

# Farmer's perception of noxious weed and their control in arable crop production in South West Agro-ecological zone, Nigeria

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**ABSTRACT:** A survey of noxious weeds and farmers' method of controlling them was carried out in southwest agro-ecological zone of Nigeria. Multi-stage sampling technique was used. The study was carried out in four local governments in each of Ekiti, Ogun and Oyo states. Information on noxious weeds, severity of damage to the crops planted and farmer's methods of weed control were collected with the aid of a well structured questionnaire and personal interview. The sample size in Ekiti, Ogun and Oyo are 320, 319 and 315 farmers respectively. The survey reveals that *Chromolaena odorata* (Linn.), *Imperata cylindrica* (Linn.), *Pennisetum purperium* (Schumacher), *Panicum maximum* (Jacq.), *Euphorbia heterophylla* (Linn.) and *Tithonia diversifolia* (Hemsl.) were the major noxious weeds in sampled area and they are in abundance and very severe. Since the practice of shifting cultivation is no longer practicable due to increase in human population, continuous cropping is practised and this also favours weed proliferation. The most common method of weed control used by the farmers are manual and the use of herbicides in all the states while varying percentages of these farmers used different types of herbicides. The use of chemical weed control is greatly influenced by the level of education of the farmers because not less than 90% of the farmers were exposed different levels of western education. Weed problem in arable crop production still remain a major hurdle farmers must overcome with modern technology if food basket of the developing nations like Nigeria will be improved upon.

**Keywords:** Arable field, crop damage, farmers, herbicides, noxious weeds, weed abundance, weed control

## INTRODUCTION

Weeds are important component of agricultural ecosystem (Marshall et al., 2003). Weeds reduce crop quality; compete with crop for mineral nutrient thereby causing reduction in crop yield quantity (Peterson, 2005). Noxious weeds are highly competitive, persistent and pernicious (James et al., 1991). Noxious weeds greatly affect agricultural lands and other open space land that are available for colonization. The losses arising from noxious weed infestation can be staggering, costing nations millions of dollars due to increased overhead cost in crop production and losses accrued from weed interference on the field.

Arising from the above is the need to put in place effective weed control strategy in crop cultivation. Effective control of any particular weed is influenced by so many factors which include correct identification of the weed species and the type of crop environment where such weed is found. In addition, farmers encounter different type of weeds on their farm and method(s) of controlling these weeds and the problem(s) associated with each weed species differ from one location to the other. The thrust of this work is to collect information from the farmers on their knowledge about noxious and problematic weeds that is peculiar to their various locations within South West agro ecological zone of Nigeria.

## MATERIALS AND METHODS

### ***The Study Area***

The study was carried out in four Local Government areas in each of the three selected states of south western agro ecological zone of Nigeria (Table 1)

### ***Sampling Technique***

The study employs the use of Multi stage sampling technique to determine the number of respondent that will be interviewed, Agricultural Development Program (ADP) offices in the states were contacted for assistance. Questionnaires were administered to randomly selected farmers through the State Coordinator and Extension Agent in each zone and locations. This ensures that all members of the population have equal chance of being selected.

### ***Data collection***

Primary data were used in this study as structured questionnaire were administered to the farmers with the Assistance State Coordinators and Extension Agents. Information on problematic noxious weeds, type of crops cultivated, weed diversity, methods of weed control employed by local farmers, constraints militating against the methods of control employed and possible available sources of information relating to weed control in their area. Samples of unidentified weed(s) were collected and placed in a sampling bag for proper identification.

### ***Measurement of variables***

In this study, there are two variables; they are dependent and independent variables. The dependent variable is the severity of noxious weed; the independent variables are the socio economic characteristics such as age, sex, level of education, and farming experience of the farmers.

Age and farming experienced of respondents were recorded in actual years. Respondent were categorized as either male or female. Level of education was recorded as the number of years in school as indicated by the respondents.

### ***Method of data analysis***

Data collected from the study were summarized using frequencies percentage and descriptive statistic. Relationships were drawn from variables and inferences were drawn from these relationship.

## RESULTS

### ***Socio-Economic Characteristics of respondents***

#### ***Age***

Age of respondents in the area sample was presented in the Table 2 below. The highest percentage age group of farmers interviewed from the three states falls between 41-50 years (36.5, 36.9 and 38.8 %) from Ekiti, Ogun and Oyo states respectively. This is followed by 51-60 age group and the least percentage age group of farmers were young people within the age bracket of less than 30 years.

#### ***Family size***

Farm size of the respondents as shown in Table 2 indicated that most of the farmer has between 6-10 family members with 69.1% in Ekiti, 61.7% in Ogun and 57.3% in Oyo states. This family size group is followed by farmers that have between 1-5 family members in all the three states. Only few farmers among the respondents have more than 10 members in their family in all of the three states selected for the study.

#### ***Year spend in school***

The number of years spent in school by the farmers varied as shown in Table 2. Most of the farmers spent between 11-15 years across all the three states with 43.3% of the respondent in Ekiti, 42.6% in Ogun and 40.4% in Oyo. The next class of respondents that spent between 6-10 years in school were the next largest group (38.3, 35.6 and 40 % in Ekiti, Ogun and Oyo states respectively) only negligible percent of the total respondents spend more years which was beyond 15 years in formal schooling. This indicated that, most of the farmers had more than primary school leaving certificate and up to tertiary education.

### ***Farm size***

The bulk of the farmers in all the states had their farm size ranging between 1-10 hectares. On percentage basis of all the respondents, Ekiti state has 91.1% of their farmers cultivating between one and hectares while Ogun and Oyo states followed the same trend (96.5 and 97.7% respectively). It was only a few farmers in all the sampled areas that are cultivating more than 10 hectares.

### ***Gender of the respondents***

Male folks dominate the entire farming community in the South Western part of Nigeria and this is obvious in the ratio of the male/female respondents. From Table 2, not less than 74% of the farmers were male across the three states and the rest were female.

### ***Sources of labour***

Table 3 shows that in all the sampled areas, approximately 50% of the respondents hire labourers for their farm operations while half of, 46.7 % use their Family members and 2.8% use contractual in sample selected area respectively.

### ***Sources of farm capital***

Table 3 revealed that between 56.7-65% of respondent in sampled area uses fund from family saving for their farm operations and this is followed by farmers who raise fund from cooperatives societies (24-29%) and respondents who takes loan from friend are between 11- 15%. This implies that most of farmers in the sample selected used family saving.

### ***Level of Education***

Data in the Table 3 show that almost all the respondents have one form of formal education or the other while negligible percentage have no formal education at all. This indicates that most of the farmers are educated. It has been asserted that formal education foster adoption of improved practices. The literacy among most of the respondents might foster adoption of chemical control of noxious weeds by them.

### ***Years already spent in crop production and farming experience***

Years spent in crop production vary between the selected sampling locations. Table 3 shows these variations. Not less than 53% of farmers in Ekiti state have spent between 1-10 years in arable farming while 46 and 42% of sampled farmers in Oyo and Ogun states respectively have spent the same time period on arable crop production. The population of farmers who have spent more than 10 years in crop farming also varies in all the states. In the land use history, majority of the farmers have spent more than five years cultivating the same plot of land which is an indication that types of plant species which are not cultivated crops and can be regarded as weeds will not be strange to these farmers. Weeds species that are peculiar to these areas can be identified by the farmers.

### ***Crops cultivated***

Maize tops the list of cultivated crop across the states. Estimated farmers of between 84-87% were involved in the cultivation of maize and this is followed by cassava (80-89%), yam (56-73%). Fruit crops are not commonly cultivated in sample selected area. This implies that most of the respondents were arable crop famers.

### ***Noxious weeds***

Table 4 shows the frequency of problematic weeds on the farmers' field within the study area. *Chromolaena odorata* (Siam weed) is the most common weed in the study area with appearance between 90-96% and this followed by *Impereta cylindrica* (Spear grass) (56-77%), *Pennisetum purperium* (Esun) (60-65%) and *Panicum maxima* (50-61%) respectively.

### ***Seasonal variation of problematic weeds***

Farmers affirm that *Chromolaena odorata* is the most dominant weed species during the dry season within the study area (27-36%) and this is followed by *Impereta cylindrica* (18-40%) *Pennisetum purperium* (24-26%) and *Panicum maxima* (21-26%) respectively. During the rainy season, *Euphorbia hererophylla* (milk weed), *Tithonia diversifolia* (Wild Sunflower) and *Pennisetum purperium* (Esun) were the dominant weeds species according to the respondents.

**Weed Control Methods**

Table 6 shows that 100% of respondent uses hoe and cutlass, between 36-50% plough their field to suppress weeds, 39- 47% used ridgers, 24-28% used harrow and few farmers used rake for weeding. It is obvious that most farmers are still using traditional weed control method as all of the interviewed farmers still have attachment to cutlass and hoe in controlling weed and this also give good impression on the scale of production.

The use of herbicides is gaining momentum among farmers in the study area and data in Table 6 shows that different herbicides were being used. The herbicides categorised by trade names from chemical company shows that between 45- 60.7% of the respondents used Glyphosate and Atrazine, 31-42% of the respondents used Diuron while 30-40% used paraquat.

Other herbicide brands were also used at different proportion of the farmers' population interviewed.

**Constrain militating the methods of control employed in controlling weed and information sources**

Respondents stated many constraints militating against weed control strategy employed. Table 6 shows a list of four major limitations and these include: lack of capital, scarcity of manpower (labourers), high cost of herbicides and time constraints. Extension agents still remain the major sources of agricultural information to the farmers and this is followed by radio and television source respectively.

Table 1. Sampled Locations within South West Agro Ecological Zone

States	Local Government Areas	Sample Size (n)
Ekiti	Ado Ekiyi, Ifelodun, Ilejemeje and Oye	320
Ogun	Ado-odo, Ijebu Ode, Odogbolu and Yewa	304
Oyo	Atisbo, Akinyele, Egbeda and Saki- West	293

Table 2. Personal data of respondents in Ekiti, Oyo and Ogun states within South Western Part of Nigeria

Respondents personal data	Ekiti state Frequency (Percentage)	Oyo state Frequency (Percentage)	Ogun state Frequency (Percentage)
Age (years)			
≤30	2 (0.6)	6 (1.9)	17 (5.6)
31-40	53 (16.4)	56 (19.0)	74 (24.4)
41-50	118 (36.5)	108 (36.9)	118 (38.8)
51-60	97 (30.2)	81 (27.6)	68 (22.2)
≥ 60	51 (16.2)	42 (14.1)	27 (8.7)
Family size			
1-5	94 (29.2)	102 (34.8)	123 (40.4)
6-10	222 (69.1)	181 (61.7)	174 (57.3)
11-15	4 (1.2)	7 (2.4)	7 (2.3)
16-20	1 (0.3)	3 (0.9)	0 (0.0)
Number of children			
1-5	302 (94.2)	271 (92.6)	292 (96.0)
6-10	19 (5.9)	22 (7.4)	12 (4.0)
Year(s) spend in school			
1-5	48 (15.0)	40 (13.6)	29 (9.6)
6-10	123 (38.3)	105 (35.6)	122 (40.0)
11-15	139 (43.3)	125 (42.6)	123 (40.4)
16 and above	11 (3.4)	23 (7.8)	30 (9.9)
Farm size (hectates)			
1-10	315 (98.1)	283 (96.5)	298 (97.7)
11 and above	6 (1.6)	10 (3.3)	7 (2.3)
Gender			
Male	243 (75.7)	217 (74.1)	240 (78.9)
Female	78 (24.3)	76 (25.9)	64 (21.1)

Source: Field Survey, 2014

Table 3. Important socio economic characteristic if farmers within Ekiti, Oyo and Ogun states of South Western Nigeria.

Respondents	Ekiti state	Oyo state	Ogun state
	Frequency (%)	Frequency (%)	Frequency (%)
Source of Labour			
Hire	162 (50.6)	146 (49.8)	202 (66.4)
Family	150 (46.7)	142 (48.5)	82 (27.0)
Contractual	9 (2.8)	5 (1.7)	20 (6.6)
Source of capital			
Loan from friend	46 (14.3)	43 (14.7)	33 (10.8)
Family saving	182 (56.7)	178 (60.8)	198 (65.1)
Cooperatives	93 (29.0)	72 (24.6)	73 (24.0)
Level of Education			
Primary	106 (32.7)	87 (29.4)	102 (33.8)
Secondary	163 (50.5)	144 (48.9)	126 (41.7)
Tertiary	39 (11.9)	51 (17.1)	65 (21.6)
Others	13 (5.1)	11 (4.8)	11 (3.2)
Years already spent in crop production			
1-10	172 (53.6)	135 (46.2)	128(42.0)
11-20	75 (23.3)	78 (26.5)	90 (29.6)
21-30	42 (13.0)	40 (13.7)	53 (17.4)
31-40	24 (7.5)	29 (9.8)	24 (7.9)
>40	8 (2.5)	11 (3.6)	9 (2.9)
Years already spent on this field			
1 years	6 (1.9)	1 (0.3)	0 (0.0)
1-2 years	1 (0.3)	2 (0.7)	4 (0.7)
3-5 years	58 (18.1)	39 (13.3)	46 (15.1)
Above 5 years	256 (79.8)	251 (85.7)	254 (83.6)
Crop cultivated			
Yam	253 (73.2)	201 (68.6)	170 (55.9)
Cassava	257 (80.1)	242 (82.6)	273 (89.8)
Cowpea	14 (4.4)	14 (4.8)	25 (8.2)
Cocoa	56 (17.4)	57 (19.5)	39 (12.8)
Okra	37 (11.5)	48 (16.4)	66 (21.7)
Tomato	40 (12.5)	59 (20.1)	69 (22.7)
Maize	270 (84.1)	256 (87.4)	255 (83.9)
Pineapple	13 (4.0)	16 (5.5)	9 (3.0)
Cucumber	10 (3.1)	16 (5.5)	16 (5.3)
Water melon	26 (8.1)	34 (11.6)	44 (14.5)
Banana	48 (15.0)	49 (16.7)	35 (11.5)
Plantain	57 (17.8)	53 (18.1)	55 (18.1)
Rice	72 (22.4)	61 (20.8)	36 (11.6)

Source: Field Survey, 2014

Table 4. Checklist of dominant weed species encountered by the respondent (farmers) within the south Western Nigeria.

Weed Species	Ekiti state	Oyo state	Ogun state
	← Frequency (percentage) →		
<i>Imperata cylindrica</i> L.	233 (72.6)	227 (77.5)	169 (55.6)
<i>Chromolaena odorata</i> L.	292 (91.0)	282 (96.2)	275 (90.5)
<i>Euphorbia hererophylla</i> L.	163 (50.8)	128 (43.7)	160 (52.6)
<i>Tithonia diversifolia</i> Hemsl	175 (54.5)	121 (41.3)	120 (39.5)
<i>Aspilia africana</i> Pers.	162 (50.5)	139 (47.4)	128 (42.1)
<i>Rottboelia cochinchinensis</i> Lour.	91 (28.3)	63 (21.5)	80 (26.3)
<i>Cyperus rotundus</i> L.	139 (43.3)	121 (41.3)	93 (30.6)
<i>Stachytapheta indica</i> L.	96 (29.9)	58 (19.8)	71 (23.4)
<i>Syndrella nodiflora</i> Gaertn.	91 (28.3)	61 (20.8)	81 (26.6)
<i>Panicum maxima</i> Jaqt.	197 (61.4)	172 (58.7)	153 (50.3)
<i>Pennisetum purperum</i> Schamach	207 (64.5)	186 (63.5)	184 (60.5)

Source: Field Survey, 2014

Table 5. Seasonal variation in the appearance of weed species on farmers' field

Dominant Weed Species	Ekiti state		Oyo state		Ogun state	
	Dry Season	Rainy season	Dry Season	Rainy season	Dry Season	Rainy Season
	Frequency (percentage)					
Impereta cylindrica L.	93 (29.0)	56 (18.4)	117 (39.9)	92 (31.4)	56 (18.4)	56 (18.4)
Chromolaena odorata L.	115 (35.8)	115 (35.8)	92 (31.4)	117 (39.9)	90 (26.9)	90 (26.9)
Euphorbia hererophylla L.	43 (13.4)	120 (37.4)	37 (12.6)	91 (31.1)	45 (14.8)	45 (14.8)
Tithonia diversifolia Hemsl	55 (17.1)	120 (37.4)	38 (13.0)	83 (28.3)	43 (14.1)	77 (25.4)
Aspilia Africana Pers.	56 (17.4)	106 (33.0)	49 (16.7)	91 (31.1)	44 (14.5)	86 (28.3)
Rottboelia cochinchinensis Lour.	37 (11.5)	55 (17.1)	23 (7.8)	40 (13.7)	26 (8.6)	57 (18.8)
Cyperus rotundus L.	62 (19.3)	77 (24.0)	49 (16.7)	71 (24.2)	37 (12.2)	53 (17.4)
Stachytapheta indica L.	39 (12.1)	56 (17.4)	24 (8.2)	33 (11.3)	31 (10.2)	40 (13.2)
Syndrella nodiflora Gaertn.	41 (12.8)	50 (15.6)	29 (9.9)	32 (10.9)	41 (13.8)	40 (13.2)
Panicum maxima Jaqt.	85 (26.5)	113 (35.2)	73 (23.2)	105 (35.8)	64 (21.1)	89 (29.3)
Pennisetum purperium Schamach	86 (26.8)	121 (37.7)	86 (24.9)	113 (38.6)	72 (23.7)	112 (36.8)

Source: Field Survey, 2014

Table 6. Distribution of respondent on methods of weed control and implement used

	Ekiti state		Oyo state		Ogun state	
	Frequency (Percentage)					
Manual/Mechanical Weed Control						
Hoe	321 (100.0)		293 (100.0)		304 (100.0)	
Cutlass	321 (100.0)		293 (100.0)		304 (100.0)	
Rake	38 (11.8)		38 (13.0)		24 (7.9)	
Plougher	159 (49.5)		147 (50.2)		111 (36.5)	
Ridgers	152 (47.4)		139 (47.4)		118 (38.8)	
Harrower	80 (24.9)		71 (24.2)		87 (28.6)	
Chemical Weed Control						
Paraquat	124 (38.6)		116 (39.6)		94 (30.9)	
Atrazine	194 (60.4)		166 (56.7)		138 (45.4)	
Gramozone	103 (32.1)		121 (41.3)		122 (40.1)	
Glyphosate	195 (60.7)		174 (59.4)		138 (45.4)	
Round off	112 (34.9)		106 (36.2)		103 (33.9)	
Diuron	134 (41.7)		123 (42.0)		95 (31.3)	
Orizon plus	106 (33.0)		93 (31.7)		98 (32.2)	
2,4-D	94 (29.3)		80 (27.3)		88 (28.9)	
Dragon	74 (23.1)		70 (23.9)		67 (22.0)	
Torch down	64 (19.9)		63 (21.5)		63 (20.7)	
Constrain militating the methods of control employed in controlling weed						
Lack of capital	90 (28.0)		92 (31.4)		68 (22.4)	
Scarcity of labourers	175 (54.5)		169 (57.7)		171 (56.3)	
Cost of herbicides	61 (19.0)		94 (32.1)		85 (28.0)	
No time	32 (10.0)		62 (21.2)		48 (15.8)	
Others	101 (31.5)		90 (30.7)		97 (31.9)	
Available sources of information relating to weed control in your area						
Extension agent	193 (60.1)		182 (62.1)		188 (61.8)	
Radio	156 (48.6)		153 (52.2)		157 (51.6)	
Television	99 (30.8)		104 (35.5)		99 (32.6)	
Farmer's association	157 (48.9)		150 (51.2)		163 (53.6)	
Others	61 (19.0)		70 (24.9)		77 (25.3)	

Source: Field Survey, 2014

## DISCUSSION

The survey reveals that high percentage of the farmers were educated and is an improvement on earlier report which showed that the majority of farmers were illiterate without formal education (Adesina et al., 2009). This is an added advantage to the possibility of farmers in the developing countries like Nigeria to adopt improved practices and the use of herbicides to control weed is one of such improved farm practices that will boost agricultural production in the third world. Moreover, weed control in a traditional developing countries crop production effort is labour intensive and high drudgery. This factor scares away many young school leavers who would have loved to take up farming as profession. With the advent of herbicide development, which is removing this factor, more young people will be drawn to crop production initiatives by new government policies since requirement for crop production will be less drudgery as of old time. This study revealed higher level of adoption of chemical weed control as different brands of herbicides are used in weed control efforts on the arable field.

Moreover, this factor will also reduce rural-urban migration of young men and women who are running away from high labour intensive career like farming.

Majority of the farmers in selected area are male which was in accordance with world farming population and the preponderance of maize, yam, cassava and other arable crop production attests to the fact that farmers under these study areas were arable farmers. Weeds species found in the study area revealed the enormous task before all the farmers in these areas. *C. odorata* is an aggressive colonizing plant and proliferate easily through abundant seed production, *I. cylindrica* is a grass plant that is highly devastating in tuberous crops like yam and cassava. *I. cylindrica* reduces crop quality and invariably the quantity of harvested produce. Generally, Nigeria had been rated as the highest producer of cassava the world over and notable producer of yam and maize which was in agreement with FAO report that, Nigeria is the largest producer of cassava in the world with about 45 million metric tonnes (FAO, 2008). Yam and maize are Nigeria's leading crops both in terms of land under cultivation and preferred major staple food crops contributing immensely to rural and regional economies (Agboola, 2000). Also, it was reported that, food crops such as rice, maize, cassava, yam, cowpea, melon, groundnut, sweet potatoes, millet, sorghum, etc. are crops that contribute to food security to meet the consumption needs of the households, and as a source for livestock feeds in Nigeria (Ala and Bello, 2010).

Various factors have been listed as being responsible for weed distribution in Nigeria, amongst which are, vegetation, rainfall pattern, farming system, cropping system etc. Thus, the preponderance of *I. cylindrica* (Spear grass) and *C. odorata* and other weeds in the study area may not be unconnected with the vegetation of the area which is rain forest coupled with the frequent bush burning both of which favours grass weeds proliferation (Akobundu, 1987). Since the practice of shifting cultivation is no longer practicable due to heavy pressure on land, continuous cropping which also favours grass weed proliferation is the common practice. Another reason for the popularity of the grass weeds is the use of hoes and cutlasses for weed control. Since Spear grass is rhizomatous hoeing only achieve multiplication of the weed by cutting the rhizomes into pieces which later germinates

Most of the farmers uses fund from family saving. Meanwhile, Government should provide financial assistance to the farmer in form of loan to encourage youth to develop interest in Agriculture. Availability of resources to interested youth will guarantee ability to afford modern input like herbicides for weed control. Inadequate monetary resources available to farmers in these locations may be responsible for over dependence on primitive weed control methods which involves the use of hoe and cutlasses. This invariably limit to hectarages an individual farmer can put into use because of weed infestation. Moreover, some of these weeds encountered by farmers are very difficult to control through the use manual weed control method as this usually leads to proliferation of the weed and labour loss. A typical example of such weed is *I. cylindrica* which can be controlled effectively through the use of herbicides that will kill the underground perenating propagule. The severity of the weed species encountered by farmers on their farm is a function of both density and effect on accompany crops. Thus the survey shows that in the study area, *C. odorata*, *I. cylindrica*, *P. purperium* and *P. maxima* are highly severe on the respondent and yield of most crops produced in this area will be below the optimal level (Lagoke et al., 1988; Olabode and Adetunji, 2000).

### Conclusion

The survey reveals prominent weed species that are devastating to the health of crop cultivated by farmers in South West Agro Ecological zone of Nigeria. These weeds possess the potential of reducing yield of farmer's crop to zero level. The effect of this will not only affect the present generation of farmers but even the next generation as many young people will be discouraged from taken up farming as a profession. Government intervention is seriously needed to avert the overall effect of weeds on the food basket of the nation (Nigeria) with more than one hundred and sixty million people to feed. Weed research into other methods of weed control should be encouraged in shortest period of time.

*C. odorata*, *I. cylindrica*, *P. purperium*, *P. maxima* and *T. diversifolia* are the major noxious weed found in the sample area. The farmer's major crops are maize, cassava and yam and if production of these crops will be increased, farming operations must graduate from the level of hoes and cutlasses to the level of improved technology to combat the menace of weed on the arable field.

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