SOIL STATUS AND SEASONAL VARIATIONS OF SOIL SEED BANK IN IBODI MONKEY FOREST, IBODI, ATAKUMOSA WEST LOCAL GOVERNMENT AREA, OSUN STATE, NIGERIA

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B.Sc.(Hons.) (Ife)

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CERTIFICATION

This is to certify that the research study was carried out by ADEMAYOWA ADENIKE OMODARA as part of the requirement for the award of Master of Science degree in Botany of the Obafemi Awolowo University, Ile-Ife.

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DEDICATION

This piece is dedicated to the Almighty God who by his provision, protection and sustenance has enabled me to successfully carry out this research work.

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LIST OF ABBREVIATIONS

°C	Degree centigrade
cm	centimeter
et al.et alia	
FAO	Food and Agriculture Organization
GBH	Girth at Breast Height
Ha^{-1}	per hectare
Km	Kilometer
%	Percentage
π Pi	
m^2	Meter square
mm	Millimeter
>	Greater than
<	Less than

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ABSTRACT

Soil status and seasonal variation of soil seed bank in Ibodi Monkey Forest, Ibodi, Osun State, Nigeria, were studied to determine the species composition of the extant vegetation, the soil seed bank of the various physiognomies; evaluate the similarity between the composition of the germinable soil seed bank and the extant vegetation in the various physiognomies; as well as determine the seasonal variation of the soil seed bank and the status of the soil.This was with a view to determining the status of the forest with respect to the standing vegetation, soil seed bank, soil properties and the potential significance of the soil seed bank for vegetation restoration

Three distinct sites (Natural regrowth forest, Cocoa plantation and Tree Fallow) designated as A, B and C were selected from the study area. Seven sample plots, each of 25 m × 25 m were randomly selected from the three distinct sites. Species enumeration, identification and distribution into families of the standing vegetation were carried out. In each of the seven plots, soil samples were collected in five replicates at two different depths (0-15 cm and 15- 30 cm) in dry season and rainy season. The collected soil samples were subjected to seedling emergence for six months to determine the density and species composition of the seed banks of the three study sites. Soil samples were analyzed for the physico-chemical properties using the standard methods. The data collected were analyzed using appropriate descriptive and inferential statistics.

The results of seedling emergence showed that soil samples collected at 0-15 cm depth had a higher seed density than samples collected at 15-30 cm depth in both seasons. Herbaceous species dominated the seed bank of the three sites when compared to other life forms. Few

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woody species emerged from the soil seed bank in the samples collected from the three study sites during the two seasons. Site B (Cocoa plantation) had the highest species composition, while there was low similarity (8.77%-29.4%) in species composition between the standing vegetation and the soil seed bank. Shannon-Wiener index (H′) revealed that the Regrowth forest had the highest community diversity (3.40) while the Cocoa plantation had the lowest diversity (2.50). Plant species richness ranges from 10.82 to 15.81 with the Regrowth forest being the most species-rich site, followed by the Tree Fallow site while the Cocoa plantation had the lowest.

The study concluded that the soil seed banks of the vegetation of Ibodi Monkey forest were dominated with herbaceous species and there was low similarity between soil seed bank and above-ground vegetation of the study area which indicates that the potential for vegetation restoration of Ibodi Monkey Forest from the soil seed bank may not be achievable. High level of disturbance increases seed bank density while low level of disturbance reduces the seed bank.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Forest

Forest is defined as vegetation dominated by woody species in an open or close canopy from which grasses are virtually absent (Richards, 1957). The word forest comes from a Latin word *foris* which means outdoor or away from civilization. Today, there are many definitions of the term "forest" based on emphases or concerns of different people. The Food and Agriculture Organization (FAO, 1997) has defined forest as land with tree crown cover (or equivalent stocking level) of more than 10% and area of more than 0.5 hectare. The trees should be able to reach a minimum height of 5 m at maturity *in situ*. A forest, also referred to as a wood or the woods, is an area with a high density of trees. As with cities, depending on various cultural definitions, what is considered a forest may vary significantly in size and have different classifications according to how and of what the forest is composed (Wikipedia, 2013). Forests occupy approximately one-third of the earth's land area, account for over two-third of the leaf area of the land plants, and contain about 70% of carbon present in the living things (McGinley, 2007). The total forest area in 2005 was estimated to be around 30% of the planet's land area, just under 40 million km^2 (Green Facts, 2007). A typical forest is composed of the overstorey (canopy or upper tree layer) and the understorey. The understorey is further subdivided into the shrub layer, herb layer, and also the moss layer and soil microbes. In some complex forests, there is also a well-defined lower tree layer.

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Forests can be subdivided into plantations and natural forests (FAO, 1997). Natural forests are forests composed mainly of indigenous trees not deliberately planted; semi-natural forests are the results of assisted natural regeneration, planting or seeding. Forest plantations are defined as forests of introduced or native species, established through planting or seeding or both, in the process of afforestation or reforestation; with few species, even spacing and/or even-aged stand. Forests can also be classified into different types based on their characteristics (FAO, 2005). Primary forests also known as old-growth forests are forests where native tree species grow, where ecological processes are not significantly disturbed, and where there are no clearly visible indications of human activities. It is a forest that has attained great age without significant disturbance and thereby exhibits unique ecological features and in some cases may be classified as a climax community. Green Facts (2007) stated that an estimated 13 million km^2 of forest, a little more than a third of the world's forest area, are considered primary forests. Though primary forests still represent a little more than a third of the world's forest area (36.4%), in absolute terms, the area of primary forest has been shrinking by about 60 000 km^2 per year over the last 15 years (Green Facts, 2007). Primary forest makes up more than a third of total forest area, but these primary forests are unevenly distributed. Modified natural forests cover slightly more than half of total forest area. About 7% of forests are considered semi-natural forests; and forest plantations account for about 4% of forests. In the case of other wooded land, over two thirds are considered modified natural wooded land. The general trend is that areas of primary forest and modified natural forest are decreasing, while the areas of semi-natural forest and forest plantation are increasing (Green Facts, 2007). Estimates indicate that about 60,000 km^2 per year of primary forest have been lost or modified by logging or other human interventions since 1990 and there is no indication that the loss of primary forest is slowing down (Green

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Facts, 2007). A secondary forest (or second-growth forest) is a forest or woodland area which has re-grown after a major disturbance such as fire, insect infestation, timber harvest or wind throw, until a long enough period has passed so that the effects of the disturbance are no longer evident. It contains significant elements of species which were originally from other regions or habitats. It is distinguished from an old-growth forest (primary or primeval forest), which has not undergone such disruptions, as well as third-growth forests that result from severe disruptions in second growth forests (Wikipedia, 2013).

Forest is a complex ecosystem consisting mainly of trees that buffer the earth and support a myriad of life forms. The trees help create a special environment which, in turn, affects the kinds of animals and plants that can exist in the forest. Trees are an important component of the environment. They clean the air, cool it on hot days, conserve heat at night, and act as excellent sound absorbers. It is essential to preserve forests in order to maintain the richness of life on earth because forests are central to all human life since they provide a diverse range of resources (Nwosu, 2014). They store carbon, aid in regulating the planetary climate, purify water and mitigate natural hazards such as floods. Forests also contain roughly 90 percent of the world's terrestrial biodiversity and they provide a wide variety of ecosystem services, contributing to the livelihoods of more than 1 billion people (World Bank, 2008). It provides a protective canopy that lessens the impact of raindrops on the soil, thereby reducing soil erosion. The layer of leaves that fall around the tree prevents runoff and allows the water to percolate into the soil (Singh, 2011). Roots help to hold the soil in place. Dead plants decompose to form humus, organic matter that holds the water and provides nutrients to the soil. Trees provide

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