ABUNDANCE OF *Aframomum hispidum* AND STRUCTURE OF WEEDS COMMUNITIES IN SOME COCOA PLOTS IN APOJE, IJEBU IGBO, OGUN STATE, NIGERIA

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ABUNDANCE OF *Solanecio biafrae* AND STRUCTURE OF WEEDS COMMUNITIES IN SOME COCOA PLOTS IN APOJE, IJEBU IGBO, OGUN STATE, NIGERIA

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CERTIFICATION

This is to certify that this research work was carried out by **Agbaje Aderonke Esther** with the Matriculation number **13/06/2732** in the department of Science Laboratory Technology, School of Science, Abraham Adesanya Polytechnic, ijebu – Igbo, under my supervision.

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DEDICATION

I dedicate this project to Almighty God the author and finisher of my life and to my incomparable parent Alhaji Tunde and Mrs. Toyin Agbajelola for their support at all stages of my life.

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ABSTRACT

Solanecio biafrae is an important indigenous vegetable collected in the wild from cocoa plantation. The enumeration of *S. biafrae* and other low growing plant species was carried out in five coca plot in Apoje Farm, Ijebu North Local Government Ogun State, Nigeria, in July 2015 using random sampling techniques. Relative frequency, relative density and relative importance value (RIV) were determined for each plant species. Shannon – wieners index (H^1) and evenness (J^1) indices were calculated to determine the community structure.

Average of nineteen weeds species were enumerated for the each of the five plots. *Solanecio biafrae* was found on two plots out of the five plots enumerated with RIV of 5.4% and 7.1%. Domestication and cultivation of *S. biafrae* should be encourage to avast the extinction of this vegetable.

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CHAPTER ONE

1.0 INTRODUCTION

Nigeria is an agricultural giant nation in Africa, with a total and area of 93.7 million square kilometres out of which cultivable land area is about 71.2 million hectares. This land area accommodates several species of vegetables. Nigerian is recognized worldwide for its vast fauna and flora biodiversity, which can be employed in several ways such as culinary, medicinal, therapeutic and nutritional, for the benefit of mankind (Adebooye *et al.*, 2003).

Vegetables play an important role in human nutrition. Most are low in fat and calories but are bulky and filling. The term "vegetable" is somewhat arbitrary, and largely defined through culinary and cultural tradition. It normally excludes other main types of plant food, fruits, nuts and cereal grains but includes seeds such as pulses. (Ajala, 2009)

Vegetables can be exotic, those that are introduced from a foreign country, which were not naturally occurring in an ecosystem but were brought into the new ecosystem such *Brassila oleraceae*, *Lactuca sativa* and *L. longifolia* or indigenous vegetables which are mostly cultivated locally or collected from the wild, in its natural growing condition. Examples of indigenous vegetables

in Nigeria are *Amarathus sp, Veronia amygdalina, Corchorus olitorus* and *Solanecio biafrae* (Adebooye and Opabode, 2004).

Vegetables can be group into fruity and leafy vegetables. Examples of fruity vegetables are *Lyioporsicum escullentum, Capsicum sp* and *Pseudomonas solanacirum.*

Leafy vegetables constitute an indispensable constitute of human diet in Africa generally and West Africa in particular. The varieties of leafy vegetables utilized are diverse, ranging from leaves of annuals and shrubs to leaves of trees. Leafy vegetables are generally good sources of nutrients, important protective foods, highly beneficial for the maintenance of health and prevention of diseases as they contain valuable food ingredients which can be utilized to build up and repair the body. Examples of leafy vegetables are *Solanecio biafrae, Corchorus olitorius, Vernonia amygdalina, Telfarria occidentalis, Amaranthus cruentus L. and Solanium macrocarpon L.* (Adebooye *et al.*, 2004).

Cocoa plot diversity and structurally complex shade present a land use that may perfectly simulate the forest land use and thus conserving a significant portion of the original tropical forest biodiversity (Alves, 1990; Rice and Greenberg, 2000; Scorth *et al.*, 2004). The biodiversity conservation potential of cocoa plots is well documented for bats, ants and birds. (Rice and

Greenberg, 2000) but poorly documented for floral diversity especially indigenous leaf vegetables.

The close canopy of mature cocoa trees creates a microclimate for shade – loving herbs (sciophytes), both annuals and perennials, to establish. Thus cocoa plot continue to serves as the land use where some useful plot herbs like *Solanecio biafrae* are collected for consumption (Adebooye et al., 2003).

This study enumerated the low growing plant species in selected cocoa plot in Apoje village, Ijebu-Igbo, Ogun State. One of the 14 cocoa growing states in Nigeria, to determine the spatial distribution and abundance of *Solanecio biafrae* related to other under storey herbs as they determine structure of weeds communities and to identify the invasive weed species.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 PLANT OF STUDY: *Solanecio biafrae*

Solanecio biafrae is known as Bologi in Sierra Leone, also called Worowo vegetable in Nigeria. It is a perennial climbing plant, producing stems up to 3 meters long that twine into other plants for supporting. The plant branches profusely about 50 cm above ground level. The plant is and important and very popular leaf crop in West Africa, and is also harvested as a traditional medicine. It is cultivated in West Africa for its edible leaves and commonly sold in local market. (Adebooye, et.al., 2003)

The plant is available all year round because high humidity and moist conditions under the canopy in cocoa plots supports its growth, even in the dry season. Today, the importance of African indigenous leaf vegetables to human nutrition, medicine and nature has been realized.

2.2 SCIENTIFIC CLASSIFICATION

Solanecio biafrae belongs to Kingdom - *Plantae,* Phylum - *Tracheophyta,* Class - *Tagnoleopsida,* Family - *Asteraceae,* Genus - *Solanecio,* Specie - *Solanecio biafrae*, and Scientific Name - *Solanecio biafrae*

2.3 GEOGRAPHICAL DISTRIBUTION

It is found in the rainforest zone of West Central Africa where annual rainfall is up to 1500 mm and at attitude up to 1800 m high. It has medical and cultural uses in Nigeria, Cameroun, Sierra Leone, Liberia, Ghana, Cote d'ivoire and Congo where it is used to treat bleeding from cut and injury, and in treating sore eyes (Schippers, 2000; Adebooye, 2004).

Though "*Worowo*" (as it is called in Nigeria) is cultivated and staked on trellis about 1m tall in few home stead gardens, much of the plant consumed as pot herb is collected from the wild and in cocoa and kolanut plot where they are spared during weed control, which is mainly by manual method. The plant is available all year around because highly humidity and moist conditions under the canopy in cocoa plots support it growth, even in the dry season. (Schippers, 2000).

2.4 IMPORTANCE OF *Solanecio biafrae*

The indigenous species are also adapted to many tropical conditions, pest and diseases. Therefore, they can be very good sources of genes for genetic improvement of cultivated species especially in the area of pests and diseases resistance. Also, the indigenous species can be improved by introducing desirable trails from cultivated species into them.

This plant continues to grow in the dry season when planted under the moist conditions of cocoa plantations. Plants quickly form a dense, weed-excluding canopy under the trees. They provide adequate amount of many vitamins and minerals for humans.

2.4.1 Nutritional Importance

Solanecio biafrae provides adequate amount of many vitamins and minerals for humans. The potassium content of leafy vegetable is good in the control of diuretic and hypertensive complications (George, 2003). The 100g dry matter of leaves of the green-stemmed and purple-stemmed types of *Solanecio biafrae* is reported to contain respectively 12.3 g and 11.6 g of crude protein; 11.8 g and 10.5 g of crude fibre; 342 mg and 320 mg of calcium; 39 mg and 46 mg of potassium; and 52 mg and 53 mg of iron (Adebooye, 2004).

2.4.2 Medical Importance

The plant has a reputation as a cough-cure, for heart trouble, and to be appetitive and tonic, and for these uses it is eaten as vegetable. The plant is pulped into a paste for application to the breasts as a galactogene. The leaves, or a leaf extract, are used as a wound dressing and to stop bleeding, a leaf extract is used to treat sore eyes. The sap is also rubbed on the body to relieve rheumatic pain, prurigenic allergies and localized oedemas. The sap is also

taken by draught for treating cough in children. The plant can also be used for pregnant women for safe delivery.

2.5 WEEDS

A weed is a plant considered undesirable in a particular situation, "a plant in the wrong place". They are plants unwanted in human – controlled settings, such as farm fields, gardens, lawns, and parks. Taxonomically, the term "weed" has no botanical significance, because a plant that is a weed in one context is not a weed when growing in a situation where it is in fact wanted, and where one species of plant is a valuable crop plant, another species in the same genus might be serious weed, such as a wild bramble growing among cultivated loganberries. The term also is applied to any plant that grows or reproduces aggressively or is invasive outside the native habitat (Janick, 1979).

The concept of weed in many parts of the world came with man's disturbances of the natural vegetation to meet his agricultural and recreational needs in conform to his aesthetic value (Akobundu and Agywakwa 1998).

Many plants terms weed are medicinal and economic importance and their importance in agro – ecosystem cannot be underestimated. This is need to identify and differentiate the beneficial and detrimental effect of weeds in our

environment in order to determine the weed to keep and be aware of their special peculiarities and to determine how best to control and prevent the spread of noxious weeds.

2.5.1 Weeds as Adaptable Species

An alternate definition often used by biologists is any species, not just plants that can quickly adapt to any environment (Quammen 1998). Some traits of weedy species are the ability to reproduce quickly, disperse widely, live in a variety of habitats, establish a population in strange place successes in disturbed ecosystem and resist eradication once established. Other weedy species have been able to expand their range without actually living in human environments, as human activity has damaged the ecosystem of their species. These include the coyote, the white – tailed deer and the brown headed cowbird (Quammen, 1998).

In response to the idea that human may face extinction due to environmental degradation, paleontogist David Jablosky counters by arguing that human area need weedy species. Like other weedy species human are widely dispersed in a wide variety of environments, and are highly unlikely to go extinct no matter how much damage the environment faces (Quammen, 1998).

2.5.2 Dispersal of Weeds

Many weed species have moved out of their natural geographic ranges and spread around the world in tandem with human migrations and commerce. Weeds seeds are often collected and transported with crops after the harvesting of grains, so human are a vector of transport as well as a producer of the disturbed environment to which weed species are well adapted, resulting in many weeds having a close association with human activities (Rashid *et al.*, 2005).

2.5.3 Beneficial Effect of Weed

Not all weeds are nuisances in all location. Weeds serve good purpose in different ecosystem, they provide vegetation cover for soil against direct insolation; they also prevent and reduce soil erosion. A study in diurnal soil temperature under different soil cover showed that while temperature at 5 cm soil depth at 18:00 h was 30.98°C on weedy plot, it was 34.18°C on weed-free plot (Awodoyin and Ogunyemi, 2005).

Weed help in recycling soil nutrients. Deep-rooting weeds serves as nutrients pump, mop up nutrients leached to the sub-soil layer and bring them to the surface soil; weeds on decomposition increase the organic matter content of the surface soil. Leguminous weed such as *Crotalaria retusa, Mimosa pudica, Desmodium adscendens,* and *Tephrosia brateolata* enhance soil fertility

through nitrogen fixation. Weed serve as source of genetic materials for the improvement of cultivated crops, for example, wild cowpea is used in the genetic improvement of *Vigna uguiculata* (Awodoyin and Ogunyemi, 2005).

2.5.4 Noxious Effect of Weed

Weeds compete with crop for space, moisture and nutrients, they affect crop growth and performance and subsequent yield several scientists have shown that different weed species induced economic yield losses in rice, maize, yam and other crops. Weed reduces crop quality by contaminating agricultural produce. *Paspalum orbiculare* seeds often contaminate rice grain. Also for the perfect resemblance, seed of *Ruillia tuberosa* will contaminate the seed of tomatoes. Fruits of *Solanium nigrum* will contaminate the fruits of green cowpea (*Pisium sativa*). Weed also harbour vertebrate pest, providing food and shelter. For example, green cutters are more devastating in unwedded maize filed than in clean ones (Awodoyin and Ogunyemi, 2005).

Some weeds are poisonous to man and his livestock, for example, *Spigelia anthelmia* and *Amaranthus spinosus* are poisonous to sheep and goats; weeds may cause discolouration of animal products. Some weed interferes with farm operations and may cause damages to farm machinery. Weeds are unsightly and usually reduce the aesthetic value and outlook of well laid farm and recreational areas. "To thy fair flower add the ranks smell of weeds; but why

thy odour matcheth not thy show, the soil is this, that thou dost common grow" (Baker, 1974).

2.5.5 Weed Control

Weed management within an organic farm relies on an integrated cropping-system approach. Weeds are plant that people view as undesirable in a particular place. Throughout the long human history of horticulture, people have worked to control weed for many reason. Weed control is a highly developed field of knowledge.

Weed control methods vary according to the growth habit of the weeds in questions, as well as the context. For example, different methods of weed control may be used on a food crop versus a fibre crop or a golf course, because there is often more concern about health effects of chemicals used on food crops, because they are ingested.

Weeds can be categorized by their life habitat. They can generally either be grouped as annuals or perennials. An annual weed grows from the seeds dropped in the previously growing season. Perennial weeds regrow from previously established roots, dormant stolon's, tubers, rhizomes, as well as the seed.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 STUDY SITES AND SAMPLING METHOD

The enumeration was carried out in Apoje village, Ijebu North Local Government area of Ogun State. Ten cocoa plots were found in Apoje Village respectively. 20 x 20m area was marked out. At the centre of each cocoa plot a and using X-and Y-ordinate random sampling technique/ ten points were located for the placement of wooden quadrant (1 x 1m) for weed species enumeration.

3.2 IDENTIFICATION OF WEED SPECIES.

All weeds and other low-growing plants (including samplings of tree plants) that rooted within each quadrant were identified and counted. Weed identification and naming were done using West African weeds (Akobundu and Agwkwa, 1998) the species that cannot be identified immediately on the field were preserved in wooden press and identified in the Herbarium section, Department of Plant Science, Olabisi Onabanjo University, Ogun State, Nigeria.

3.3 ANALYSIS OF DATA ON SPECIES ABUNDANCE

The following measures of abundance were calculated for each species: density (D), Relative density (Rd) (%), Frequency (F) (%), Relative frequency (Rf) (%) and Relative Importance Value (RIVs) (Barbour et al., 1999).

$$\text{Density} = \frac{\text{Number of individuals of a species}}{\text{Area sampled}}$$

$$\text{Relative Density} = \frac{\text{Density of a species}}{\text{Total density for all species}} \times 100\%$$

$$\text{Frequency} = \frac{\text{Number of quadrats in which a species occurs}}{\text{Total number of quadrats samples}} \times 1000\%$$

$$\text{Relative frequency} = \frac{\text{Frequency of a species}}{\text{Total frequency value for all species}} \times 100\%$$

$$\text{RI V} = \frac{(\text{Relative Frequency} + \text{Relative Density})}{2} \%$$

3.4 MEASUREMENTS OF COMMUNITY STRUCTURES ON THE FIELDS

Measures of community structures in the four fields were calculated as follows; species richness (R) Shannon – wiener index (H^I) and evenness index (J^I)

Species Richness (R) = number of species present in a given area

Shannon – Wiener index (H^I) = -£pi. In Pi

Evenness Index (J^I) = $\frac{(H^I)}{}$

CHAPTER FOUR

4.0 RESULTS

4.1 SPECIES RICHNESS OF THE PLOT

Fifty (50) quadrats were laid in the farm during this study. In all, (48) forty - eight weed species belonging to thirty - one (31) plants families were enumerated (Table). The average number of species per cocoa plots during this study was 18, 18, 19, 20, and 21 respectively.

Families *Asteraceae, Poaceae, Convolvulaceae* and *Commecinaceae* had the highest number of species 5, 3, 3 and 3 respectively (Table 1). Table 2, 3, 4, 5, and 6 shows the frequencies, relative frequencies, densities relative densities and RIVs of each weed species for the five plots during this study. *Chromolena oditara* and the highest RIVs (10.9%) in plot 1, *Senna obtusifolia* had the highest RIV (14.7%) in plot 2, *Commelina diffusa* had the highest RIV (15.3%) in plot 3, *Laportea ovalifolis* had the highest RIV (10.2%) in plot 4, *Syndrella nocliflora* has the highest RIV (12.5%) in the plot 5. Out of the five cocoa plots enumerated *Solanecio biafrae* was found on plot 4 and 5, the RIV of *Solanecio biafrae* was low in comparism with other species on this two plot, RIVs of 5.4% and 7.1% respectively.

Table 1: Identified Weed Species in the Five Cocoa Plots for Abundance of *Solanecio Biafrae*

S/N	FAMILY	WEED SPECIES	COMMON NAME	LOCAL NAME
1	*Adoxaceae*	*Viburnium suspensum*	Viburnium plant	
2	*Amaranthaceae*	*Acthyranthus aspera*	Devil horse whip	Aboro
		Alternanthera repens	Paper thorns	Dagunro
3	*Araceae*	*Colocasia essulenta*	Cocoyam	Koko
4	*Asteraceae*	*Ageratum conyzoides*	Goat weed	Imi-esu
		Aspilia africana	Haemorrhage	Yinyin
		Chromolaena odorata	plant	Akintola
			Siam weed	Worowo
		Solanecio biafrae	Sierra Leone bologi	aluganbi
		Syndrella nodiflora	Node weed/Starwort	
5	*Azollaceae*	*Azolla pinnata*	Water velvet	
6	*Caesalpinoidae*	*Senna hirtusa*	Stinking cassia	Asunwon
		Senna obtusifolia	Foeid cassia	Ako-rere
7	*Combretaceae*	*Combietum lospidum*	Combietum	
8	*Commelianaceae*	*Aneilema beninense*	Aneilema	
		Commelina benghalensis	Day flower	
			Scurvy weed	
		Commelina diffusa	Commelina	
9	*Convolulaceae*	*Ipomea aquatic*	Ipomea	Ododo-oke

		Ipomea involucrata	Morning glory	Afewogbe
		Ipomea triloba	weed	
10	*Curcubribitaceae*	*Curcubribita pepo*	Little bell	
11	*Denstaeditiaceae*	*Pterdium aquilinum*	Pumpkin	Elegede
12	*Dioscoreaceae*	*Discorea dumetorum*	Bracken	
13	*Ebenaceae*	*Diorphyrus kaki*	Yam	Isu
14	*Euphiorbiaceae*	*Manihot essculenta*	Persimmon plant	Oriloge
		Phyllanthus amarus	Cassava	Ege, garri
15	*Fabaceae*	*Senna occidentalis*	Phyllanthus	Iyin-olole
16	*Lamiaceae*	*Solenostemon*	Coffee senna	Rere
		monostachyus	Solenostemon	Aranpoo
17	*Lauraceae*	*Laurus nobilis*	Bay lavel	
18	*Leguminosae*	*Albizia zygia*	Albizia	
		Anthonantha	Anthonantha	Agoin
		macrophylla		
		Piptadeniastrum	Piptadeniastrum	
		africanum		
19	*Loganiaceae*	*Spigelia anthelmia*	Pink-	Aparan/aran
			weed/wormush	
20	*Malvaceae*	*Abutilon*	Africa mallow	Furu
		mauritianum		
		Sida acuta	Broom weed	Isekutu
21	*Moraceae*	*Ficus exasperata*	Sand-paper plant	Ewe-ipin
		Morus species	Burbak	
22	*Musaceare*	*Musa sp*	Banana	Ogede
23	*Onagraceae*	*Ludwigia decurrens*	Water promerose	

24	*Palmea*	*Cocos nucifera*	Coconut palm	Agbon
25	*Passifloraceae*	*Adenia sp*		Aro-kek
26	*Poaceae*	*Andropogon tectrum*	Giant bluestem	
		Brachiaria deflexa	Signal grass	
		Sorghium arandinaceum	Sorghium	
27	*Portulaceae*	*Talinum fruticosum*	Water lettuce	Gbure
28	*Solanaceae*	*Capsicum fruitescens*	African pepper	Ata-jije
29	*Tiliaceae*	*Triumfetta cordiflora*	Chinnes bur	Aku-eri
30	*Urticeceae*	*Larpotea aestuans*	Stinging nuttle	Fovefu
		Larpotea ovalifolia	schmach	Mpupu

Table 2: Density, Relative Density, Frequency, Relative Frequency and RIVs of Weeds Enumerated Around Cocoa Plot One (1).

Weeds species	Density	RD%	FR%	RFr %	RIV%
Abutlilon mauritianum	12.5	1.5	10	1.9	2.7
Adenia sp	37.5	4.6	50	9.3	6.9
Albizia zygia	7.5	0.9	10	1.9	1.4
Alternantaria repens	22.5	2.8	20	3.7	3.3
Andropogon tectorum	7.5	0.9	20	3.7	2.3
Aneilema beninense	20.0	2.4	20	3.7	3.1
Anthonatha macrophylla	7.5	0.9	20	3.7	2.3
Azolla pinnata	2.5	0.3	10	1.9	1.1
Brachiaria deflexa	12.5	1.5	10	1.9	1.7
Capsicum species	2.5	0.3	10	1.9	1.1
Lapotea aestuans	30	3.7	40	7.4	5.6
Chromolaena odorata	87.5	10.7	60	11.1	10.9
Commelina benghalensis	15	1.8	30	5.6	3.7
Commelina diffusa	122.5	14.9	20	3.7	9.3
Ludwigia decurrens	5	0.6	20	3.7	2.2
Musa species	2.5	3.1	10	1.9	2.5
Pteridium aquitinum	45	5.5	30	5.6	5.6
Senna obtusifolia	25.5	31.2	50	9.3	20.3
Senna occidentalis	15	1.8	20	3.7	2.8
Senna hirsute	27.5	3.4	20	3.7	3.6
Syndrella nodiflora	80	9.8	60	11.1	10.5

Table 3: Density, Relative Density, Frequency, Relative Frequency and RIVs of Weeds Enumerated Around Cocoa Plot Three (3).

Weeds Species	Density	RD%	RF%	RFr%	RIV
Abutilon mauritinum	40	4.9	20	4.8	4.9
Adenia species	32.5	3.9	20	4.8	4.4
Ageratumconyzoides	187.5	22.9	20	4.8	13.9
Branchiaria deflexa	25	3.0	30	7.1	5.1
Chromolaena odorata	15	1.8	40	9.5	5.7
Cocus nucifera	25	3.0	10	2.4	2.7
Colcasia osculenta	5	0.6	10	2.4	1.5
Diorpyrus kaki	15	1.8	20	4.8	3.3
Ficus exasperata	12.5	1.5	20	4.8	3.2
Laportea aestuans	25	3.0	40	9.5	6.3
Laportea ovallifolia	70	8.5	30	7.1	7.7
Laurus nobilis	10	1.2	20	4.8	3.0
Morus species	7.5	0.9	10	2.4	1.7
Musa species	7.5	0.9	20	4.8	2.9
Senna obtusipila	182.5	22.2	30	7.1	14.1
Sorghium arundinaceum	17.5	2.1	10	2.4	2.3
Spigelia anthelmia	57.5	7.0	20	4.8	5.9
Syndrella nodiflora	80	9.8	30	7.1	8.5
Triumfella cordifolis	5	0.6	20	4.8	2.7

Table 4: Density, Relative Density, Frequency, Relative Frequency and RIVs of Weed Enumerated Around Cocoa Plot Three (3)

Weed Species	Density	RD%	FR%	RFr	RIVs
Adenia species	25	1.4	10	2.1	1.8
Andropogon tectorum	15	0.8	40	8.5	4.1
Agapanthus africnu	22.5	1.2	10	2.1	1.7
Azolla plinnata	25	1.4	10	2.1	1.8
Brachiaria deflexs	117.5	6.4	20	4.3	5.4
Chromolaena odorata	62.5	3.4	30	6.4	4.9
Colocasia essulents	55	2.9	20	4.3	3.6
Commelina diffusa	102.5	5.6	30	6.4	15.3
Curcubribitaceae	67.5	3.7	30	6.4	5.1
Ipomea aquatic	225	12.3	30	6.4	9.4
Laportea aestuans	47.5	2.6	30	6.3	4.5
Phyllanthus amarus	112.5	6.1	30	6.4	6.3
Plastostoma africanum	90	4.9	10	2.1	3.5
Pteridium aquilinum	12.5	0.7	30	6.4	3.6
Senna obtusifolia	112.5	6.1	20	4.3	5.2
Sida acuta	112.5	6.1	30	6.4	6.3
Solenostemon monostachyus	12.5	0.7	10	2.1	1.4
Spigelia anthelmis	442.5	24.1	30	6.4	15.3
Syndrella nodiflora	170	9.3	40	8.5	8.9
Syndrella nodiflora	170	9.3	40	8.5	8.9
Viburnium suspensum	5	0.3	10	2.1	1.2

Table 5: Density, Relative Density, Frequency, Relative Frequency and RIVS of Weeds Enumerated Around Cocoa Plot Four (4).

Weed Species	Density	RD%	FR%	RFr%	RIV
Adenia species	5	0.7	30	2.1	1.4
Aneilema beninense	55	8.1		6.3	7.2
Chromolaena odorata	47.5	6.9	30	6.3	6.6
Commelina benyhalensis	15	2.4	30	6.3	4.3
Commelina diffusa	57.5	8.4	30	6.3	7.2
Curcubritaceae	75	10.9	20	4.2	7.5
Discorea dumetorum	85	12.5	30	6.3	9.4
Ficus exasperata	7.5	1.1	20	4.2	2.6
Ipomea aquatic	22.5	3.3	40	8.3	5.8
Ipomea involucrate	40	5.9	30	6.3	6.1
Laportea ovalifolia	82.5	12.1	40	8.3	10.2
Ludwigia decurrens	5	0.7	20	4.2	2.5
Musa sp	40	5.8	20	4.2	5.0
Phyllanthus amarus	42.5	6.2	20	4.2	5.2
Senia obtusifolia	17.5	2.6	30	6.3	4.5
Solanecio biafrae	30	4.4	30	6.3	5.4
Syndrella nodiflora	45	6.6	30	6.3	6.5
Talinum fruiticosum	10	1.5	20	4.2	2.8

Table 6: Density, Relative Density, Frequency, Relative Frequency Ad RIVs of Weeds Enumerated Around Cocoa Plot Five (5).

Weed Species	Density	RD%	FR%	RFr%	RIVs
Achyranthus aspera	2.5	0.3	10	2.2	1.3
Aneilema beniense	70	9.5	30	6.7	9.8
Capsicum sp	7.5	1.0	20	4.4	2.7
Chromolaeana odorata	20	2.7	30	6.7	4.7
Commelina diffuse	10	1.3	20	4.4	2.7
Combietum hispidum	5	0.7	20	4.4	2.6
Curcubribitaceae	5	0.7	10	2.2	1.5
Ipomea involucrate	22.5	3.0	20	6.7	4.9
Ipomea triloba	22.5	3.0	20	4.4	3.7
Larpotea aestuans	50	6.8	20	4.4	5.6
Larpotea ovalifolia	117.5	15.9	30	6.7	11.3
Manihot essculenta	15	2.0	10	2.2	2.1
Phyllantus amarus	42.5	5.7	30	6.7	6.2
Senia obtusifolia	62.5	8.4	40	8.9	8.7
Senna occidentalis	35	4.7	20	4.4	4.6
Solanecio biafrae	55	7.4	30	6.7	7.1
Syndrella nodiflora	102.5	13.9	50	11.1	12.5
Talinim triangulare	9.5	12.8	30	6.7	9.8

4.2 SPECIES DIVERSITY AND EVENNESS OF THE FIELDS

Shannon-wiener index of species diversity (H^I) obtained were 2.4, 2.4, 2.5.3, 2.5.9, 2.8 (Table 7), H^I was highest in plot 3, 4, and 5 than plot 1 and plot 2 respectively (Table 7).

Evenness index (J^I) was used to measure the distribution of individuals in a community, the value obtained for (J^I) at the five plots were 0.83, 0.82, 0.84, 0.86 and 0.76 respectively, this tending towards 1 in plot 4, plot 3, plot 2 and plot 1 indicates equal representation or similar abundance of individual species in the four plots.

TABLE 7: Measurement of the Community Structure of The Five Cocoa Plots Enumerated At Apoje Village

	R	H^I	J^I
Plot 1	18	2.4	0.83
Plot 2	19	2.4	0.82
Plot 3	20	2.53	0.84
Plot 4	19	2.59	0.86
Plot 5	18	2.8	0.96

4.3 MEDICAL WEEDS IDENTIFIED ON THE COCOA PLOTS

Twenty-six weed species of medicinal importance were identified in the five cocoa plots. The major indicator listed for these weed species are against malaria, stomach disorder, cough, disbarred, fever, dysentery, rheumatism, ulcer, wound, anti-poison, convulsion, skin-diseases, tuberculosis, gonorrhoea, abortifacient, galactagogue, anti-microbial and blood purifier properties. Detailer list and indicated of these plants are represented in Table 8.

Table 8: Weed of Medicinal Importance Identified On The Cocoa Plot At Apoje Village

S/N	Weed species	Constituents	Part used	Medicinal uses
1	*Abultilon mautitianum*		Leaves, root	Gonorrhea, inflammation, ulcer, diarrhea
2	*Achyranthes aspera*	Alkaloid, potassium salt	Whole plant, leaves	Stomach disorder, cough, diarrhea, fever, dysentery, rheumatism
3	*Adenia species*		Bark, leaves & Roots	Cough and respiratory disorder
4	*Ageratum conyzoides*	Flavonoid, limonene, pinene, tannins	Whole plants, seed and leaves	Dressing wounds, ulcers, inflammation, redness of the eyes
5	*Alternthera repens*	Alkaloid	Whole plant	Dysentery, galactagogues
6	*Aneilema beniniense*	Inulins	Whole pant	Laxative
7	*Chromolaema odorata*	Essential oil, pinene, limonene, pinene, tannins	Leaves	Malaria, fever and dysentery
8	*Commelina diffusa*	Alkaloids, inulins, saponin, mannins	Leaves, entire plat	Yellow fever, premature labour
9	*Cucurbrita pepo*	Resin, taxolbumin, oil	Seeds	Diuretic, demulant & vemifuge
10	*Ficus exasperate*	Tannins	Leaves, bark, root, seed	Stomach urinary disorder, tumors
11	*Ipomea triloba*		Whole plant	Headache
12	*Laportea aestuans*		Leaf	Dressing burns, wounds and rickets
13	*Laportea ovalifolia*		Leaf	Haemostatic on cuts and wounds, anti-

14	*Manihot essulenta*	Leaves contain alkaloid, saponins & tannins	Leaves, tubers	irritant, poison antidote Anticoagulant, gonorrhea, ulcer & burns
15	*Musa sp*	Inulin, tannins, alkaloid-5, hydroxytryptamine	Leaves, roots, fruits	Fresh wounds, cut, dysentery, hysteria, abortifacient
16	*Phyllanthus amarus*	Inulin, saponin, tannin	Whole plant	Purgatives, vemifuge
17	*Pteridium aquitinum*		Whole plant	Cancer
18	*Senna obtusifolia*	Chysarobin, postagladin, tannins	Leaves, root, seed	Mild laxative, skin-disease
19	*Senna hirtusa*	Azuline, saponin, tannins	Leave, stem, bark, seed, flower	Blood purifier, asthma, skin-disease
20	*Sida acuta*	Saponin, tannins, postagladin	Leaves, root	Ulcer, fever, antipyretic
21	*Solenostemon monostrachyus*	Essential oil, tannin alkaloid	Leaves	Convulsion, tuberculosis
22	*Spigella anthelmia*	Alkaloids, spigeline	Whole	Intestinal worms, convulsion, muscle
23	*Syndrealla nodiflora*	Inulins, tannins, saponins	Leaves, whole pant,	Laxative, leprosy.
24	*Talinum triangulare*	Steroidal saponins	Tuber leaves	Premenstrual, kidney disorder, syndrome virility, rheumatoid
25	*Triumfelta cordifolia*	Inulins, saponin	Leaves, flowers	Malaria, laxative.

CHAPTER FIVE

5.0 DISCUSSION AND CONCLUSION

18, 18, 19, 20 and 21 weed species were identified on the five plots (5) respectively. The high species richness (R) of these fields are similar to (Sonwal *et al.*, 2007) who reported average species richness ranging from 15-20 for cocoa plantation in different areas of forest of South Camerron. High R is peculiar to tropical rain forest zone because of favourable environmental factor. *Solanecio biafrae* was found in two cocoa plots out of the five cocoa plots enumerated with RIVs of 5.4% and 7.1% on plot 4 and 5 respectively. The relatively high RIVs of *Solanecio biafrae* on plot 5 may be attributed to the deliberate cultivation and preservation of the plant by the farmer.

Forty-Seven (47) weed species were least ubiquitous across the five cocoa plots, these weed species were found only in one field. Five weed species were most ubiquitous across the five cocoa plot, these include *Chromolaena odorata, Syndrella nodiflora, Ipomea involucrata, Commelina diffusa* and *Laportea ovalifolia.* Twenty weed species were found in two or three cocoa plots. This shows that geographical location and evaluation, which determine soil properties, landscape and level of inter and intraspecific competition, has significant effect on species diversity and richness of these cocoa plots. This is similar to the findings of *Tuomistio* and *Poulsen,* (2000) who found that weed

diversity is often related to local condition, level of inter and intraspecific competition and the landscape

This study shows that twenty-five medicinal plants were found on the five cocoa plots. This implies that while there are medicinally useful plants in the study area, most of their species are rare and may be endangered. Conservation of medicinal plants is therefore recommended. This study shows that *Solanecio biafrae* is been threatened and might be endangered if not cultivated. This studies also shows that many weed species have many medicinal or economical important, many are termed weed because their uses are not yet been discovered. It is therefore recommended that researches should be done more on low – growing plants termed weed. *Chromolaena odirata, Adenia sp, Ipomea sp,* are invasive plants and might be a treat to the existence of *S. biafrae* this is in accordance with the founding of Awodoyin, *et al.,*(2013) that *Chromolaena odorata, oplimenis burmanni* and *Adenis cissampeloides* are treat to the existence of *S. biafrae*. In some cocoa plots in Oyo, Ekiti and Cross river states. It is also recommended that similar studies on a large scale be carried out in order to ascertain species diversity, determine threatened species and make informed decision on the use of herbicide.

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