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A PHYTOSOCIOLOGICAL STUDY OF WEED FLORA IN THREE ABANDONED FARMLANDS IN OWO AREA, ONDO STATE, NIGERIA

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ABSTRACT

A phytosociological study of weed flora from three abandoned farm lands within Owo Local Government area of Ondo State, Nigeria, was undertaken. The data indicated that Chromolaena odorata, Tridax procumbens and Imperata cylindrica are the most dominant weed species in the area. The lists of other dominant species identified in the area are also presented. The weed biology and its implications for weed management are discussed.

Keywords: Phytosociology, weed Flora, Nigeria, abandoned farmland.

INTRODUCTION

Ever since man began cultivating plants, he has to fight with weeds competing with crops for space, water, mineral nutrients and sunlight. According to Shah *et al.,* (2006), the concept of weeds as unwanted plants was born when man started to deliberately grow plants for food.

No matter what definitions are used, weeds are plants whose undesirable qualities outweigh their beneficial properties. Weeds are naturally strong competitors to agricultural crops because of their high adaptability to different environmental conditions and those weeds that can best compete always tend to dominate. They constitute a major impediment to agricultural and natural ecosystem in Nigeria. Primarily, weeds compete with crop plants for light, water and nutrients (Wang *et al.*, 2007), thereby reducing yields and quality of produce. They harbour many fungal, viral and bacterial diseases as well as insects' pests. In addition to acting as alternate hosts, weeds provide food for birds, rodents and their predators. Furthermore, weeds increase labour costs and inputs such as herbicides and may

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produce chemical substances which are toxic to crop plants (allelopathy), animals and humans.

There is therefore an urgent need for an effective weed crop management programme. For such a programme to be visible, accurate information on the systematics of weeds, their frequency, density, growth habit, phenology (Alm *et al.*, 1991; Ghersa and Holt, 1995) and weed crop relationships are pre-requisite. But such information on many tropical weeds, especially in Nigeria, is lacking. This lack of information forms the basis for carrying out this present study which is aimed at quantifying the weed flora associated with shifting cultivation that is widely practiced in Ondo State, Nigeria. The degree of similarity among the communities and the importance value index (IVI) of the weed flora was also investigated.

MATERIALS AND METHODS

THE STUDY AREA

The study area consists of three sites designated as A, B and C and they were chosen from within Owo Local Government Area of Ondo State. These study sites are: Owo, Isuada and Emure Ile (Fig.1). Site A is an abandoned farmland, very close to the local government secretariat in Owo. Site B is an abandoned farmland in Isuada while site C is an abandoned farmland in Emure-Ile.

Owo local government is one of the local governments in Ondo state and lies between latitudes 50^{o} 45^{o} and 7^{o} 52^{o}N and longitudes 4^{o} 20^{o} and 6^{o} 05'E. It is bounded in the North and South by Akoko South West local government and Edo state, respectively and in the East and West by Akure North and Ose Local government areas, respectively.

GEOGRAPHICAL FEATURES, VEGETATION AND CLIMATE

The natural vegetation of this area is the lowland tropical rainforest type, composed of a variety of hard wood timbers. The rainforest vegetation in Ondo state is among the vegetation that represents the climax vegetation of the Nigerian forest. In the Northern district of the state, the vegetation consists of woody savannah featuring tree species like *Blighia sapida and Parkia biglobosa*. The climate consists of distinct wet and dry seasons with the mean annual temperature of about 20 to 30^{o}C and high precipitation (2000-10,000mm yr^{-1}). The soil in the study is sandy-loam. The soils derived from the basement complex rocks are mostly well drained, with medium-to-fine textures which are of high agricultural value for the production of both tree and arable crops.

Fig. 1. Map of Owo local government area showing the study sites.

ECOLOGICAL TECHNIQUES

SAMPLING PROCEDURE

Each study site was measured 100m by 100m. Before the study, each of the sites had been cropped for five growing seasons to maize, beans, vegetables, cassava, and yam either alone or as mixed crops.

A rectangular quadrate was used for the weed sampling, and at each site, a quadrate size of 50 cm^2 was thrown fifty times and the weed species inside each quadrate were observed, identified and recorded.

The weeds were assessed quantitatively and the information obtained was used to determine the following ecological parameters. such as abundance, density, cover, frequency, relative cover, relative density, relative frequency, index of similarities and importance value index(IVI) using the method of Kayode and Ige (1998).

RESULTS AND DISCUSSION

A total of 71 weed species belonging to 21 families were recorded in the study sites (Table-1). In site A (Owo town), 40 weed species belonging to 17 different families were recorded. Table-2 shows ten dominant weeds in site A. Weeds such as *Chromolaena odorata, Imperata cylindrica* and *Tridax procumbens* were found to be more common in the community with IVI values of 20.8, 17.5 and 16.5, respectively, and thus the community could be described as *Chromolaena – Tridax – Imperata* community.

Table-1. Weed families recorded in the three study sites.

S.No.	Family	Number of species
1.	Asteraceae	6
2.	Amaranthaceae	3
3	Apocynaceae	3
4.	Annonaceae	2
5.	Arecaceae	1
6.	Combretaceae	2
7.	Commelinaceae	2
8.	Cucurbitaceae	4
9.	Convolvulaeae	3
10.	Cyperaceae	4
11	Euphorbiaceae	9
12.	Liliaceae	1
13.	Loganiaceae	2
14.	Malvaceae	4
15.	Olacaceae	2
16.	Potulacaceae	1
17.	Poaceae	11
18.	Rubiaceae	5
19.	Solanaceae	4
20.	Tiliaceae	1
21.	Zingiberaceae	1

In site B (Isuada), 49 weed species belonging to 20 different families were recorded. In this community *C. odorata, T. procumbens* and *I. cylindrica* were also the most abundant with IVI values of 18.2, 14.4 and 16.0, respectively. The ten most dominant weed species at the locality under reference are presented in Table-3. This community could also be described as *Chromolaena – Tridax – Imperata* community.

In site C (Emure-Ile), 39 weed species belonging to 19 different families were present. In this community *C. odorata, T. procumbens* and *I. cylindrica* were also the most predominant with IVI values of 17.2, 16.3 and 16.3, respectively. This community could also be described as *Chromoleana – Tridax – Imperata* community. Table-4 shows the ten most dominant species.

The families with the highest number of weeds include the Poaceae, Euphorbiaceae and Asteraceae (Table-1). In this study, herbaceous weeds recorded constitute about 45 species (68%) while 21 (40%) are woody species. The highest number of herbaceous species were found in the families Rubiaceae and Cyperaceae which recorded 5 and 4 species, respectively. Next to this are the families Apocynaceae and Amarathaceae with 3 species each.

The number of species in the weed communities ranged from 40 in site (A), 49 in site (B) and 39 species in site (C). The differences may probably be due to the changes in the surrounding forest vegetation, anthropogenic activities and the access roads around the sites.

Excessive weed growth is one of the most important factors limiting crop production in the tropics. In newly cleared forests, the major problem is from annual, broadleaved weeds. Although annual weeds are often very competitive, they generally respond to timely weeding and other weed control methods.

Because of the negative effect which weeds exert on our farmlands, there is the need to provide effective weed control mechanisms. According to Melander *et al.* (2005), weeds are a persistent problem in agricultural production systems and considerable effort has been put into studying and developing chemical, physical and cultural weed control methods. The idea of controlling weeds is to limit their negative effects to the level of acceptability. Some of the biggest problems with weeds in fields of cultivated crops occur in areas where substantial rainfall occurs throughout the growing season. This might be the reason behind the presence of this diverse species recorded in this study as this area receives rainfall throughout the year because of its location. Similar conclusions have been drawn from researches on weeds conducted by Martin and Carnahan (1983) and Buckley *et al.* (2003). The high moisture level keeps the weed seeds germinating, and unless the weeds are controlled, they either choke out and cause crop failure or reduce their yields.

This study has revealed that the study areas could be described ecologically as *Chromolaena – Tridax – Imperata* seral communities. *C. odorata* (L) King and Robinson; is a perennial weed and belongs to the family Asteraceae whose production is primarily by wind dispersed seeds (cypsela) which occur before the rainy season i.e. January–March. It is rapidly dispersed and is easily established in full sunlight which makes it an efficient colonizer of disturbed sites. This is the most widely distributed and highly competitive perennial, broad-leaved weed. It covers the entire forest in Guinea Savannah zones of Nigeria and has been reported to have invaded five continents of the world successfully (Kriticos *et al.*, 2005). It occurs in both field and plantation crops. Regrowth from the basal stumps establishes so rapidly during raining season that is difficult to harvest long-season crops such as cassava and yams. An effective chemical control of regrowth of this weed is needed.

I. cylindrical (L.) Beauv. is an aggressive, rhizomatous perennial weed with an underground stem that gives out leaves periodically. It is a member of the family Poaceae and thrives well in fire prone environments. Its abundance tends to increase with an increase in its mechanical disturbance. This is one of the most serious weeds of the cleared forest and guinea savannah zones; especially in rice, maize, root and tuber crops plantations in Nigeria, though Macdonald *et al.* (2006) had reported that this weed does not survive in cultivated areas of Florida. In addition to competing with crops for nutrients, light and water, its rhizome, is known to pierce yam tubers thereby reducing their quality. Seasonal bush burning, a common practice in this area, induces the plant to flower and set seed thus contributing to its spread.

T. procumbens L. belongs to the family Asteraceae whose method of dispersal is by wind. It is a semi prostrate perennial herb which occurs throughout the tropics and subtropics. It is frequently found in annual crops, fallow land and occasionally in perennial crops. Its wide distribution is attributed to its spreading stems and abundant seed production which is put at between 50- 1500 per plant (Holm *et al.*, 1997).

Selecting appropriate weed control methods can be very complex. While weed control principle remain established and unchanged, the diversity of farming systems can influence both weed problems and their solutions. It is therefore, difficult to make a list of recommendation to fit every situation that might arise at any point in time. However, the integrated weed control approach as canvassed by several authors (Bond and Grundy 2001; Anderson, 2003; Melander *et al*., 2005; Otto *et al*., 2007) is further stressed.

This study has shown that areas having the same eco-climatic conditions are likely to support the growth of the same weed species and the ecological information offered by this study may constitute strategies to effective weed control.

Table-2. Ten dominant weed species recorded in site A.

Plant Species	Density m^{-2}	Freq%	Basal cover	IVI
Chromolaena odorata L.	2.3	56	2.0	20.8
Tridax procumbens L.	1.8	46	2.5	16.3
Imperata cylindrica (L.) Beauv	2.0	52	0.1	17.5
AspiliaAfricana (P.Beauv. C.D.Adams var. *minor*	1.8	44	0.5	9.4
Euphorbia heterophylla L.	1.1	28	1.3	7.1
Eleucine indica L.	1.0	22	1.2	4.2
Ageratum conyzoides L.	1.2	30	0.4	8.7
Cynodon dactylon (L) Pers.	0.4	14	1.0	3.6
Centrosema pubescens L.	0.6	10	0.8	2.1
Boerhavia diffusa L.	0.3	8	1.0	3.0

Table-3. Ten dominant weed species recorded in site B.

Plant species	Density m^{-2}	Freq%	Basal cover	IVI
Chromolaena odorata L	2.9	72	1.5	18.2
Tridax procumbens L.	2.8	70	3.5	14.6
I*mperata cylindrical* (L.) Beauv.	2.8	70	0.2	16.0
Amaranthus spinosus (L)	2.6	60	1.3	13.7
Talinium triangulare (Jacq.) Willd.	2.6	64	0.6	13.8
Aspilia Africana (P.Beauv. C.D.Adams var. *minor*	2.2	56	1.1	11.9
Ageratum conyzoides L.	1.2	30	0.4	8.7
Boerhavia diffusa L.	0.8	20	0.5	3.9
Desmodium salicifonium Benth.	0.2	8	0.8	2.2
Eleusine indica L	0.3	8	1.0	3.0

Table-4. Ten dominant weed species recorded in site C

Plant species	Density m^{-2}	Frequency %	Basal cover	IVI
Chromolaena odorata (L.) King & Robinson	3.0	78	1.5	17.2
Tridax procumbens L.	2.9	72	1.5	16.3
Amaranthus spinosus L.	2.6	64	0.6	13.8
Aspilia Africana (P.Beauv. C.D.Adams var. *minor*	2.0	50	1.1	11.9
Talinium triangulare L.	2.3	58	0.5	6.5
Ageratum conyzoides L.	1.4	3.4	0.5	6.5
Boerhavia diffusa L.	1.0	22	1.3	4.2
Centrosema pubescens Benth.	0.4	10	2.0	3.2
Desmodium salcifonium (Poiret)DC	0.6	6	0.8	2.1

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