND RECOMMENDATIONS

Biofuel can play an important role in improving the lives and livelihood of people in rural areas by contributing to greater employment and income opportunities, technology advancement, environmental and social well-being among others. The study showed that the farmers were aware that fuel can be obtained from cassava and biodiesel from jatropha. They are also aware of some of the social, environmental and economic benefits that can be derived from this biofuel crops. The most prominent benefits being that biofuel crops can create employment opportunity, increase source of income and improve standard of living. However, the farmers are not well informed about other benefits that they can enjoy from these crops. The result revealed that farmers lacked technical information on the production of biofuel, ready market for the fuel and insufficient fund to go into large scale cultivation of these biofuel crops. Therefore, the study recommended that sensitization program should be organized by the government to enable the farmers to be well informed about the benefits of biofuel crops as alternate source of energy. Moreover, technical information and financial support should be provided for the farmers growing these crops to encourage them go into production.

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