Research on Humanities and Social Sciences
ISSN (Paper)2224-5766 ISSN (Online)2225-0484 (Online)
Vol.6, No.9, 2016

Farmers' Behaviour towards Utilisation of Jatropha Curcas for Environmental Mitigation in Oyo State, Nigeria

ADEOYE A.S.* OKE O.O. SMART M. OLATUNJI O.
Federal College of Forestry, P.M.B. 5087, Jericho, Ibadan, Nigeria

Abstract
The dysfunctional environment caused by soil erosion, wind erosion, deforestation, desertification, issues of flood was due to the effect of greenhouse gases emanating as a result of various activities of man and industries. Consequently, this has prompted the exploitation of Jatropha curcas for mitigating the environment. Therefore, this study was carried out to examine farmers' behaviour towards utilisation of Jatropha curcas for mitigation of environment in the study area. A multistage sampling procedure was used in selecting 120 farmers from 217 trained Jatropha farmers across Ido and Akinyele Local Government Areas in Oyo State. The data was analysed using frequencies, percentages, mean scores, and pearson product moment correlation. The result for the study showed that majority of the respondents had mean age of 44.4± 10.8 with majority also being male (66.7%) and formal education (91.7%). The result revealed that there was significant relationship between socio-economic characteristics of the respondents and farmers' behaviour towards utilization of Jatropha curcas for environmental mitigation. There was correlation between farmers' awareness on cultivation of Jatropha curcas and their behavior towards utilisation of Jatropha curcas for environmental mitigation ($r = 0.399^{**}$, $p < 0.05$). The respondents' attitude was significantly related to their behavior towards utilization of Jatropha curcas for environmental mitigation ($r = -0.182^{*}$, $p < 0.05$). The study showed that awareness and attitude of farmers strongly influence their behaviour towards utilization of Jatropha curcas for environmental mitigation. The implication of this study is to ensure that the environment becomes free of hazards and degradation which affect survival of the ecosystem and biodiversity. Hence, government should join in the advocacy to open continuous channels of communication on the importance of Jatropha to motivate farmers to having right behaviour towards utilization of Jatropha curcas as a measure to mitigate the environment.
Keywords: Behaviour, utilisation, Jatropha curcas, farmers, mitigation, environment

INTRODUCTION

The degradation of the environment sets in as a result of human activities through immense use of energy. The greater consumption and generation of energy induced a greenhouse effect which has led to deterioration of the environment through depletion of air, water, soils, and the destruction of ecosystem and the extinction of wildlife (Wikipedia, 2012). When the environment becomes less valuable or damaged, then environmental degradation has occurred. There are many forms of environmental degradation which ranges from destroyed habitat biodiversity loss to destruction of natural resources which are pronounced in soil and wind erosion, flood disaster, deforestation, and desertification. Moreover, there are also negative impacts from activities of man through use of agrochemicals for agricultural purposes which have led to damage of the climate, and the ecosystem and biodiversity. Other activities which cause environmental instability include thermal power station, burning of fossil fuels, gas flaring, and cement manufacturing plants. Apart from environmental despoliation caused by energy industries and use of fossil fuels in the country, there has been consistently plague of the environment through soil erosion in the southwest, desertification, and drought in the northern Nigeria, flood in the southwest, north-central and other parts of Nigeria in recent times, precisely in the year 2011 (Ehwarieme *et al*., 2011). However, all these environmental challenges call for urgent and sustainable solution from the perspective of a renewable energy plants which is not well pronounced in Nigeria unlike developed countries of the world where renewable energy plants such as poplar, elephant grass, Jatropha plant are used for the mitigation of the environment. In the developed countries, biofuel energy production serve a better alternative to fossil fuels, and Jatropha biofuel has advantage in replacing the diesel engines and in neutralizing the carbon emissions from the combustion of hydrocarbon (Mkoma and Mabiki, 2011). Hagman *et al*. (2011) emphasized that the world is facing a big challenge to prevent environmental damage which is as a result of use of fossil energy and global warming with the evidential increase in greenhouse gas concentration in the atmosphere. Achten *et al*. (2008) reiterated that cultivation of Jatropha curcas promises to simultaneously combat desertification, produce bio-diesel, and enhance socio-economic development of rural environment. The exploitation of Jatropha curcas is for restoration of the environment through its plantation for prevention of soil erosion, and ecosystem and biodiversity sustenance (Amoah, 2009). Farmers' diversification from food crops into production of renewable energy plants for biofuel for improvement of microclimate and cleaning of greenhouse is worthy of note in ensuring sustainable environment (Anjum, 2012). The indigence of sustainable environment in this part of the world might be lack of adequate awareness and right attitude among the people generally on corrective measures necessary to ensuring a habitable and danger free environment for man, plants,

animals, and wildlife as it were. Between 1998 and 2009 the non-government and community-based organizations have been involved in awareness creation among the people at all levels including local communities on cultivation of Jatropha curcas for environmental mitigation through production of biofuel as alternative source to fossil fuels which helps to reduce adverse effect of greenhouse gases on the environment (Yammama, 2009). Therefore, the cultivation of Jatropha curcas will serve as a potential plant of utmost importance for environmental mitigation but many farmers are yet to be aware of the energy plant. Nevertheless, attitude to Jatropha cultivation and awareness programmes from non-governmental organizations could have influence on the bahaviour of farmers towards utilisation of Jatropha curcas for environmental mitigation. But how accessible are these farmers to awareness programmes on usefulness of the plant and their attitude to Jatropha cultivation in mitigating the environment. The purpose of the study was to examine farmers' behaviour towards utilisation of Jatropha curcas for environmental mitigation in Oyo State, Nigeria. The specific objectives were to examine the socio-economic characteristics of the farmers in the study area, determine awareness of the farmers in the study area and assess attitude of farmers to cultivation of Jatropha curcas in the study area. The hypotheses for the study were; there is no significant relationship between awareness of respondents on Jatropha cultivation and their behaviour towards utilisation of Jatropha curcas for environmental mitigation, and there is no significant relationship between farmers' attitude to Jatropha cultivation and their behaviour towards utilization of Jatropha curcas for environmental mitigation.

METHODOLOGY

The study was carried out in Oyo State. The state is made up of 33 Local Government Areas. It has a population of 5,591,589 consisting 2,809,840 males and 2, 781,749 females (NPC, 2006). Primary data used in this study was obtained from 120 Jatropha farmers randomly selected from 217 trained Jatropha farmers across two (2) Local Government Areas which are Ido and Akinyele respectively using the multistage sampling procedure. Structured questionnaire was used to collect the data. Data collected were described using frequencies, mean scores, and percentages. Pearson product moment correlation was used to test relationship between the dependent variable and the independent variables of the study.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The result in table 1 reveals the mean age as 44.4±10.8 which portends that majority of the respondents are in their middle age. This implies that farmers in the study area who practiced Jatropha cultivation are predominantly in their active working age. This result concurs with Oboh and Sani (2009) that the population of people practicing farming in Nigeria is within an average age of 47 years. The result shows that 66.7% of the respondents were male farmers. This implies that there are more male farmers in the study area. This is in line with the submission of Iwala (2007) that majority of the farmers invoved in agricultural production in Nigeria are predominantly males. The result further shows that majority of respondents (91.7%) had formal education. This implies high level of literacy in the study area could influence the utilisation of Jatropha curcas for environmental mitigation. This is corroborated by Yasmeen *et al*. (2009) that education may boost farm production through refined labour, and better aptitude to regulate disequilibria for improved agricultural innovation. The result shows that majority of respondents (64.1%) possesses average household size of 4-6, and the implication is that members of household will help contribute greatly to farm work which might positively impact the utilization of Jatropha curcas for environmental mitigation. This result is corroborated by Toluwase and Apata (2011) that may farm families in Nigeria have between 1-5 household members with their participation in active agricultural production. The result reveals that majority of respondents (86.7%) practice both crop and livestock farming in the study area. This implies high level of activeness among farmers which could influence the utilization of Jatropha curcas for environmental mitigation. The result reveals that more than half of the respondents (56.7%) work with agility for about 4-6 hours in the study area. This implies that farmers are still very much in their active working age in the study area. These results explain that the respondents' socio-economic characteristics influence farmers' behaviour towards utilisation of Jatropha curcas for environment mitigation.

Table 1: Distribution of respondents by their socio-economic characteristics (N = 120)

Variable	Frequency	Percentage (%)	Mean
Age			
Less than 30	9	7.5	44.4±10.8
31-40	39	32.5	
41-50	39	32.5	
51-60	22	18.3	
More than 60	11	9.2	
Sex			
male	80	66.7	
female	40	33.3	
Education			
Formal education	110	91.7	
No formal education	8	6.7	
Adult education	2	1.7	
Household size			
1-3	17	14.1	
4-6	77	64.1	
7-9	22	18.3	
10-12	4	3.3	
Livelihood activities			
Crop and livestock farming	104	86.7	
Hired labour	13	10.8	
Buying and selling	3	2.5	
Working hours			
1-3	38	31.7	
4-6	68	56.7	
7-10	14	11.8	

Source: Field survey, 2013

Awareness of farmers on the cultivation of Jatropha curcas

The results in table 2 show that half of the respondents (50%) had awareness through advocacy programmes on radio, television, and newspaper which had motivated them to cultivate Jatropha curcas for mitigation of the environment. This implies that advocacy programmes were not evenly accessible among the respondents in the study area. The result also show that majority of the respondents (86.7%) participate in a seminar organized by a non-government organization on utilisation of Jatropha curcas for environmental mitigation. This implies that respondents in the study area are progressive farmers who accept innovation of this renewable energy plants early for its use in mitigating the environment. Jatropha curcas utilization was also encouraged among 43.3% of the respondents for control of soil erosion, desertification, wind erosion, deforestation, and for fertilization of infertile soils as measures to mitigating the environment. This is corroborated by submission of Olushola (2009) that Jatropha curcas has several purposes of desertification control for restoration of vegetative cover, useful for soil conservation, soil and wind control and other opportunistic effects on the habitat for wildlife. The result further reveals that 99.2% of the respondents in the study area received awareness programme on Jatropha curcas cultivation for utilisation in mitigation the environment. This implies that majority of the respondents in the study area had access to awareness information on Jatropha curcas for mitigation of erosion. This result is in line with the submission of Food and Agricultural Organization (2013) that renewed interest in Jatropha curcas among farmers had brought high level of awareness of benefits of the crop for environmental mitigation. The implication of these results is that awareness of farmers on the cultivation of Jatropha curcas has positive influence of their behaviour towards utilisation of the crop for environmental mitigation.

Table 2: Distribution of respondents based on their awareness on cultivation of Jatropha curcas for environmental mitigation (N = 120)

Awareness	Yes Frequency	Percentage (%)	No Frequency	Percentage (%)
Advocacy programme on radio, television, and newspaper was the source of awareness motivated me to cultivate Jatropha curcas for environmental mitigation	60	50	60	50
There was participation in a seminar organized by a non-governmental organization for awareness among farmers in Oyo State for Jatropha curcas utilisation for environment mitiggation	104	86.7	17	13.3
Jatropha cultivation was encouraged among farmers in Oyo State for soil erosion, wind erosion, desertification, deforestation, and for fertilization of infertile soils as means of mitigating the degraded environment	52	43.3	68	56.7
Awareness programmes were available to farmers in Oyo State	119	99.2	1	0.8

Source: Field survey, 2013

Attitude of farmers on cultivation of Jatropha curcas

Results in table 3 revealed the mean scores of farmers' attitude on cultivation of Jatropha curcas for environmental mitigation. There is possibility of using Jatropha curcas cultivation for mitigating the environment because of its invasive growth on all soil types (mean = 4.58), farmers believe that Jatropha is a potential renewable energy plant for environmental mitigation (mean = 4.86), Jatropha curcas is drought tolerant which makes it useful in controlling soil erosion (mean = 4.55), Jatropha cultivation is useful for control of wind erosion and desertification due to its growth on all soil types (mean = 4.47), and farmers believe that oil extract from its seeds helps in purifying the environment (mean = 4.61). The implication of the results is that majority of the respondents have favourable attitude towards utilisation of Jatropha curcas for environmental mitigation. This further exemplifies a positive disposition of respondents towards the utilisation of Jatropha curcas which means that they had right and good behaviour towards the plant for mitigating the environment. This is in line with the assertion of Van de Ban and Hawkin (1996) that farmers' attitude are more likely to correspond to their behaviour, and in most cases, attitude influences a broad range of behaviours.

Table 3: Respondents attitude towards Jatropha cultivation for environmental mitigation (N=120)

Attitude Statement	SA F	%	A F	%	U F	%	D F	%	SD F	%	Mean
Environmental mitigation could be possible through Jatropha cultivation because of its invasive growth on all soil types.	80	66.7	35	29.2	2	1.7			3	2.5	4.58
Believe that Jatropha is a potential renewable energy plant for environmental mitigation.	92	76.7	25	20.8	2	1.7	1	0.8			4.86
Jatropha exhibits seasonal features which makes it a wonder plant for environmental mitigation.	85	70.8	29	24.2	2	1.7	3	2.5	1	0.8	4.62
Jatropha is used for soil erosion control because of its drought tolerant nature.	77	64.2	38	31.7	1	0.8	2	1.7	2	1.7	4.55
Jatropha is also useful for control of wind erosion and desertification.	79	65.8	30	25	3	2.5	4	3.3	4	3.3	4.47
Believe that oil extract from the seed helps in purifying the environment.	88	73.3	24	20	2	1.7	5	4.2	1	0.8	4.61

SA= Strongly Agree, A= Agree, U= Undecided, D= Disagree, SD= Strongly Disagree, F= Frequency, %= Percentage

Source: Field survey, 2013

Utilisation of Jatropha curcas among respondents for environmental mitigation

Table 4 revealed that most of the respondents agreed that Jatropha curcas is useful for flood control (68.3%), Jatropha can be used for soil erosion control (96.7%), Jatropha is vital for wind erosion and desertification control (94.2%), Jatropha plant removes carbon (IV) oxide from the atmosphere (99.2%). The result implies that there is correlation between the cultivation of Jatropha and the mitigation of the environment. The result further revealed that majority of the respondents (67.5%) disagree that Jatropha grows infertile soils but does not helps improve the soil fertility. This result is in line with Chachage (2003) that Jatropha contributes to the control of wind and soil erosion, flood, and desertification control, serves as organic fertilizer for infertile soils, removes carbon (IV) oxide from the atmosphere and helps in solving deforestation problems in developing countries.

Table 4: Distribution of respondents according to their utilization of Jatropha for environment mitigation (N= 120)

Jatropha curcas for environmental mitigation	Agree Frequency	Percentage	Disagree Frequency	Percentage
Jatropha curcas removes carbon (IV) oxide from the atmosphere.	119	99.2	1	0.8
Jatropha helps in control of flood.	82	68.3	38	31.7
Jatropha curcas is useful for soil erosion control.	116	96.7	4	3.3
Jatropha curcas grows on infertile soils but does not help improve soil fertility.	39	32.5	81	67.5
Jatropha curcas is germane for control of wind erosion and desertification.	113	94.2	7	5.8
Jatropha is useful for both man and animals' health and nutrition wise.	66	55	54	45
The biofuel from Jatropha curcas is useful in powering generating sets, lanterns, cooking stoves which help in global warming reduction.	111	92.5	9	7.5

Source: Field survey, 2013

Hypotheses Testing

$H_0$1: There is no significant relationship between respondents' awareness on Jatropha curcas and their behaviour towards utilisation of Jatropha for environmental mitigation.

The analysis on table 5 showed that there is a significant relationship between farmers' awareness on Jatropha curcas and their behaviour towards utilization of the plant for mitigation of the environment ($r = 0.399^{**}$, $p < 0.05$). The result implies that awareness of the farmers on Jatropha influences farmers' behaviour positively towards utilization of Jatropha curcas for environmental mitigation.

Table 5: PPMC Analysis of Respondents' Awareness of Jatropha towards its Utilisation for Environment Mitigation

Variable	r - value	p - value	Decision
Awareness and utilisation of Jatropha curcas for environmental mitigation	0.399^{**}	0.000	Significant

r = correlation coefficient, p = probability level of significance, $p \leq 0.05$

Source: Data analysis, 2013

$H_0$2: There is no significant relationship between respondents' attitude to cultivation of Jatropha and the behaviour towards its utilisation for environmental mitigation.

Table 6 reveals that respondents' attitude to cultivation of Jatropha is significantly related to respondents' behaviour towards utilisation of the plant for the environmental mitigation ($r = -0.182^{*}$, $p < 0.05$). This explains why attitude of respondents is significantly related to farmers' behaviour towards utilisation of Jatropha curcas for environmental mitigation.

Table 6: PPMC Analysis of Respondents' Attitude towards Utilisation of Jatropha curcas for Environmental Mitigation

Variable	r - value	p - value	Decision
Respondents' attitude and utilisation of Jatropha curcas for environmental mitigation	-0.182^{*}	0.045	Significant

r = correlation coefficient, p = probability level of significance, $p \leq 0.05$

Source: Data analysis, 2013

CONCLUSION

The study revealed that most of the respondents were middle-aged and active working age with majority having formal education, and majority of them were males in the study area. There was high level activeness in livelihood activities for majority of the respondents in the study area which was relevant for utilisation of Jatropha curcas for environmental mitigation. The farmers had access to awareness programmes, sensitization, and information on Jatropha curcas cultivation which influenced their behaviour towards utilisation of Jatropha curcas for mitigation of the environment. The farmers' attitude to Jatropha curcas cultivation was favourable to strengthen their behaviour towards utilization of the plant for mitigation of the environment. The study revealed significant relationship between farmers' awareness and attitude and their behaviour towards utilisation of the plant for environmental mitigation. Hence, the behaviour of farmers towards utilisation of Jatropha curcas for mitigating the environment was right and positively strong.

RECOMMENDATION

The study expounded the fact that farmers had access to awareness programmes especially through a non-governmental organization with little or no information and sensitization from the government agencies. Therefore, government should be involved in advocacy for Jatropha curcas utilisation among farmers, and ensure open and continuous communication channels to motivate farmers for right and good behaviour towards utilization of Jatropha curcas as a measure to mitigating the environment from effect of greenhouse gases and other hazards.

REFERENCES

Achten, W. (2010). Sustainability Evaluation of Biodiesel from *Jatropha curcas* L. : A Life Cycle Oriented Study. Retrieved March 12, 2013 from perswww.kuleuven.be/¬u0053809/PhD/W…

Achten, W.M.J., Verchot, L., Franken,Y.J., Mathijs,E., Singh,V.P., Aerts,R. and Muys.B. (2008). Jatropha Biodiesel Production and Use. Journal of Biomass and Bioenergy. Vol.32 (12),pp1063-1084. Retrieved July 13, 2013 from www.biw.kuleuven.be/lbh/lbnl/foreco...

Amoah, O. (2009). Jatropha : A Catalyst for Economic Growth in Africa. (Not an Official UNCTAD Document). Retrieved July 18, 2013 from www.unctad.org/sections/wcmu/docs/ditc_...

Anjum, A. (2012). 'Biomass: Energy and Environmental Concerns in Developing Countries'. Research Journal of Environmental Sciences. Vol.1(1) 54-57. Retrieved January19, 2013 from www.sep/zp/direct/biomass.html

Anyaegbunam, H.N., Nto, P.O., Okoye, B.C. and Madu, T.U. (2012). Analysis of Determinants of Farm size Productivity among Smallholder Cassava Farmers in South-East Agro-Ecological Zone, Nigeria. America Journal of Experimental Agriculture. Vol.2 (1),pp74-80. Retrieved July 18, 2013 from www.sciencedomain.org/abstract.php%...

Ehwarieme, W. and Cocodia, J. (2011). Corruption and Environmental Degradation in Nigeria and Its Niger-Delta. Journal of Sustainable Development in Africa. Vol.13 (5). Retrieved July 23, 2013 from www.jsd-africa.com/jsda/vol13No5_Fa...

FAO (2013). Bioenergy and Food Security Criteria and Indicators. Retrieved July 23, 2013 from www.fao.org/bioenergy/31527-076b7e5

Hagman, J. and Nerentorp, M. (2011). Life Cycle Assessment of Jatropha Oil as a Biofuel for Transports in Rural Mozambique : A Master's Thesis for Division of Environmental System Analysis. Retrieved July 20, 2013 from www.publications.lib.chalmers.se/record...

Iwala, O.S. (2007). The role of development organizations in rural and agricultural transformation of Nigeria: The case of EU-MPP6 in Ondo state. Department of agricultural engineering and technology, Rufus Giwa Polytechnic, Owo, Ondo state, Nigeria.

Mkoma, S.L., and Mabiki, F.P. (2011). Theoretical and Practical Evaluation of Jatropha as Energy Source of Biofuel in Tanzania. Retrieved July 24, 2013 from www.intechopen.com/download/pdf/17883

National Population Commission (2006). 'Census 2006: National Summary' (NPC) Abuja, p6

Oboh, V.U. and Sani, R.M. (2009). The Role of Radio on the Campaign against Spread of HIV/AIDS among Farmers in Makurdi, Nigeria. Journal of Social Sciences. Vol.19 (3), pp179-184.Retrieved July 28, 2013 from www.krepublishers.com/02-journals/j...

Olushola, B. (2009). *Jatropha curcas* the New In-road for Nigeria's Biofuel Policy. 1st July, 2009. Retrieved August 02, 2013 from www.businessdayonline.com/NG/index.

Toluwase, S.O.W. and Apata, O.M. (2011). Impact of Farmers' Cooperative on Agricultural Productivity in Ekiti State, Nigeria. Greener Journal of Agricultural Sciences. Vol.3 (1), pp63-67. Retrieved August 10, 2013 from www.gjournals.org

Van den Ban, A.W. and Hawkins, H.S. (1996). Agricultural Extension. Blackwell Science Publisher, 294 pages. Retrieved January 20, 2014 from book.google>technologies>engine

Wikipedia (2012). Exploitation of Natural Resources. Retrieved January 6, 2012 from en.wikipedia.org/wiki/Exploitation_...

Yammama, K.A. (2009). Jatropha Cultivation in Nigeria: Field Experience and Cultivation. Programme of Green Shield of Nations. Retrieved September 15, 2012 from www.jatropha.pro/PDF%252obestanden/...

Yasmeen, K., Abbasian, E. and Hussain, T. (2011). Impact of Educated Farmers on Agricultural Product. Journal of Public Administration and Governance. Vol.1 (2). ISSN 2161-7104. Retrieved August 10, 2013 from www.macrothink.org/jpag