



PLANT SPECIES COLONIZING ABANDONED FARMLANDS LESS THAN 20 YEARS IN ISIALA MBANO LOCAL GOVERNMENT AREA, IMO STATE, NIGERIA

Dike M. C. and Obiajunwa U. P.

Department of Forestry and Environmental Management, Michael Okpara University of Agriculture, Umudike, Nigeria

E-Mail: michael.dike@ymail.com

ABSTRACT

Plant species colonizing abandoned farmlands less than 20 years old were studied at Isiala Mbano, Imo State, Nigeria. Ten blocks of 30 hectares were demarcated within the abandoned farmlands and three blocks were selected at random. Within the central portion of each of the 30 hectares, a study plot of 25.0 x 25.0 m was laid. All plant species up to 1.0 cm in height within these three study plots were enumerated in the months of June and November 2010. The life form of each plant species was recorded. Data revealed that trees belonging to megaphanerophytes and mesophanerophytes were absent. It was only few microphanerophytes and nanophanerophytes that were observed. It was mainly climbers, shrubs, and herbs that were abundant. The most relatively abundant species in the studied abandoned farmlands were *Andropogon tectorum* (19.01 %) and *Dactyladenia barteri* (18.38 %). It was concluded that animals which disperse tree fruits and seeds into abandoned farmlands were not frequent in the abandoned farmlands. Moreover, wind speed greater than 7.0 ms⁻¹ at 2.0m above the ground is poorly recorded. Fruits/seeds are not carried up to 100.0 m away from the dispersing tree species. Consequently, man ought to assist in the dispersal of economic tree fruits and seeds if abandoned farmlands within the tropical rainforest are to maintain most of the trees species the rainforest is known for.

Keywords: plant species, colonization, abandoned farmlands, megaphanerophytes, nano-phanerophytes, microphanerophytes.

INTRODUCTION

The population of Nigeria is increasing at a rate of over 1.2 percent per annum (Madu, 2001). Food is required to maintain the large population of between 80 and 120 million people. Excessive pressure is put on land as most subsistent farmers attempt to produce the daily food need of the people. The period a piece of land is left fallow has been reduced to five years in many places. In areas within southeastern Nigeria for example, in places having severe land hunger, a piece of land is cultivated annually often with different arable crops. Presently, there is no law restricting a person from becoming a subsistent farmer. Moreover, the size of the farm is often determined by the farmer. Seedlings of trees species listed as economic are not given any preference during either the clear felling or weeding operations by farmers (Lancaster, 1961; Dike, 2003). The seed banks and seedling banks are therefore reduced both in quality and quantity by farmers without replacement. According to Dike and Aguguom (2010), it is difficult for fruits/seeds of many tree species to be dispersed by wind for over 100 m from the dispersing tree species. There is paucity of literature on plant species colonizing abandoned farmlands in southeastern Nigeria. Many plant ecologists were of the view that the composition of a forest could be determined early (Okali and Ola Adams, 1987). There is the need to understand the tree species that exist in abandoned farmlands. The absence of trees listed as economic would necessitate the introduction of the tree species either by Line planting or Enrichment planting. This paper reports plant species colonizing some abandoned farmlands less than 20 years in Isiala Mbano Local Government Area, Imo State, Nigeria. The paper will be useful to plant and

animal ecologists and all who are interested in combating climate change.

MATERIALS AND METHODS

The study was carried out at Isiala Mbano Local Government Area of Imo State, Nigeria. Isiala Mbano lies between latitudes 40 45" and 70 15" N and longitudes 60 50" and 70 25" E. It occupies an area of 166 km² and has a population of 198, 736. The mean monthly maximum temperature ranges from 280C to 350C. The total annual rainfall ranges between 1800 mm and 2500 mm. There are two seasons: a wet and a dry season. The relative humidity is between 60 and 90 percent during the wet season. The relative humidity was as low as 45 percent during the peak of the Harmattan season. The vegetation is the tropical rainforest (White, 1983). The abundant tree species in the area include *Anthonotha macrophylla*, *Dactyladenia barteri*, *Harungana madagascar-iensis*, *Elaeis guineensis* and *Pentaclethra macrophylla* (Dike, 2003). The soil is sandy loam. There are no hills or mountains. The slope is gentle. The soil is deep. The soil parent material is the pre-Cambrian Basement Complex.

METHODOLOGY

A reconnaissance survey of the abandoned farmlands within Isiala Mbano Local Government Area, Nigeria, was studied. The area was divided into 10 blocks, each 30 hectares. Three blocks were selected at random. Within each block a 25.0 x 25.0 m plot was marked at the central portion of the 30 hectares block. The 25.0 x 25.0 m was further divided into 5.0 x 5.0 m. All plant species up to 1.0 cm in height were enumerated in the months of June and November. The edges of the blocks were pegged for



easy identification. Parts of unknown plant species were collected and identified at the Herbarium unit in the Department of Forestry and Environmental Management, Michael Okpara University of Agriculture Umudike, Nigeria. The percent frequency of occurrence and relative abundance of the enumerated plant species were calculated. Menhinick's index was used to determine the species richness (Menhinick's, 1964; Mueller-Dombois and Ellenberg, 1974).

$$D = \sqrt{\frac{S}{N}}$$

where D represents species richness index,
S represents number of species and
N represents total number of individuals.

RESULTS AND DISCUSSIONS

Table-1 shows the list of 32 plant families observed at the abandoned farmlands at Isiala Mbanjo, Imo State, Nigeria. The families were represented by between one and three plant species. The plant species were mainly climbers such as *Gongronema latifolia* and *Combretum hispidum*. Grasses were abundant. Tree species such as *Dactyladenia barteri* and *Allophylus africanus* which resist fire were recorded.

Plant species with over 60 percent frequency of occurrence in the month of June 2010 include: *Andropogon tectorum* (77.78 %), *Chromolaena odorata* (66.67%), *Dactyladenia barteri* (100%), *Dialium guineense* (66.67%), *Elaeis guineensis* (88.89 %) *Icacina trichantha* (66.67 %), *Napoleonaea vogelii* (66.67 %) and *Pentaclethra macrophylla*. (66.67 %). Plant species with over 60 percent occurrence in the month of November 2010 include: *Andropogon tectorum* (100 %), *Chromolaena odorata* (88.89 %), *Dactyladenia barteri* (77.78 %), *Elaeis guineensis* (100%) and *Pentaclethra macrophylla* (77.78 %). The grass *Andropogon tectorum* with 19.01 percent had the highest relative abundance while *Dactyladenia barteri* had 18.38 percent during the month of June. In the month of November some of the grasses such as *Andropogon tectorum* died. *Dactyladenia barteri* had the highest percent relative abundance (25.35 %), while *Salaginella njam njamenses* had 24.56 %. Climax tree species (Swaine and Whitmore, 1988) were not recorded. Emergent tree species were not recorded. The absence of these trees is due to lack of their viable

seeds. According to Nwoboshi (1982), tree species regenerate mainly by seeds. The observation is in line with that of Okali (1979), who recorded that the rainforest of Nigeria is land capable of bearing forest but in various degrees of degradation. The observation also agrees with the report of Oguntala, *et al.*, (2000) who reported that 115 Nigerian plant species are endangered. The observation differed from the report of Swaine and Hall (1983) who observed both large pioneer species and primary forest species at 800 m² forest clearance in upland evergreen forest in Ghana. Ninety-five percent of the trees were secondary species which gradually died while one to two additional climax species appeared yearly. The flight pattern of tree fruits/seeds is very poor. According to Dike and Aguguo (2010), most fruits/seeds of Nigerian rainforest tree species are rarely dispersed for over 100.00 m. These tree seedlings are therefore rare in abandoned farmlands but abundant in gaps or forest clearance where the fruits/seeds could enter as seed rain.

CONCLUSIONS AND RECOMMENDATIONS

Seedlings of megaphanerophytes and mesophanerophytes tree species such as *Khaya ivorensis* and *Milicia excelsa*, respectively were not recorded in abandoned farmlands studied at Isiala Mbanjo Local Government Area Nigeria. Presumably because of lack of enough wind speed (> 7 ms⁻¹) required to carry the fruits/seeds into the farmlands. Most of the seeds of megaphanerophytes, mesophanerophytes and nanophanerophytes that germinated after the clearing and burning were uprooted during the weeding operations. Many more seeds of tree species were not dispersed into the abandoned farmlands. The seedlings of megaphanerophytes, mesophanerophytes and nanophanerophytes were poorly represented. Grasses that came into the abandoned farmlands germinated and produced flowers, fruits and viable seeds. These seeds of grasses germinated resulting in the abundance of grasses. It is recommended that viable seeds of emergent and upper canopy tree species should be collected and distributed to farmers. These should be broadcast in abandoned farmlands. Farmers should be taught how to care for these seedlings by the Department of Forestry and Environmental Management of any university closest to the farmers. Each State Department of Forestry, during the annual tree planting week should plant a minimum of 10 hectares per year with indigenous canopy tree species and maintain the canopy trees species planted in the previous years.



Table-1. The number of plant species enumerated within three 25.0 x 25.0 m study plots at abandoned farmlands at Isiala Mbanjo Nigeria in the months of June and November 2010.

Family name	Scientific name	June 2010			November 2010		
		Number of plants	Percentage frequency	% Relative abundance	Number of plants	Percentage frequent	% Relative abundance
Anacardiaceae	<i>Anacardium occidentale</i>	19	44.44	0.54	29	33.33	0.45
	<i>Mangifera indica</i>	16	44.44	0.46	14	33.33	0.22
Annonaceae	<i>Cleistopholis patens</i>	-	-	-	20	33.33	0.31
Apocynaceae	<i>Rauvolfia vomitoria</i>	-	-	-	26	22.22	0.40
Asclepiadaceae	<i>Gongronema latifolia</i>	9	11.11	0.26	-	-	-
Asteraceae	<i>Aspilia africana</i>	40	11.11	1.15	-	-	-
Bombacaceae	<i>Ceiba pentandra</i>	1	11.11	0.03	2	11.11	0.03
Burseraceae	<i>Canarium schweinfurthii</i>	4	22.22	0.11	4	11.11	0.06
	<i>Dacryodes edulis</i>	8	33.33	0.23	13	22.22	0.20
Caesalpiniaceae	<i>Dialium guineense</i>	42	66.67	1.20	35	44.44	0.54
Combretaceae	<i>Combretum hispidum</i>	5	11.11	0.14	7	11.11	0.11
Compositae	<i>Chromolaena odorata</i>	572	66.67	16.38	479	88.89	7.41
Connoraceae	<i>Cnestis ferruginea</i>	20	44.44	0.57	10	33.33	0.16
Euphorbiaceae	<i>Alchornea cordifolia</i>	-	-	-	80	22.22	1.24
	<i>Hevea brasiliensis</i>	379	22.22	10.85	274	11.11	4.24
	<i>Manihot esculenta</i>	30	11.11	0.86	4	11.11	0.06
Gramineae	<i>Andropogon tectorum</i>	664	77.78	19.01	949	100	14.68
	<i>Bambusa vulgaris</i>	120	22.22	3.44	87	11.11	1.34
	<i>Panicum maximum</i>	10	11.11	0.29	-	-	-
Icaciniaceae	<i>Icacinia trichantha</i>	160	66.67	4.58	21	33.33	0.33
Irvingiaceae	<i>Irvingia gabonensis</i>	1	11.11	0.03	1	11.11	0.02
Lecythidaceae	<i>Napoleonaea vogelii</i>	66	66.67	1.89	72	44.44	1.11
Malvaceae	<i>Sida arguta</i>	-	-	-	17	22.22	0.26
Mimosaceae	<i>Mimosa pudica</i>	20	22.22	0.57	-	-	-
	<i>Pentaclethra macrophylla</i>	51	66.67	1.46	42	77.78	0.65
Moraceae	<i>Treculia africana</i>	12	22.22	0.34	2	11.11	0.03
Ochnaceae	<i>Lophira alata</i>				8	11.11	0.12
Palmae	<i>Elaeis guineensis</i>	270	88.89	7.73	700	100	10.33
	<i>Raphia hookeri</i>	21	44.44	0.60	12	22.22	0.19
Papilionaceae	<i>Baphia nitida</i>	4	11.11	0.11	-	-	-
	<i>Pterocarpus osun</i>	2	11.11	0.06	-	-	-
Passifloraceae	<i>Barteria nigritiana</i>	-	-	-	11	22.22	0.17
Poaceae	<i>Schizachyrium exile</i>	-	-	-	212	33.33	3.28
Polygalaceae	<i>Carpolobia lutea</i>	13	22.22	0.37	4	11.11	0.06
Rosaceae	<i>Dactyladenia barteri</i>	642	100	18.38	1639	77.78	25.35
Salaginellaceae	<i>Salaginella njam njamensis</i>	275	22.22	7.87	1588	55.56	24.56
Sapindaceae	<i>Allophylus africanus</i>	-	-	-	17	22.22	0.26
Tiliaceae	<i>Triumfetta rhomboidea</i>	-	-	-	48	22.22	0.74
Verbenaceae	<i>Stachytarpheta spp</i>	-	-	-	22	33.33	0.34
Vitaceae	<i>Cissus arguta</i>	-	-	-	8	22.22	0.12
Zingiberaceae	<i>Costus afer</i>	17	22.22	0.49	9	22.22	0.14
		3493.00		100.00	6466.00		100.00
Menhinick's Species Index		=		0.51	=		0.44



REFERENCES

- Dike M.C. 2003. Early succession on mechanically cleared moist Forestland in Southeastern Nigeria Rainforest. *Journal of Tropical Forest Resources*. 19(2): 104-116.
- Dike M.C. 2009. Relationship between fruits and seed sizes germination and early seedling growth of some edible plant species in Southeastern Nigeria rainforest. *Global Journal of Pure and Applied Sciences*. 15(2): 141-150.
- Dike M.C. and Agugum A.C. 2010. Fruits/seeds weights, flight patterns and dispersal distance of some Nigerian rainforest tree species. *ARPN Journal of Agricultural and Biological Science*. 5(3): 1-9.
- Lancaster P.C. 1961. Experiment with Natural regeneration in the Omo Forest Reserve. A report on Trial of methods of obtaining natural regeneration in lowland rainforest in Southern Nigeria (Investigation No. 208). *Nigeria Forestry Information Bulletin (New Series No. 13)*. Federal Orunter, Lagos.
- Madu I.A. 2001. Population and Environmental Problems. In: Ofomata G.E.K. and Philip Eze P.O. (Eds.). *Geographical Perspective Problems and Management in Nigeria*. pp. 80-95. Jamoe Enterprises (Nigerian). p. 327.
- Menhinick's E.F. 1964. A comparison of some species individuals Diversity indices applied to samples of field insects. *Ecology*. 45: 859-861.
- Muellar Dombois D. and Ellenberg H. 1974. Aims and methods of vegetation Ecology. John Willey and Sons, New York. p. 547.
- Nwoboshi L.C. 1982. *Tropical Silviculture. Principles and Techniques*. Ibadan University Press, Nigeria. p. 333.
- Oguntal A.B, Soladoye M.O. Ugbodu O.A. 2000. Endangered tree species of Nigerian flora. *Nigerian Journal of Forestry*. 30: 15-21.
- Okali U.U. 1979. Introduction. In: Okali; D.U.U (Ed.). *The Nigerian Rainforest Ecosystem* Pp V-viii. Federal Ministry of Science and Technology MAB, Ibadan.
- Okali D.U.U. and Ola-Adams B.A. 1987. Tree population changes in treated Rainforest at Omo Forest Reserve, South-western Nigeria. *Journal of Tropical Ecology*. 3: 291-313.
- Swaine M.D. and Hall John B. 1983. Early succession on cleared forest land in Ghana. *Journal of Ecology*. 71: 601-627.
- Swaine M.D. and Whitmore T.C. 1988. On the definition of Ecological species groups in the Tropical Rainforest. *Vegetatio*. 73: 81-80.
- White. 1983. *The Vegetation of Africa*. UNESCO, Paris.