



Utilization of Repellant Crops by Smallholder Farmers to Mitigate Farmers-Herdsmen Conflicts in Oyo State, Nigeria

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Abstract: Nigeria has witnessed series of communal clashes arising from the activities of the herdsman who move about on a daily basis with their cattle in search of water and green pastures. This study examined the utilization of repellant crops by smallholder farmers to mitigate farmers-herdsman conflicts in Oyo State, Nigeria. Specifically, the study ascertained the demographic characteristics of the respondents; identified the various causes of conflicts in the area; identified the repellant crops and sources of information as well as the constraints to planting of such crops. A multi-stage sampling procedure was used to elicit information from 80 farmers in the study area using a well-structured interview schedule. The data collected were subjected to descriptive and inferential statistical analyses. The study reveals that most of the farmers were male (82.22%), aging with mean age of 52.7 years, married (83.75%) with relatively large households size of 7 persons and practice all kinds of religious practiced in Nigeria. A majority of them had one or more forms of education, 53.75 percent of them have access to extension service delivery, 76.25 percent of them belong to one or more social association and they were experienced farmers with average annual income was ₦301,567.75.00. Crop damage, encroachment of farmland, stealing of crops, slow respond of law enforcement officers to reported crisis, deliberate hostility by other parties, injustice and political favouritism, competition for land and water, cattle rustling, indiscriminate bush burning, free access to illegal arms by the herdsman, declining influence of traditional rulers, depleting of soil fertility and ethnic rivalry were the main causes of farmers-herdsman conflicts in the area. *Jatropha multifida* (lapa lapa); *Senna alata* (Asunrun oyinbo); *Citrullus colocynthis* (Egunsi bara) and Castor plant (*Ricinus communis*) were the prevalent repellant crops planted by the farmers either round the farmland in form of fence, intercrop or separately to repel the cattle from feeding on their crops. They got to know about this plant through friends, family, farmers' cooperative societies, contact with extension personnel, ministry of agriculture, social media, radio programmes and NGOs. The constraints encountered were labour intensive, requires high soil nutrients than other plants, inadequate advisory services for such plants, scarcity of viable seeds, capital intensive, lack of local market and inadequate farmland. Hence, the utilization of repellant crops by the farmers has significant effect on the demographic characteristics of the farmers. It was recommended that, farmers should be encourage and educated on the potentials of planting some repellant crops on their farmland especially where farmers-herdsman conflicts is rampant.

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1. Introduction

Recently, farmers-herdsman conflicts are threats to peace, unity and national stability since it impede tribal co-existence, as Nigeria is a multi-ethnic and multi-tribal nation. These conflicts have now become so threatening on the country's national integration, such that the hitherto peaceful relationship between farmers and herdsman across various parts of Nigeria is degenerating to a carnage level, leading to loss of lives and properties, farm job displacement, reduction in farm produce and farm income (Doyin, 2017; Akorede, 2018). According to Okeke (2014) damages

frequently done during herdsman activities range from theft of cattle, overgrazing and unsustainable land for farming, loss of fertile lands, destruction of crops, loss of yields, hardening of soils resulting in increased labour in pre-farming activities, destruction of reservoir and source of drinkable water, fights, rape, burning of rangelands, destruction of irrigational facilities to infrastructural damages. Whenever these clashes occur, the undulations wriggle through the immediate flash points down to the foundations of Nigeria. When herdsman attack and kill scores of villagers in the course of a contest for grazing fields

and water, there are usually reprisal attacks (Audu, 2013). There are also claims and counter claims as to who were the aggressors and the underlying motives for the violence. It often brings to the fore, the indigene/settler question, land ownership and citizenship rights in Nigeria (Nformi *et al.* 2014).

However, conflicts between farmers and herdsmen emanated from increase in population of both parties as well as increase in pressure resulting from land resource degradation and scarcity. Other causes of the conflict include: trampling of farmers' farms, rapping of female farmers, encroachment of livestock routes, muddling of water ponds of communities by the herds, change in climate condition leading to draught and dessert encroachment; improvement in technology that brought about irrigation; the need to cultivate and produce more of the cash crops newly introduced (Akorede, 2018). Conflict between farmers and herdsmen is reinforced by the farmers' habit of extending the boundary of their farms to livestock route and the herdsmen's habit of allowing cattle to swerve into the farmers' farm to eat their plants and drop their compost either on the farm or on the pedestal route (Moritz, 2003). As a result Adalakun, Adurogbangba and Akinbile (2015), posited that farmers-herdsmen conflicts are increasingly recurrent and intensified in many parts of the country.

Over the years, different measures have been taken by individuals, stakeholders, non-governmental organizations (NGOs) and government at all levels to mitigate these seemingly intractable conflicts. For instance, designated grazing reserves were allocated by the government for the herdsmen and reconciliation committees were constituted in conflict prone states. Unfortunately, all the attempts to curb the incessant farmers-herdsmen conflicts by the aforementioned institutions appear to be futile and it is fast becoming a national phenomenon. It is on this background that this study examined the utilization of repellent crops by smallholder farmers to mitigate farmers-herdsmen conflicts in Oyo State, Nigeria. Specifically, the study ascertained the demographic characteristics of the respondents; identified the various causes of farmers-herdsmen conflicts in the area; identified the repellent crops and sources of information as well as the constraints to planting of such crops. Also, the significant effect of the utilization of repellent crops on the demographic characteristics of the respondents.

2. Material and Methods

2.1. Study Area

The study was carried out in Oyo State Nigeria, which is an inland state in Southwest Nigeria and the capital city is Ibadan. The state is endowed with three

distinct vegetation belts: rainforest, guinea savanna and derived savanna. It is located on longitudes 20 32'W and 40 08'E, and latitudes 70 34'N and 80 35'N. It is bounded in the North by Kwara state, in the South by Ogun state, and in the East and West by Osun and Ogun/Benin republic respectively. The State has a total land area of 27,249 Sq km and estimated population was 7,840,864 (NBS, 2017). The climate of the state is tropical with distinct wet and dry seasons, and mean annual temperature and rainfall of $\pm 26.5^{\circ}\text{C}$ and 1950 mm respectively. It has 33 Local Government Areas (LGAs) which according to Agricultural Development Project's structure of operation is divided into four ADP zones: Ibadan/Ibarapa zone (11 LGAs), Oyo zone (4 LGAs), Ogbomoso zone (5 LGAs), and Shaki zone (13 LGAs). Diverse tribes dwell in the area with Yoruba as the host while others are: Hausa, Igbo, Fulani, Egede, and Bororo among others (Oyo State Diary, 2012). Moreso, farming is prevalent in the area, some were full-time farmers while some were part-time farmers. The edaphic feature of the soil shows that it is moderately weathered, thus retain nutrient even at the upper ground level, hence supports and sustains the cultivation of surface feeder crops and deep-rooted crops such as: maize, sorghum, cassava, yam, melon, cowpea, watermelon and the like.

2.2. Sampling Procedure and Sample

Size: A multi-stage sampling procedure was employed to elicit information from 80 farmers in the study area. The first stage involves a purposive selection of four (4) Local Government Areas where farmers-herdsmen conflicts has happened in recent time. The second stage involves a purposive selection of two communities from each of the selected Local Government Areas. The last stage involves a snow ball selection of 10 farmers from each of the selected community, thus, a total of 80 farmers were interviewed for the study. A well-structured interview schedule was used to elicit information from the respondents.

2.3. Methods of data analysis: Data were analyzed with the use of descriptive statistics such as frequency count, percentages and mean; and Chi-square statistical tool.

2.3.1. Chi-Square Analysis

The Chi-Square analysis was used to examine the significant effect of the utilization of repellent crops on the demographic characteristics of the respondents.

$$X^2 = (O-E)^2/E$$

Where;

O = the observed effect of utilization of repellent crops on the demographic characteristics of the farmers.

E = the expected effect of utilization of repellent crops on the demographic characteristics of the farmers.

3. Results

3.1. Demographic Characteristics of the Respondents

The result in Table 1 reveals that 82.22 percent of the farmers were male, while 17.78 percent of them were female and this indicated that most of the farmers in the study area were male. It could be as a result of the laborious nature of agricultural activities. This agrees with the finding of Oyedokun and Lawal (2017); Ogunwande and Akinrinola (2017) and Olaleye *et. al.* (2010) which revealed that male was more involved in both farming and peace making activities. Also, more than half (58.75%) of the respondents were between the age of 51 and 70 years, 32.50 percent of them were between the age range of 31 and 50 years, while 7.50 percent of them were below 31 years of age and 1.25 percent of them were above 70 years of age. The mean age of the respondents was 52.7 years and this implies that farmers in the study area were aging. Most (83.75%) of the respondents were married with average household size of 7 persons and this afford them access to family labour to mitigate paucity of farm labour due to massive rural-urban migration and land resource for their agricultural activities. It was opined that they enjoys cross-fertilization of productive ideas and also helps in procreation for farm labour advantage as supported by the findings of Ogunwande

and Akinrinola (2017) and Adelokun, Adurogbanga and Akinbile (2015).

Christianity was the prevalent religion practiced in the study area as indicated by 78.75 percent of the respondents. Hence, agricultural production has no religion barrier in the study area, because the farmers practice all kinds of religious practiced in Nigeria. A majority of the respondents had one or more forms of education as shown in Table 1 and this could assist them in the strategies employed to mitigate farmers-herdsmen conflicts in the study area. This corroborates the assertion of Ogunwande and Akinrinola (2017) that farmers' education enhances an ample advantage to ease self-accessing information and quick acceptance of innovation. It established that 76.25 percent of the respondents belong to one or more social association and their average years of farming experience was 25.7 years. This indicated that they have long year record of being in the farming practices and were exposed to risk involve in agricultural activities.

More than half (53.75%) of them indicated that they have access to extension service delivery, while 46.25 percent of their counterpart did not. The average annual income of the respondents was ₦301,567.75.00 and this implies that less than half of the respondents realize more than the average annual income as indicated in Table 1. Thus, it was opined that farming activities in the study area was affected by the farmer-herdsmen conflicts, which requires calculated strategies to mitigate its occurrences. Also, 61.25 percent of the respondents indicated that the occurrence of conflict in the area was seasonal, 26.25 percent of them indicated that it was annually, while 11.25 percent indicated that it was rarely and 1.25 percent indicated that it was biannual.

Table 1. Demographic Characteristics

Age (Years)	Frequency	Percentage	Mean
Below 31	6	7.50	
31 – 50	26	32.50	
51 – 70	47	58.75	53.7
Above 70	1	1.25	
Sex			
Male	65	82.25	
Female	15	18.75	
Marital Status			
Single	5	6.25	
Married	67	83.75	
Widow	4	5.44	
Separated	3	3.75	
Divorced	1	1.25	
Household Size			
1 – 4	28	35.00	
5 – 9	24	30.00	7
10 – 14	26	32.50	
Above 14	2	2.50	

Age (Years)	Frequency	Percentage	Mean
Religion Practiced			
Christianity	15	18.75	
Islam	63	78.75	
African Traditional Religion	2	2.50	
Level of Education			
Quranic Education	3	3.75	
No Former Education	12	15.00	
Primary Education	17	21.25	
Secondary Education	32	40.00	
Tertiary Education	16	20.00	
Membership of Social Association			
Yes	61	76.25	
No	19	23.75	
Income (₦)			
≤ 300,000.00	49	61.25	
300,001.00 – 500,000.00	19	23.75	
500,001.00 – 700,000.00	9	11.25	
≥ 700,000.00	3	3.75	
Years of Farming Experience			
Below 21	32	40.00	
21 – 40	42	52.50	25.7
41 – 60	6	7.50	
Access to Extension Service Delivery			
Yes	43	53.75	
No	37	46.25	
Frequency of Conflicts			
Rarely	9	11.25	
Yearly	21	26.25	
Twice a year	1	1.25	
Seasonal	49	61.25	

Source: Field Survey, 2020.

3.2. Causes of Farmers-Herdsman Conflicts

Table 2: Causes of Farmers-herdsman Conflicts

Causes of Conflict	Freq.	%
Encroachment of farmland	66	82.50
Crop Damage	77	96.25
Ethnic rivalry	33	41.25
Indiscriminate bush burning	46	57.50
Stealing of crops	65	81.25
Competition for land and water	54	67.50
Deliberate hostility by other parties	57	71.25
Little respect for traditional rulers or land owners	32	40.00
Low awareness of stock routes	33	41.25
Depleting soil fertility	41	51.25
Low level of compliance to stock routes	31	38.75
Declining influence of traditional rulers	42	52.50
Cattle rustling	54	67.50
Free access to illegal arms	43	53.75
Injustice or Political favouritism	56	70.00
Slow respond of law enforcement officers to reported crisis	61	76.25

Source: Field survey, 2020.

The result in Table 2 shows the distribution of respondents based on the causes of farmers-herdsman conflict in the study area. A majority (96.25%) of the respondents indicated that crop damage was the cause of the farmers-herdsman conflicts in the area. It was followed by, encroachment of farmland (82.50%), stealing of crops (81.25%), slow responds of law enforcement officers to reported crisis (76.25%), deliberate hostility by other parties (71.25%), injustice or political favoritism (70.00%), competition for land and water (67.50%), cattle rustling (67.50%), indiscriminate bush burning (57.50%), free access to illegal arms by the herdsman (53.75%), declining influence of traditional rulers (52.50%), depleting of soil fertility (51.25%), ethnic rivalry (41.25%), low awareness of stock routes (41.25%), little respect for traditional rulers or land owners (40.00%) and low level of compliance to stock routes (38.75%). Hence, the occurrence of farmers-herdsman conflicts in the study area was caused by one or more factors by both parties. This affirmed the findings of Adebo and Olotu (2018); Aliyu, Ikedinma and Akinwande (2018); Abdulrahman, Abdulsalam, Dagona and Pate (2015); and Adalaku, Adurogbangba and Akinbile (2015)

noted that crop destruction and land related matter were the major causes of farmers-herdsmen conflicts in Nigeria.

3.3. Resolution Measures

The result in Table 3 shows the distribution of the respondents based on the resolution put in place by them to mitigate farmers-herdsmen conflicts in the study area. A majority (93.75%) of the respondents indicated that they plant poisonous plants to combat the herdsmen conflicts in the study area, 83.75 percent of them change their planting crops, 71.25 percent of them changes their planting pattern, 57.50 percent of them regularly dialogue with the herdsmen, 47.50 percent of them resolve to planting of teak and other tree crops and 28.75 percent of them indicated that they have to fence their farmland to avoid farmers-herdsmen conflicts in the study area. This implies that the farmers in the study area resolved to various resolution measures to combat farmers-herdsmen conflicts in the study area.

Table 3: Resolutions measures to combat Farmers-Herdsmen Conflicts

Resolution Measures	Freq.	%
Planting of poisonous plants	75	93.75
Fencing of farmland	23	28.75
Dialogue with herdsmen	46	57.50
Planting of teak and tree crops	38	47.50
Changing of planting crops	67	83.75
Changing of planting pattern	57	71.25

Source: Field survey, 2020. *Multiple responses

3.4. Types of Plant Used to Repel Cattle Feeding on Farmers' Crops

Table 4: Types of Plants Used to Repel Cattle from feeding on your farmland

Repellant Crops	Freq.	%
Ilara, Ilarum or Iru (Castor plant) (<i>Ricinus communis</i>)	72	90.00
Lapa lapa (<i>Jatropha multifidi</i>)	80	100.00
Asunrun Oyinbo (<i>Senna alata</i>)	80	100.00
Egusi bara (<i>Citrullus colocynthis</i>)	75	93.75

Source: Field survey, 2020. *Multiple responses

The result in Table 4 reveals the various repellant plants used to repel cattle from feeding on their crops in the study area. All the respondents interviewed in the study area indicated that *Jatropha multifidi* (lapa lapa) and *Senna alata* (Asunrun oyinbo) were planted by them to repel the cattle from feeding on their planted crops, while 93.75 percent of them indicated that *Citrullus colocynthis* (Egunsi bara) was planted by them and 90.00 percent of them planted Castor plant (*Ricinus communis*) to repel cattle from feeding on their crops. This indicated that

the farmers in the study area planted various poisonous plants to repel the cattle from feeding on their crops and also to mitigate farmers-herdsmen conflicts in the area.

Hence, it was found that repellant crops were planted separately, round the farm in form of fence and intercrop it with other crops.

3.5. Sources of Information

The result in Table 5 shows distribution of the respondents based on their sources of information of the repellant plants used to mitigate farmers-herdsmen conflicts in the study area. A majority (95.00%) of the respondents indicated that private organisations notified them about the use of repellant plants to combat farmers-herdsmen conflicts in the study area. Also, 67.50 percent of them indicated that friends were their source of information. It was followed by extension agents, family members, Agricultural Development Programme personnel (ADP), farmers' cooperative societies, social media, Ministry of Agriculture and Natural Resources and radio programmes as indicated by 63.75, 58.75, 53.75, 48.75, 46.25, 43.75 and 30.00 percentages, respectively. This implies that the farmers in the study area uses the available various sources of information to combat the occurrence of farmers-herdsmen conflicts in the area.

Table 5: Sources of Information

Sources of Information	Freq.	%
Friends	54	67.50
Family members	47	58.75
Farmers' Cooperatives	39	48.75
Social media	37	46.25
Radio Programmes	24	30.00
Extension Agents	51	63.75
Agricultural Development Programmes	43	53.75
Ministry of Agriculture	35	43.75
Private organisations	76	95.00

Source: Field survey, 2020. *Multiple responses

3.6. Constraints to Planting of Repellant Crops

The result in Table 6 shows the distribution of the respondents based on the constraints encountered in planting repellant planting to combat farmers-herdsmen conflicts in the study area. A majority (91.25%) of the respondents indicated that the repellant plants require high soil nutrients than other plants. It was followed by labour intensive (91.25%), inadequate advisory services (85.00%), scarcity of viable seeds (83.75%), it promotes laziness among the labourers (77.50%), it is capital intensive (76.25%), challenges of marketing at local market (73.75%), time constraint during processing (63.75%) and inadequate farmland used for planting such plants due to the specification of sponsors (58.75%). This

implies that the farmers cultivating repellent plants encountered one or more constraints in the study area.

Table 6: Constraints to Planting of Repellent Crops

Constraints	Freq.	%
Scarcity of viable seeds	67	83.75
Difficulties in marketing of produce at local market	59	73.75
It requires high soil nutrient than other plants	73	91.25
Unavailability of land according to specification	47	58.75
Stress of processing such plants	51	63.75
Inadequate advisory service delivery	68	85.00
Capital intensive	61	76.25
It is labour intensive	73	91.25
It promotes laziness among the labourers	62	77.50

Source: Field survey, 2020. *Multiple responses

3.7. Hypothesis testing

The result in Table 7 shows the significant effects of the utilization of repellent crops on the demographic characteristics of the respondents. The result reveals that the respondents' age, marital status, household size, religion, level of education, membership of social association, and access to extension service delivery were all significant at 1% level of probability while their annual income and years of farming experience were significant at 5% level of probability. Hence, utilization of repellent crops by the farmers in the study area to repel cattle from feeding on their crops has significant effect on their demographic characteristics.

Table 7: Chi-Square Analysis showing the significant effect of the repellent crops on the demographic characteristics of the farmers

Variables	X ²	df	Sig.
Age	82.450***	17	0.001
Marital Status	52.375***	4	0.001
Household Size	59.050***	8	0.001
Religion	28.675***	2	0.001
Level of Education	97.300***	5	0.001
Membership of Social Association	12.800***	1	0.001
Annual Income	2.412**	21	0.059
Years of Farming Experience	82.000**	23	0.042
Access to Extension Service Delivery	11.250***	1	0.001

Source: Computed result, 2020.

3.8. Conclusion and Recommendation

It was concluded that crop damage, encroachment of farmland, stealing of crops, slow

respond of law enforcement officers to reported crisis, deliberate hostility by other parties, injustice or political favoritism, competition for land and water, cattle rustling, indiscriminate bush burning, free access to illegal arms by the herdsmen, declining influence of traditional rulers were the main causes of farmers-herdsmen conflicts. *Jatropha multifida* (lapa lapa); *Senna alata* (Asunrun oyinbo); *Citrullus colocynthis* (Egunsi bara) and Castor plant (*Ricinus communis*) were the common repellent crops planted by the farmers to repel cattle from feeding on their crops and it was planted round the farm in form of fence, intercrop with other crops and separately.

The common constraints to such plants were requirement of high soil nutrients, inadequate advisory services, scarcity of viable seeds, capital intensive, time constraint during processing and inadequate farmland used for planting such plants due to the specification of sponsors. Hence, utilization of repellent crops has significant effect on the demographic characteristics of the farmers in the area.

Consequently, farmers should be encourage and educated on the potentials of planting repellent crops on their farmland especially where farmers-herdsmen conflicts is rampant.

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