CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of study

Water is the most abundant compound on earth's surface, constituting about 70% of the planet's surface. In nature it exists in liquid, solid, and gaseous states. At room temperature, it is a nearly colourless (with a hint of blue), tasteless and odourless liquid. Many substances dissolve in water and it is commonly referred to as the Universal solvent. Water is the common substance found naturally in all three common states of matter and it is essential for life on earth. (UNDP, 2009). Water usually makes up 55% to 78% of the human body (Jeffrey, 2009).

The seventh of the eight Millennium Development goals of the United Nations Development Programme which is captioned, "Ensure environmental sustainability", has the following subthemes:- Integrate the principles of sustainable development into country policies and programmes; reverse loss of environmental resources; Reduce biodiversity loss, achieving by 2010, a significant reduction in the rate of loss. – Halve by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. – By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers (UNDP, 2009).

In the light of the foregoing therefore, "A watershed is an area of land that drains rain water or snow into one location such as a stream, lake or wetland." These water bodies supply our drinking water, water for agriculture and manufacturing, offer opportunities for recreation and provide habitat to numerous plants and animals. Unfortunately various forms of pollution, including runoff and erosion, can interfere with the health of the watershed. Therefore, it is important to protect the quality of our watershed. (The Nature Conservancy, 2016).

1.2 Statement of the Problem.

Many people look upon the watersheds as natural dumping site for all manner of wastes. Others see them as the natural home for agricultural activities, and other commercial ventures. The integrity and sanctity of the watershed therefore, is not respected. Watershed protection which is a means of protecting a lake, river, or stream by managing the entire watershed that drains into it is an indispensable prerequisite for the sustainability of all human communities. Clean, healthy watersheds depend on an informed public to make the right decisions when it comes to the environment and actions carried on by its inhabitants. The earth is covered in 70% water and unfortunately 40-50% of our nations' waters are impaired or threatened. "Impaired" means that the water body does not support one or more of its intended uses. This could mean that the water is not suitable to drink, swim in or to consume the fish that was caught therein. The leading causes of pollution in our waterways are sediments, bacteria (such as E.coli) and excess nutrients. Sediments can suffocate fish by clogging their gills and the presence of bacteria alone can indicate that other viruses and germs can be found in the water as well. Erosion, runoff of animal waste and overflowing of combined sewers are just a few ways these pollutants reach our waters. (The Nature conservancy, 2016). In parts of southeast Nigeria, Anambra State for instance (emphasis mine), population explosion, rise in and unplanned industrial, infrastructural and agricultural development together with other unacceptable environmental practices have exacerbated watershed degradation. This has continuously impacted negatively on watershed sustainability (particularly water safety and biodiversity). As natural vegetation is rapidly being replaced with impervious surfaces (roof tops, concrete surfaces, paved roads etc), increased runoff and excessive flooding which results in siltation, leaching and erosion (recurring decimal in the South East) occur. The associated pollutants constitute health hazards to man and other living organisms which depend on the water and its resources for overall sustenance, growth and advancement.

Anambra State has a very large population of traders, artisans, land speculators, unemployed folks and even government workers who have little or no regard for vegetation. This has led to dizzying (unbelievable) rates and acts of deforestation with its associated degradation.

1.3 Significance of the Problem.

The Amawbia watershed (under study) lies on a relatively higher incline than other neighbouring/surrounding watersheds in Awka, Nibo, Nise, Nawfia, Enugu Agidi, Enugwu-Ukwu et cetera. This was probably why the Anambra State Government selected this particular watershed for its Agricultural Development Project (ADP) field site. This watershed is surrounded by Hotels, Diesel, fuel, Gas and Kerosene dispensing mega stations, a medium capacity prison, Government offices, banks, residential buildings, paved and unpaved roads, industries, factories and other commercial enterprises. On the watershed proper, massive deforestation, continual cropping and harvesting on the same undulating land, fuel wood gathering, overharvesting of more useful species, bush-burning, yearly application of inorganic fertilizer, slash and burn agriculture and continuous flow of point and non point sources of sewage/effluents from roads, cesspits, floodwaters and incinerators, gaseous effluents et cetera introduce hazardous, disease causing materials into the water and atmosphere. These are also filtered by surrounding vegetation, thus rendering the fish, fruit, vegetables, leaves, tubers, and other medicinal products harvested from the site not very palatable nor safe for consumption by man or his livestock. These deleterious materials also naturally, are distributed through the water channels to the numerous other watersheds downstream in neighbouring communities thereby ensuring a vicious cycle of toxic substances distribution throughout the state in the food chain and food webs. Ingwu (2006) observes that the ever-increasing speed of infrastructural development has resulted in many environmental problems. These include deforestation, siltation of streams, eutrophication (contribution mine), water pollution and invariably water scarcity. Thus the decline of forests and freshwater and concomitant agricultural activities lead to land use and land cover changes, hence the degradation of the watershed system. Also, infrastructural developments are more often than not associated with the excavation of sand and gravel. These are largely confined to the beds of streams and rivers and their banks and are largely indispensable in many construction projects. Consequently, settlement encroachments close to the streams and deforestation have contributed to seasonal shortages of water. The swamp, fresh watershed and spring areas have been used for building residential houses, private schools, animal pens, raw milks et cetera. Sometimes, dam are built without involving the rural community in the decision (Ingwu, (2006).

1.4 Purpose of the study.

This work will go a long way in helping to increase enlightenment to people especially in developing nations, of the concept of watersheds, their usefulness in terms of organic (e.g. plants) and inorganic resources (e.g. water, sand, etc); their relationship to forests and tourism development; why they are being degraded, what is degrading them and how to arrest/avert further degradation, and finally, what the future portends for mankind if and when, especially tropical watersheds, are wisely midwifed and judiciously developed.

The white races of the world, having experienced more years of civilization; fully realize the wisdom inherent in wise stewardship of the earth, and its finite resources. Unfortunately, they inhabit mostly temperate regions of the world. This work serves as a wake up call most especially, to all the progressive forces of the World (environmentalists, intellectuals, leaders of thought, politicians, women and youth representatives), to pool their resources together and consciously set in motion, the long awaited vehicle of change towards massive, all encompassing campaign of environmental protection and habitat conservation. Watersheds are more than just drainage areas in and around our communities. They are necessary to support habitats for plants and animals, and they provide drinking water for people and wildlife. They also provide the opportunities for recreation and enjoyment of nature. Protection of the natural resources in our watershed is essential to maintain the health and wellbeing of all living things both now and in the future (mywatershedwatch.org, 2016).

1.5 Scope of the study.

This research work will be limited to the watershed traversing the Ministry of Agriculture, Amawbia (Old Government lodge), Awka South Local Government Area, Anambra State, Nigeria, Floristic studies will be focused on trees, climbers, shrubs, grasses and forbs in the watersheds. Economic importance and Diversity indices of encountered flora will be ascertained. Effects of seasons (rainy and dry), relief (flat and slopy), land use, (managed and not managed), on importance values of encountered flora will be studied. Percentage concentrations of Nitrogen, carbon, organic matter and pH for soil at (0-20 and 20-40) cm depths for all the independent variables will also be scrutinized.

1.6 Aim of the Study

The aim of this research work was to characterize and identify those factors that were responsible for the degradation of the watershed.

1.7 Objectives of the study

The objectives of the study were to:

i. Identify the species composition and diversity;
ii. Determine the economic relevance of the species;
iii. Determine the Importance values of the species;
iv. Determine the effects of seasons, land use and relief on Importance values of the species.
v. Determine the effects of seasons, land use and relief on selected soil properties;

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Definition

Watershed has traditionally designated the dividing line or drainage divide, between two drainage basins: that is, the ridge of high land or boundary separating regions that are drained by different river systems or bodies of water (lake, sea, etc). In some instances, watershed has come to be used interchangeably with the definition for drainage basin. In other words, watershed often refers to the entire region or area where all the waters drains into the same body of water, rather than just the elevation separating the waters flowing into different basins. Both are accepted definitions. (New World Encyclopedia, 2009). A drainage basin is a region of land where water from rain or melt drains downhill into a body of water such as a river, lake, dam, estuary, wetland, sea or ocean. The drainage basin includes both the streams and rivers that convey the water as well as the land surfaces from which water drains into those channels. The drainage basin acts like a funnel-collecting all the water within the area covered by the basin and channeling it into a waterway. Smaller watersheds are part of progressively larger watersheds. Each drainage basin is separated topographically from adjacent basins by a ridge, hill, or mountain, which is known as a water divide or a watershed. Water on one or the other side of that divide either flows toward or away from a particular basin. (New World Encyclopedia, 2009). Homes, farms, ranches, forests, small towns, big cities, and more can make up watersheds. Some cross county, state and international boundaries. Watersheds come in all shapes and sizes. Some are millions of square miles, others are just a few acres. Just as cracks drains into rivers, watersheds are nearly always part of a larger watershed. (Conservation technology Information Center, 2009).

2.2 Important Watershed Characteristics

2.2.1 Drainage Area: The drainage area (A) is probably the single most important watershed characteristics for hydrologic design. It reflects the volume of water that can be generated from rainfall. It is common in hydrologic design to assume a constant depth of rainfall occurring uniformly over the watershed. Under this assumption, the volume of water available for runoff would be the product of rainfall depth and the drainage area. (United States Geological Survey, 2000).

2.2.2 Watershed Length: This is the second watershed characteristic of interest. While the length increases as the drainage increases, the length of a watershed is important in hydrologic computations. Watershed length is usually defined as the distance measured along the main channel from the watershed outlet to the basin divide. Thus the length is measured along the principal flow path. While the drainage area and length are both measures of watershed size, they may reflect different aspects of size. The drainage area is used to indicate the potential for rainfall to provide a volume of water. The length is usually used in computing a time parameter which is a measure of the travel time of water through a watershed. (United States Geological Survey, 2000).

2.2.3 Watershed Slope: Flood magnitudes reflect the momentum of the runoff. Slope is an important factor in the momentum. Both watershed and channel slope may be of interest. Watershed slope reflects the rate of change of elevation with respect to distance along the principal flow path. Typically, the principal flow path is delineated, and the watershed slope(s) is computed as the difference in elevation (ΔE) between the end points of the principal flow path divided by the hydrologic length of the flow path (L): S = ΔE /L. (United States Geological Survey, 2000).

2.2.4. **Watershed shape:** Watersheds have an infinite variety of shapes, and the shape supposedly reflects the way that runoff will “bunch up at the outlet. A circular watershed would result in runoff from various parts of the watershed reaching the outlet at the same time. An elliptical watershed having the outlet at one end of the major axis and having the same area as the circular watershed would cause the runoff to be spread out over time, thus producing a smaller flood peak than that of the circular watershed (United States Geological Survey, 2000).

2.3 Importance of Watersheds

Watersheds supply our drinking water, water for agriculture and manufacturing, offer opportunities for recreation and provide habitat to numerous plants and animals. Unfortunately various forms of pollution, including runoff and erosion, can interfere with the health of the watershed. (The Nature Conservancy, 2016). Therefore, it is important to protect the quality of our watershed. The Amawbia watershed is the source of the water for irrigation of the market garden domiciled within the watershed. Pollutants from neighbouring commercial enterprises – faecal contamination, char from bushfires, effluents from car washing concerns/block industries, sewage from hotels and residential buildings, and of course artificial fertilizers used in the market garden, and the runoffs from the ever-increasing floods-all impact negatively on the watershed in line with what obtains in the Amawbia watershed, according to the New World Encyclopedia (2009), “People live in particular watersheds, and each of these watersheds are unique, based on the specific size, terrain, soil, land use, flora and fauna, climate and so forth. Human activities impact watershed, whether these activities be agricultural, residential, or commercial. For example, pesticides from agricultural activities in the highlands may flow down to smaller rivers and then to major rivers or lakes. Today, there is a tendency to manage watershed areas in order to provide for human needs and for a healthy environment. For the fact that watersheds are interconnected, negative influence in one rapidly spread to others, therefore all efforts must be made to safeguard the overall health (wellbeing) of our watersheds.

Watersheds, as drainage basins have been important historically in determining (delineating) boundaries, particularly in regions where trade by water has been important. (New World Encyclopedia, 2009).

In hydrology, the drainage basin is a logical unit of focus for studying the movement of water within the hydrological cycle, because the majority of water that discharges from the basin outlet originated as precipitation falling on the basin. Measurement of the discharge of water from a basin may be made by a stream gauge located at the basin outlet. (New World Encyclopedia, 2009).

In ecology, watersheds (as drainage basins) are important units. As water flows over the ground and along rivers it can pick up nutrients, sediments, and pollutants. Like the water, they get transported towards the outlet of the basin, and can affect the ecological processes along the way as well as in the receiving water body. Modern usage of artificial fertilizers, containing nitrogen, phosphorus and potassium, has affected the mouths of the watersheds. The minerals will be carried by the watershed to the mouth and accumulate there, disturbing the natural mineral balance. (New World Encyclopedia, 2009). For the fact that drainage basins are coherent entities in a hydrological sense, it has become common to manage water resources on the basis of individual basins. (New World Encyclopedia, 2009).

Watersheds sustain life, in more ways than one. According to the Environmental protection Agency, more than $450 billion in foods, fiber, manufactured goods and tourism depend on clean, healthy watersheds. (The Nature Conservancy, 2016). To a very large extent, this is also true of the Amawbia watershed. Annual vegetables are harvested for sale in the markets yearly, medicinal plants are harvested together with livestock fodder species. The major problem here is Deforestation and lack of regular aforestation. Proper disposal of industrial, commercial and domestic sources of pollution will also go a long way.

2.4 **Degradation of Watersheds:** The watershed in Amawbia is an urban watershed. In urban areas, large expanses of roads, parking lots, and roots of buildings, replace the original forest and organic soils. These impervious surfaces do not allow water to soak into the ground. Consequently, infiltration in urban areas accounts for only 5 to 35% of rainfall. Evapotranspiration is also substantially reduced, to 20-35%, due to a lack of vegetation. Therefore, 30% to 70% of rainfall in urbanized watersheds runs off almost immediately into storm drains and subsequently into natural water bodies. (Lotspeich, 2007).

2.4.1 Increased runoff creates a number of problems:

When water flows over urban impervious surfaces, it picks up pollutants such as oil, gasoline, cigarette butts, fertilizers, pesticides, and industrial chemicals. As there is little vegetation, these substances are usually not filtered before being washed into water bodies where they can seriously harm aquatic organism. The volume of water flowing off urban areas is much greater compared to natural areas. The great energy in these torrents of water can cause erosion, which destroys stream, channels and banks, wildlife habitats and adjacent property (Lotspeich, 2007). This particular point is not restricted to the watershed at Amawbia, it is currently the bane of Anambra State and all of its watersheds both rural and urban. (Lotspeich, 2007) continues, Erosion caused by the large water volumes also deposits sediments in low-energy downstream areas such as at the mouth of rivers. This can smother bottom-dwelling plants and animals as well as destroy fish spawning and bird feeding habitats. Watershed flows in urbanized watersheds are significantly altered compared to natural flows. For example very little water is stored in watersheds with large areas of impervious surfaces, this results in large peaks in stream flows immediately after a rainstorm followed by very low flows soon after. These extreme conditions are inhospitable for most fish and aquatic invertebrates. Dams, dykes, solid wastes and water retaining walls, also alter flows (Lotspeich, 2007).

2.5 **Factors that drive Watershed degradation/consequences:**

According to Enwelu and Igbokwe (2013), “The percentage decrease in forest trees has serious implications on the status of watersheds. This is because forest trees provide habitats for other living organisms in the watersheds. This fact was buttressed by Elevitch and Wilkenson (2009) when they stated that forest trees protect land from erosion, provide habitat for wildlife, support diversity of soil microlife, and reduce carbon dioxide pollution and global warming. Forest trees also help in maintenance of water quality and quantity. Through focus Group discussion (FGD), it was confirmed that the use of sophisticated instruments in clearing of forest trees, hunting of animals and fishing, compounded the decreasing status of watersheds. These study findings are synonymous with earlier reports by Akolade and Issa (2009) as well as Ukpong (1994), which state that destructive logging of forests, flooding and wind erosion menace, overgrazing, overcropping of arable lands, land degradation with pesticides and fertilizers, improper resource management, forest clearance for agricultural development, urban growth, industrial expansion and general pressure from increasing population have reduced the extent, diversity and ability of Nigerian forests to protect the watersheds". These activities can also lead to reduction in volume of water. The gamut of problems just described above also affects the Amawbia watershed, with mass hunting of species by poachers and marauding bands of men and dogs, and dumping of solid wastes also implicated."

Most watersheds in southeastern Nigeria were originally forested watersheds. Overpopulation, overcultivation, overgrazing, overharvesting of useful species, shifting cultivation, deforestation, and unplanned infrastructural development, all have collectively and independently contributed in reducing most of these forested watersheds into degraded, depauperized watersheds. The implication also is that the rich natural resources that are associated with forests are lost. According to Otegbeye and Onyeanusi (2006), "Deforestation is not only the removal of forest cover naturally or by human activities by felling of trees, but also removal of shrubs, lanes, grasses, and other plants from the forest". The United Nations System in Nigeria (UNSN) in their common country assessment of 2001, reports that the total area occupied by reserved forests in Nigeria was approximately ten per cent of the total land mass in 1977. This is considerably lower than forest estate covers of at least 25 per cent that obtains in many other countries in line with international standards. The proportion is reducing by the day as less than one per cent of forest areas cleared for domestic and commercial purposes get reforested. (Otegbeye and Onyeanusi, 2006). As deforestation takes its toll on our watersheds, they become extremely depleted in terms of biodiversity. This is the bane of most watersheds in southeastern Nigeria. The watershed under study (the Amawbia watershed) is a case in point. It has suffered from deforestation, soil degradation and general bioresource depletion. In the 1980s, about 400 hectares of forest and woodland out of every 1000 hectares suffered from deforestation while only 26 hectares were reforested on an annual basis (these days little or no reforestation is done (emphasis mine). According to the FAO, (1985). the remaining forest area in Nigeria will likely disappear by 2020 if the current rate of forest depletion continues unabated. The value of lost forest cover has been estimated at USS $750 million annually at 1989 prices, (Otegbeye and Onyeanusi, 2006). As vegetation disappears, the water and other resources of the watershed gradually vanish into thin air and the watershed becomes history. Annual rate of deforestation of woodlands (watersheds) averaged 3.5 percent in the 1980 to 1990 period. The southern rainforest which covers only 2 percent of the total land area in Nigeria, is being depleted at an annual rate of 3.5 percent. Large-scale deforestation in the south, particularly in the lowland forest areas, has resulted in a number of other problems including flooding, sheet, and gully erosion, as well as siltation of rivers (and streams, emphasis mine) that sometimes constitute the only source of water for domestic use, (Otegbeye and Onyeanusi, 2006). Siltation has been responsible for the disappearance of many watersheds, particularly in Anambra state, since the country's independence in 1960, and the local population have often attributed it to-anger of the gods, witchcraft activities and enmity of neighbouring clans. Other practices that contribute to vegetation destruction (watershed degradation) in Nigeria (particularly in Anambra State-emphasis mine) include intensive grazing, persistent bush burning, and reduction in, or absence of fallow periods, as well as extension of agricultural activities into less favoured, often environmentally fragile areas. The end result of deforestation, intensive grazing, bush burning, over ploughing and over cultivation is severe land degradation. In general, vegetation removal accelerates rainfall runoff and increases soil erosion, diminishing land productivity and aggravates local flooding. Severe land degradation has also resulted in desertification (UNSN,2001). Deforestation brings about serious ecological and socioeconomic problems some of which include wood shortage, food shortage, flooding, erosion, siltation of rivers, streams, destruction of wildlife habitats and increased poverty, especially in rural communities. All these bring to the fore the need for sustainable forest management which is the maintenance of environmental integrity to meet the needs of the present, and leaving enough in quantity and quality to satisfy the needs of the future generations (Otegbeye and Onyeanusi, 2006). The two primary natural production resources that determine agricultural potential are soil and water. Soil is acknowledged as the base for support and nutrition while its water content is basically responsible for facilitating nutrient utilization (Momodu, 2000). However, due to human activities soil and water are rarely in adequate supply to maximize agricultural production. This is one of the major problems encountered in the Amawbia watershed. Where soil and water are available, their quality renders them not very useful for productive activities. Land (watershed) degradation involves the physical removal of soil by water and wind, particularly through the process of soil erosion which results in reduction of both land surface and the quality of the soil with dire consequences on plant growth and the entire ecosystem. The various erosive powers of these agents results in sheet, rill, splash and gully erosion. The Amawbia watershed is a source of subsistence to low income dwellers associated with it. It provides food, shelter, fodder, industrial raw materials, herbal medicine, fuel wood et cetera. Over 70 percent of Nigerians live in the rural areas and almost all the rural families use fuelwood energy for their domestic needs. Fuelwood gathering is non-selective and almost all woody species can be exploited for the supply of fuel energy (Otegbeye and Otegbeye, 2002). Forest (watershed) resources generate wealth and support in diverse ways to the communities that make use of them. The livelihood is of the rural people revolve round the forest (watershed). The rural people process and trade in watershed products to earn extra cash income. For their household needs and, in some cases, they save to meet future needs. Apart from forests providing foods, herbs for medicine, fodder and fuelwood, a good number of Non-wood forest. Products (NWFP), are also gathered, processed, and sold to generate extra income. In addition, many rural and urban dwellers earn income from these activities (Otegbeye and Onyeanusi, 2006).

2.5.1 Degraded Environments: The United Nations International Strategy For Disaster Reduction (2004), defines environmental degradation as, “The reduction of the capacity of the environment to meet social and ecological objectives and needs”. It is estimated that up to 40% of the World’s agricultural land is seriously degraded (Sample, 2007). **Causes:** Land degradation is a global problem, largely related to agricultural use. **The major causes include:**

- Land clearance, such as clear-cutting and deforestation.
- Agricultural depletion of soil nutrients through poor farming practices,- including overgrazing livestock.
- Inappropriate irrigation and overgrafting (ILRI, 1989).
- Urban sprawl and commercial development.
- Land pollution including industrial waste.
- Vehicle off-loading, Quarrying of stone, sand, ore and minerals.

- Effects. The main outcome of land degradation is a substaintial reduction in the productivity of the land (UNEP, 2008)

2.5.2 The major stressed on vulnerable land include:

- Accelerated soil erosion by wind and water.
- Soil acidification and the formation of acid sulphate soil resulting in barren soil.
- Soil alkalization owing to irrigation will water containing sodium bicarbonate leading to poor soil structure and reduced crop yields.
- Soil waterlogging in irrigated land which calls for some of subsurface land drainage to remediate the negative effects.
- Soil salination in irrigated land requiring soil salinity control to reclaim the land.
- Destruction of soil structure including loss of organic matter (Wikipedia, 2010).

2.6 Typical floral Resources found in Anambra watersheds include:

Trees - *Milicia excelsa, Ceiba pentandra, Mangifera indica, Senna siamea, Pentaclethra macrophyla, Tetrapleura tetraptera, Anthocleista djalonensis, Elaeis guineenses, Dialum guineense, Zanthaxylum zanthaxyloides, Musanga cecropoides, Alstonia boonei, Dacryodes edulis.*

Shrubs – *Alchornea cordifolia, Sarcocephalum laxiflora, Annona senegalensis, Uvaria chamae, Vernonia amygdalina, Chromolaena odorata,Manihot esculenta, Riccinus Communis,* (Nigeria Natural medicine Development, Agency (2008).

Climbers – *Telfeiria occidentalis, Luffa culindrica, Peuraria phaseoloides, Cissus araliodes, Mucuna prariens, Desmodium scorpiurus.*

Grasses - *Imperata cylindrica, Panicum maximum, Paspalum scrobiculatum, Pennisetum polystachion, Hackelochloa granularis, Cymbopogon giganteus, Andropogon gayanus* and *Andropogon tectorum (Akobundu and Agyakwa, 1998).*

Forbs – *Aspilia africana, Synedrela nodiflora, Emilia coccinea, Ageratum conyzoides, Sida acuta, Spermacoce ocymoides, Mitracarpus villosus, Amarantus viridis, Gomphrena celosiodes, Aspilia bussei, Tridax procumbens, Cleome rutidosperma, Euphorbia hirta (Akobundu and Agygkwa, 1998).*

2.7 Geology: Watersheds have soils as their foundation. These soils of Anambra State are all of sedimentary origin with sandstone and shales as the dominant parent materials. These can be broadly grouped as:

1. Young brown alluvial soils derived from recent sediments. These are typical of the areas bordering the flood plains of the Niger, Anambra and Mama Rivers together with their non-seasonal tributaries. This soil group is generally fertile and extensively supports agricultural activities (Nwozor, 2010). The watersheds in this part of the state have over the years been inundated by floods because of degrading activities of man on the banks of the rivers. The Federal Government recently dredged the surrounding rivers and this has also impacted negatively on the watershed biotic and abiotic ecosystem.
2. Clay and clay-loam hydromorphic soils developed from weathered shales of various geologic formations. A good percentage of the soil horizon have hardpans and generally concretions as can be observed in parts of Ayamelum, Awka North, Awka South, Oyi and Orumba axis. They are characteristically of low permeability and constitute the swamps and wetlands of the state. They support the cultivation of various arable crops especially rice, yams, cassava, maize and sugarcane (Nwozor, 2010). The watersheds in this part of the state is very poor in biodiversity because

wetlands have a limited category of fauna and flora that can adapt here. Incidentally, this is where Amawbia town, the home of the watershed under study is situated.

3. Massive fine to coarse grained soils derived from sandstones. These are porous, permeable and unconsolidated with reddish and brown colours chemically depicting lateralization. Their high permeability renders them highly leached and poor in agrarian nutrients. They are the problem soils in the state always identified with deep and wide gully erosion sites with rugged topography. Pebbly and gravely soils buried in admixture of sand and shale matrix of various geologic formations. These are characterized by considerable variability in fertility, low stability and lateritization. Their unconsolidated nature makes them highly susceptible to erosion (Nwozor, 2010). Most watersheds found in this part of the state have being extinguished through siltation caused by flooding and erosion. These watersheds have the poorest soil fertility, therefore biodiversity is poorest here.

2.8 Diversity Index: A diversity index is a quantitative measure that reflects how many different types (such as species) there are in a dataset and simultaneously takes into account how evenly the basic entities (such as individuals) are distributed among those types. (Wikipedia, 2014). The value of a diversity index increases both when the number of types increases, the value of a diversity index is maximized when all types are equally abundant. When diversity indices are used in ecology, the types of interest are usually species, but they can also be other categories such as genera, families, functional types or haplotypes. The entities of interest are individual plants or animals, and the measure of abundance can be, for example, number of individuals, biomass or coverage. In demography, the entities of interests can be people, and the types of interest, various demographic groups. In information science, the entities can be characters and the types the different letters of the alphabet. The most commonly used diversity indices are simple transformations of the effective number of types (also known as "true diversity"), but each diversity index can also be interpreted in its own right as a measure corresponding to some real phenomenon (but a different one for each diversity index).

2.8.1 Richness: Richness simply quantifies how many different types the dataset of interest contains, for example, species richness (usually notated S) of a dataset is the number of different species in the corresponding species list. Richness does not take the abundances of the types into account, thus it is not the same thing as diversity, which does take abundances into account. However, if true diversity is calculated with 9=O, the effective number of types (D) equals the actual number of types (R).

2.8.2 Shannon Index: The Shannon index has been a popular diversity index in the ecological literature, where it is also known as Shannon's diversity, the Shannon-Wiener index, the Shannon-Weaver index and the Shannon entropy.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Description of the Study Area:

3.1.1 Location and Climate: The study was carried out along a watershed (figs1-3) which traverses the Anambra State Agricultural Development Project Field location, Amawbia-Awka South Local Government Area, at four different sites, as follows: Site A (Forest site); Site B (Short term fallow site); Site C (Long term fallow site); Site D (Current usage farming site (slope) and Site E (current usage farming site (flat). This watershed has had a long history of human interference. Originally, it was complete forest. When Anambra State was created in 1981, it was made the substantive Agricultural Development field site of the state ministry of Agriculture (ADP, Awka). Presently, most parts of the watershed have been converted to permanent Agricultural land (market gardens) and the water is being utilized intensively for irrigation and other domestic purposes. Some areas of the watershed are flat while others are slopy, thereby giving the entire land an undulating appearance. Amawbia (fig. 2) is 325 m above sea level and lies between latitude $06^0$11.434'N - $06^0$11.643N and longitude $07^0$03.649'E-$07^0$03.691'E. it falls within the humid tropical climatic belt of Nigeria. There are two seasons which are well marked in this region where the maximum average rainfall is experienced during July and August. The mean annual rainfall is in the range of 1500-2500mm (Idodo-Umeh, 2011). Amawbia has a mean annual maximum temperature of 32.9^0C; mean annual minimum temperature of 23.4^0C, while the soil monthly mean temperature is 30^0C (Ministry of Agriculture, Awka, (2009)).

3.1.2 Geology: According to the Ministry of Environment and solid minerals Awka (2004), Amawbia and most parts of Anambra State fall squarely into the Nanka geologic formation which underlies the Ogwashi-Asaba formation, but overlies the Imo formation. Nwajide (1979), was of the opinion that Nanka sand is one of the youngest lithostratigraphic units of Anambra basin. In the outcrop of sand unit of Nanka formation, the first 0.75m represented reddish laterized sand, the next 2.5m was reddish brown sandy clay, while 2.13m was reddish brown sand (coarse grained). Reyment (1965), and Kogbe (1976) had earlier recognized the Nanka formation as a distinct formation.

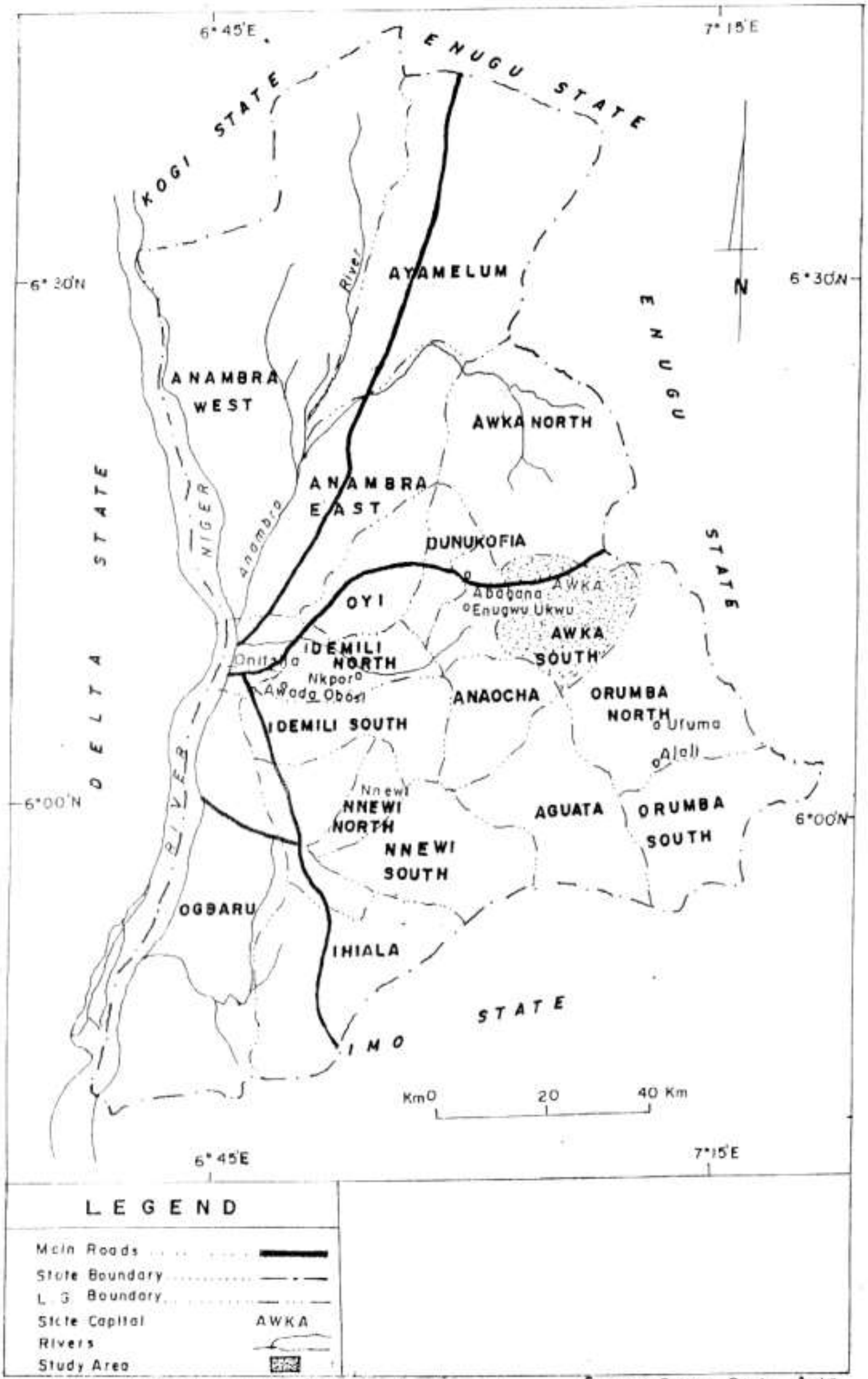

Fig. I: Map of Anambra State Showing Awka South. Source: Survey Dept., Awka

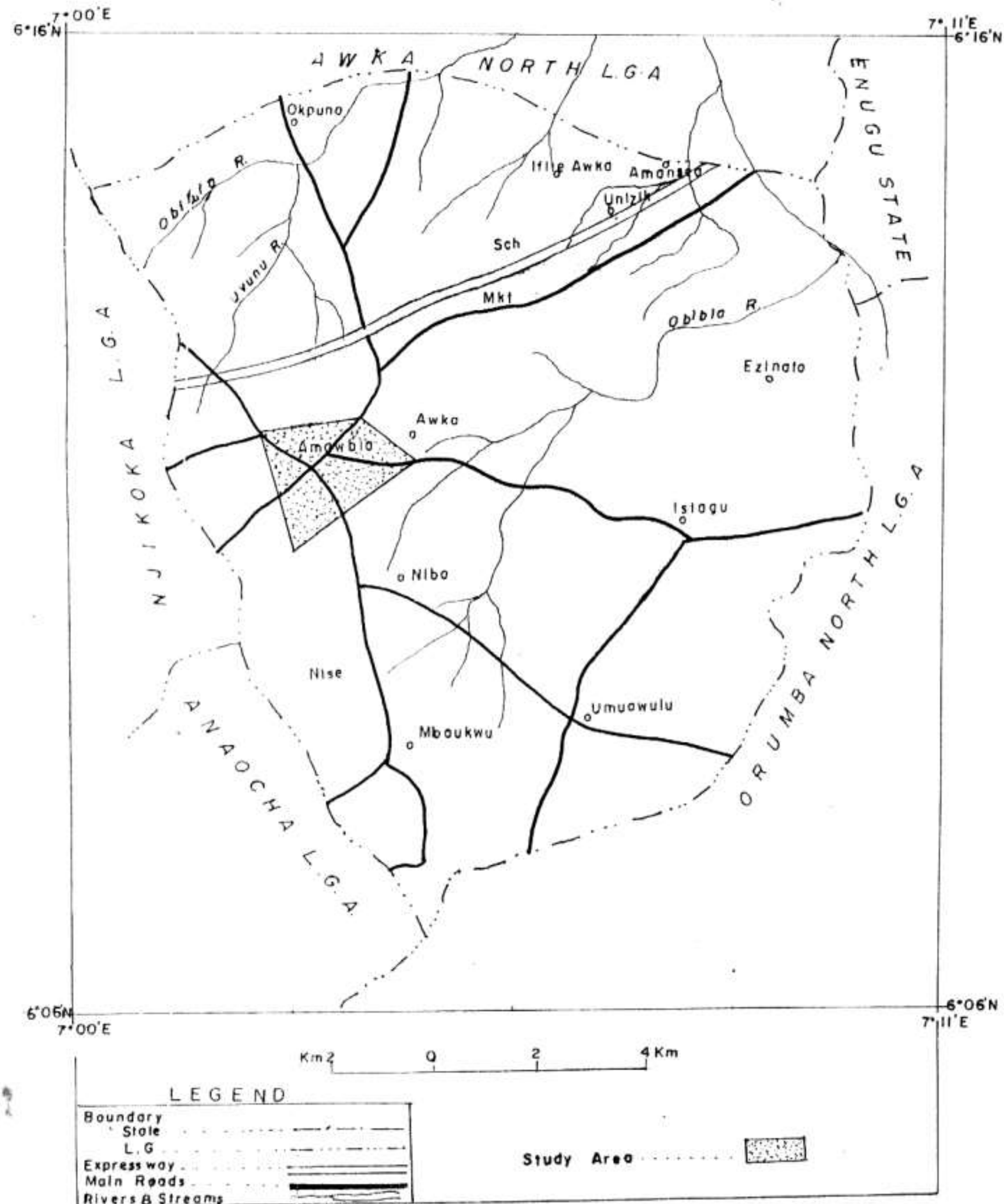

Fig.2 Map of Awka South Local Govt. Area Showing Amawbia.

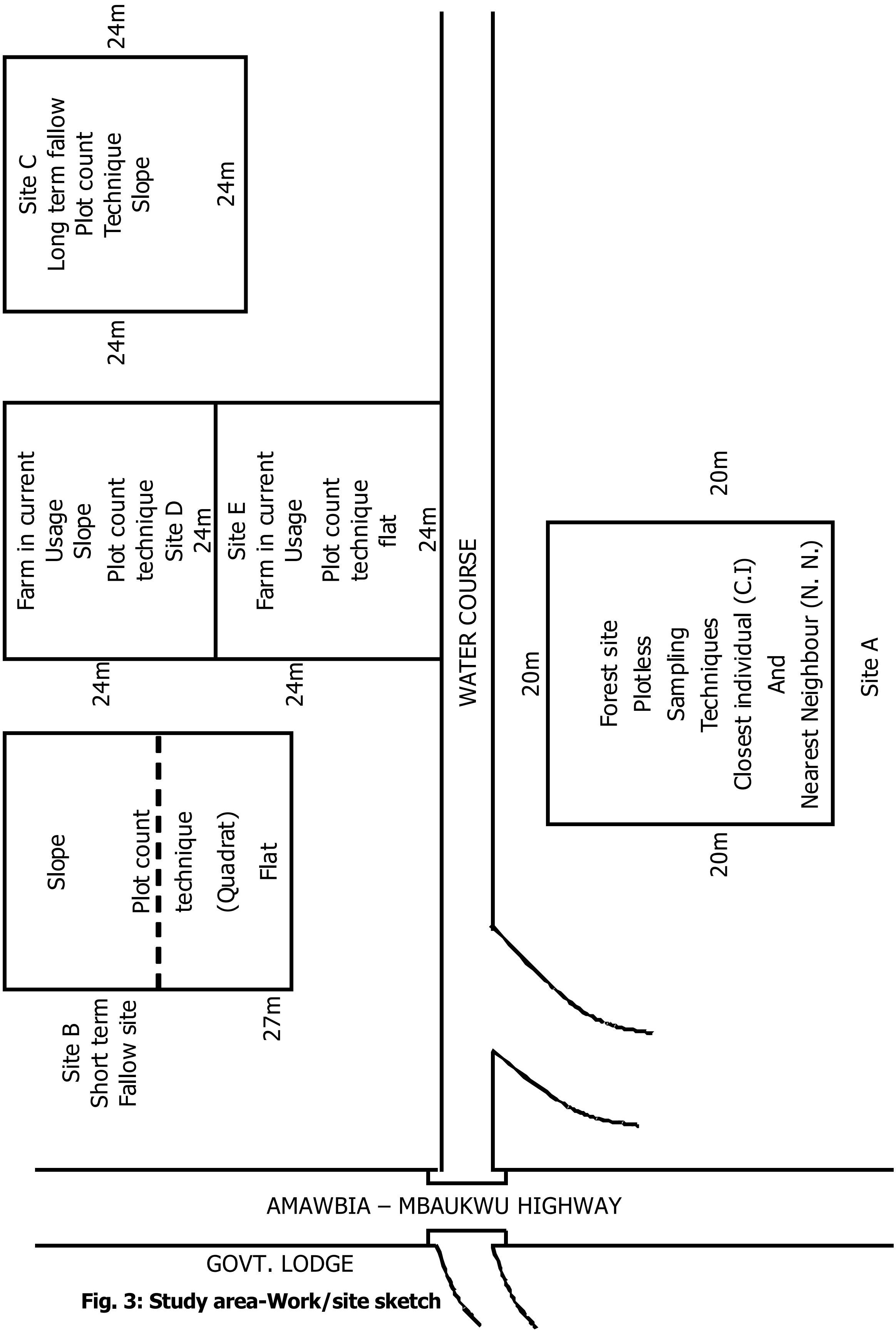

Fig. 3: Study area-Work/site sketch

3.1.3 Diagrammatic Representation of the Techniques for easier appreciation-Plotless techniques

Plotless sampling
Techniques

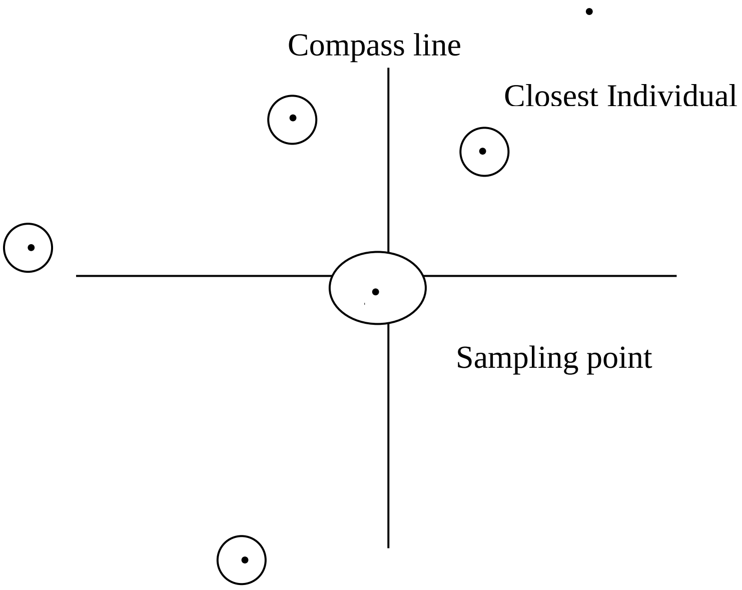

Fig. (4) Closest individual method
Source: Meuller-Dombois and Ellenberg (1974)

3.2 Sampling Procedure:

3.2.1 Vegetation Sampling and Analysis: Fig 3 is a schematic representation of the project site, indicating the five sampling locations namely: the forested-(A) Forest site, (B) Short term fallow site, and cultivated sites – (C) Long term fallow site; (D) Current usage farming site: Slope; (E) and Current usage farming site: Flat. This work was carried out during the rainy and dry season of 2010/2012.

3.2.1.1 Details of Standard Procedure and Equipment Employed Site A – The Forest Site (Fig.4) represent the plotless sampling procedure used for data collection in the site. This represents the forest site and here, closest individual (C.I) technique – a type of plotless sampling technique, was used. Sampling points were marked with pegs. The closest (nearest) plant species to each sampling point were identified and their local and botanical names recorded. At each sampling point, two different measurements were taken. Firstly, the closest tree to each sampling point was identified and the distance between them measured and recorded. Finally, any tree whose stem was up to 1.3 m high, had the girth at breast height (gbh) measured immediately at that mark.

3.3.1 Sample collection and Data Analysis (Forest site)

This is a completely flat forested site. Plotless techniques were employed here. The species at the forest site were identified physically with the assistance of field taxonomists and some relevant texts. The species and families were recorded. All individuals of each species were counted, their Gaith at breast height (Gbh) estimated and all these were recorded. The numbers of individual of each species were recorded for the rainy and dry season respectively. The Gbh were measured at

1.3m height and the formulae: Circumference = $2\pi r$ and Basal area = πr^2 were used to ascertain the basal area. The number of individuals of each species were added up and used to estimate species composition and diversity. Bar Charts were used to record species composition according to growth forms (Trees, climbers, shrubs, grasses and forbs). A well structured questionnaire was used to ascertain the economic relevance of each species using a rank of twelve (12) utility index. Subsequently, the mean of the ranks ($\bar{X}$=6.5), was worked out (Table 1). Any flora with a mean value above 6.5 had a high economic relevance while those with means below 6.5 had low economic relevances.

3.3.1 **Formulae Importance value indices (IVI) were calculated using the following formulae:**

Density of all distances for all species should be summed and divided to yield one average distance.

Density per hectare = $10000m^2$ for all trees

$$\text{Density} = \frac{10000}{2(\text{average distance, metres})^2}$$

The 2 in denominator is a constant correction factor.

$$\text{Relative density of each species} = \frac{\text{no of trees of the species}}{\text{No of all trees}} \times \text{density of all trees}$$

Frequency = Presence or absence of each plant species at or near a sampling point

$$\frac{\text{No of the sampling point at which each species is found}}{\text{Total no of sampling points}} \times \frac{100}{1}$$

$$\text{Relative frequency} = \frac{\text{frequency of one species}}{\text{Frequency of all species}} \times \frac{100}{1}$$

Dominance of each species = its relative density x its average basal area

$$\text{Relative dominance} = \frac{\text{Dominance of each species}}{\text{Total dominance for all species}} \times \frac{100}{1}$$

Importance value (IVI) = rel. density + rel. frequency + rel. dominance (COX, 1976)

The importance value is an index of dominance, controlling influence and advancement of one species over another.

Having calculated the importance values of each species, it is now subjected to T-test analysis to determine the effects of seasons, land use and relief on overall growth and development of each species. For this to be achieved, the (IVI) of species in the rainy and dry (season); flat and slopy, (relief), and managed and unmanaged sites were all ascertained and comparatively analysed scientifically to determine significance. The major advantage of estimating number of individuals through their mean distance rather than through the standard way of counting them in quadrats, plots, or strips is that no plot boundaries are required. This in many situations, saves considerable time (Curtis, 1959), because tree distances are usually shorter and more easily measured than boundaries. The problem of determining the number of individuals the important problem in the distance methods is to locate the distance that gives the best estimate of the square root of the mean area per tree. This is done by averaging a number of specific selected distance-measures in the stand (Meuller-Doubois and Ellenberg, 1974). Whereas the plot count techniques (quadrat) are used for open field herbaceous vegetation, plotless techniques are employed in woody, more cumbersome forested areas.

3.3.1.1 The assumptions of plotless techniques include:

1. Plant species occupy circular areas.
2. Plants are randomly distributed
3. Individual plants can be easily recognized Dix (1961) and Laycock (1985).
4. The distance between plants is a measurable amount. Also, The number of trees per unit area can be calculated from the average distance between the trees (Meuller-Dombois and Ellenberg, 1974).

3.3.1.2 Diagrammatical representation of the techniques for easier appreciation-Plot-count techniques

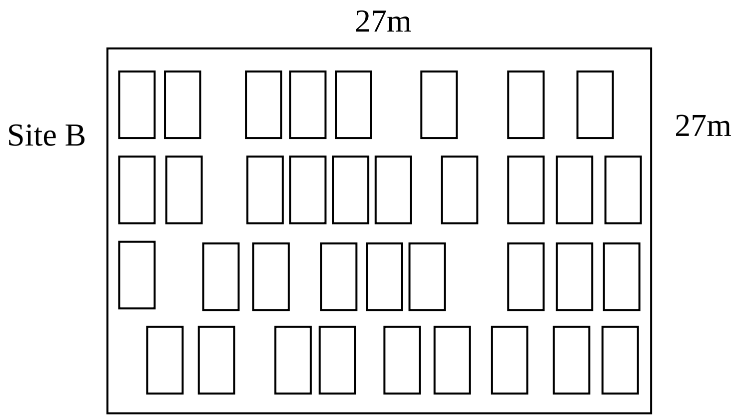

Fig. 5: Quadrat placed in site B

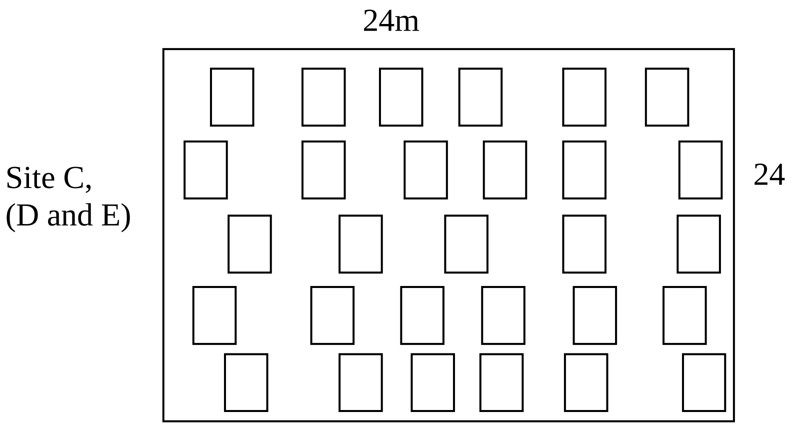

Fig. 6: Quadrats placed in sites C, D & E

3.3.1.3 Sample Collection and Data Analysis (Sites B, C, D, and E): Plot-count technique was employed for the rest of the sites. Plot counts are usually carried out in herbaceous sites with known borders, lacking physical obstacles (as in sites filled with trees and other wooded vegetation). Firstly, the total plot size (dimension (length x width) was ascertained. Next, the sampling intensity was worked out e.g determining 5% of the total plot size. Having known the sampling intensity, the no of quadrats to be placed in the plot becomes sampling intensity, divided by the sampling unit. For site B for instance, sampling intensity was 5% of the entire plot size i.e 27m x 27m = 729m^2 = 5/100 x 729 = 36 quadrats, (36/1 = 36) therefore for this site, the quadrat were placed 36 times; for the rest of sites C, D, and E, the sampling intensity was 5% of the entire plot size i.e 24m x 24m = 576m^2. 5/100 x 576 = 29 quadrats, therefore for these sites, the quadrat were placed 29 times. (29/1 = 29; 1m x 1m quadrat). Next, the sampling techniques was determined. The most appropriate for the work contemplated is usually selected. For this research work, random sampling technique was selected because it does not create room for bias. Having determined the sampling size (sampling intensity / sampling unit), two lines which represent two of the boundaries were used as coordinates on each plot. Prior to this,, a set of random numbers were put together according to the number of times the quadrat will be placed. This set of random numbers were then used to estimate the exact points (locations) at which the quadrats will be placed. The random numbers were in pairs and wherever each corresponding pair intersect themselves, there the quadrat was placed, until the correct number of quadrats were placed. Quadrats used in all cases were 1m x 1m (3.28ft)^2 in size. They were placed thirty six (36) times for site B and twenty-nine (29) times for the rest of the sites (C, D, and E). Each species in each quadrat was identified, counted and its numbers recorded. The entire exercise was repeated for each of the sites C, D. and E. for both rainy and dry seasons.

Site B: (Fig. 5): The short term fallow site: This site has both flat and slopy cultivated areas. The plot-count sampling technique was used for data collection, from an area of 27m square which was delineated with a tape and four pegs. During each rainy and dry seasons of both years of research, a 1^m x 1^m quadrat was used to sample the area (site B), thirty-six (36) times. The quadrat that fell within the slopy area of the site were used to calculate importance values for the slopy site, while the quadrats that fell within the flat area, were used to calculate importance values for the flat site-For both the rainy and the dry seasons. This site represents the cultivated site. Plant species that belong to the different microsites for each quadrat were identified, counted and their numbers recorded. The total sample size is 27m x 27m (729m^2).

Site C. (Fig. 6): The long term fallow site: This is a completely slopy unmanaged site. In this site, the plot count technique was used for data collection from an area of 24m square, which was delineated by means of measuring tape and four pegs. During each rainy and dry season of the research, a 1m^2 quadrat was used to sample the area twenty-nine (29) times. Plant species within each quadrat were identified, counted and their numbers recorded. The total sample size is 24m x 24m (576m^2).

Site D (Fig. 6). Current Usage farming slope site: Farming activities were being carried on in this site. The plot count technique was adopted for data collection after delineating an area of 24m^2, with a tape and four pegs. A 1m^2 quadrat was used to sample the area twenty-nine (29) times. Plant species encountered were identified, counted and their numbers recorded. Sampling was done for both the rainy and dry seasons. The total sample size is 24m x 24m (576m^2).

Site E (Fig. 6). Current usage farming Flat Site: Farming activities were also being carried out in this site. Plot-count technique was also employed for data collection, after delineating an area 24m2 by means of a tape and four pegs. A 1m^2 quadrat was used to sample the area twenty-nine (29) times for both the rainy ad dry seasons. Plant species encountered were identified, counted and their numbers recorded.

Hypothesis Testing: The hypothesis is based on the assumption that the importance values of the flora categories (dependent variables), is a function of several factors (independent variables) listed in fig.7

3.3.3 Factors (Design)

S/N	Dependent Variables		Independent Variables	
1	Importance value (IVI) (Trees, Climbers, Shrubs, Grasses and Forbs)	1	Seasons	Rainy Dry
		2	Land uses	Managed Not Managed
		3	Relief	Flat Slopy
		4	Soil Depths	0-20cm 20-40cm

Fig. 7: Dependent and Independent variables highlighted.

HO: There is no significant relationship (difference) between seasons (independent variable) and importance values (dependent variable).

There is no significant relationship (difference) between land use (independent variable) and importance values (dependent variable).

There is no significant relationship (difference) between Relief (independent variable) and importance values (dependent variable).

There is no significant relationship (difference) between Soil depth (independent variable) and importance values (dependent variable).

3.4 Economic Relevances of Encountered Flora / instrument of Data Collection: A well structured Questionnaire (Appendix 2) containing a hundred and eighty-eight items of flora (Trees, Climber, shrubs, Grasses and Forbs), on which responses were sought, was replicated a hundred and fifty times. The sample population comprised of foresters, lecturers and the elderly. Thirty respondents each represented Awka, Onitsha, Nnewi, Uli and Aguata areas (Oko Polytechnic Staff precisely) of Anambra State. The instrument was face-validated by some experts in Botany who looked out for clarity of instructions, consistency of organization (Economic Relevance/Floral species; sections/subsections), and how well structured the test items were. Instrument reliability was ascertained using Test-Retest method

3.4.1 **Growth form Spectrum:** The contribution made to the overall flora of each site of the watershed was expressed as a percentage of the total number of species and the resulting growth form spectrum depicted graphically. – This was determined using the population of individual plants per site. (Figs. 8-12).

3.4.2 **Techniques of Data Analysis:** There are 12 Economic Relevances (Table 1) under consideration, and there are five plant growth forms – Trees, Climbers, Shrubs, Grasses and Forbs. The trees were 31, Climbers were 9, Shrubs were 18, Grasses were 37 and Forbs were 97. Some species have more than one Economic Relevance. The total number of Economic Relevances per species is represented by N= 12 (table 1). The Economic relevances with the highest value/species size is referred to as the maximum, that with the lowest value/species size is referred to as the minimum. The means is the sum of Economic relevances/specie size, divided by the number of economic relevances, N.

Data collected from the respondents through the set of questionnaires were analysed using descriptive statistics- Bar chart, percentage, means et cetera (Appendix 5). The data were summarized and presented in tables.

Table 1. Economic Relevance of Encountered Flora arranged according to their order of importance

S/N	ECONOMIC RELEVANCE	ORDER OF IMPORTANCE	
1	Edible Food	12	A
2	Export Commodity	11	B
3	Cash crop	10	C
4	Erosion control/soil protection	9	D
5	Fuel wood	8	E
6	Medicinal plant	7	F
7	Industrial raw material	6	G
8	Non wood forest product	5	H
9	Fodder crop	4	I
10	Ornamental plant	3	J
11	Weed crop	2	K
12	Any other identified value	1	L

The encountered flora was ranked according to their economic importance as follows (1-12) under S/N above.

The mean of the above ranks is

$$X = \frac{12+11+10+9+8+7+6+5+4+3+2+1}{12} = 6.5$$

Any flora (plant species) with a means value of 6.5 and above are of high economic relevance while any with a mean value less than 6.5 is of low economic relevance.

3.5 Soil Sampling: Finally, soils at (0-20 and 20-40)cm soil depths were collected by a soil augur at the varying seasons; reliefs and land use for all sites. Therefore two soil samples each representing each soil depth were collected from the flat forest site. (A) For the rainy and dry season, four soil samples each representing (0-20 and 20-40) cm, at the flat and slopy relief, and at the rainy and dry seasons were collected for the short term fallow site. (B) Two soil samples each representing each soil depth were collected from the slopy long term fallow site for both rainy and dry season. (C). Two soil samples each representing each soil depth were collected from the slopy current usage farming site. (D) for both the rainy and dry season. Finally, two soil samples each representing each sol depth, for both rainy and dry seasons were collected from the flat current usage Farming site (E). These soil samples were then bulked, air-dried, sieved with a 2mm sieve and subjected accordingly to the requisite laboratory Analysis in order to determine: pH percentage Nitrogen, percentage Organic carbon, percentage organic matter respectively. Total soil samples collected for both rainy and dry season equals 48

3.5.1 Soil Chemical Analysis

3.5.2 Materials: Quadrat (1 m^2), soil augur, machete, measuring tape, ropes, wooden pegs, pH meter, beakers of varying sizes, distilled water, stirrer, pH buffers (4.01 and 7.01), soil samples, Erlemeyer flask, potassium dichromate solution ($K_2Cr_2O_7$), pipettes of various sizes, burettes of various sizes, concentrated sulphuric acid (H_2SO_4), Cardboard papers, standard ferrous ammonium sulphate $Fe(NH_4)_2SO_4$), 2 mm size sieve, plastic sample containers, 1.0ml NaOH solution, plastic beakers, 1.0ml-NH_4Cl, Phenolphthalein (indicator).

3.5.3 Methods (Sample Preparation): The soil samples were air-dried for 5 days, and then sieved with 2 mm sieve.

3.5.4 Soil pH: The soil pH was determined using an electric pH meter. Twenty grams of the air-dried sample was weighed into a 100ml beaker; 50ml of distilled water was added and the suspension was allowed to stand for 30 minutes with occasional stirring. The pH of the soil was measured by inserting the electrode of the pH meter into partly settled suspension. Prior to this, the pH meter was standardized with pH buffers of pH 4.00 and pH 7.00. The suspension was not stirred during the measurement.

3.5.5 Organic Carbon: Organic Carbon content of the soils were determined by the Black (1965) wet oxidation method. Five grams of each of the air dried soil sample was ground to pass through 0.5mm sieve. From this 1g of each soil sample was accurately pipetted into the 250ml Erlemeyer Flask. 10ml of 1.00 N potassium dichromate solution was accurately pipetted into each flask and the flask was gently swirled to disperse the soil. 20ml of concentrated sulphuric acid was rapidly added to the suspension from a burette. The flask was then rotated for 5 mins. It was thereafter allowed to stand on a cardboard paper for 30 mins, after which 100ml of distilled water solution was added. Next 1ml of diphenyl amine indicator was added, then the solution was titrated with standard 0.5 N Ferrous ammonium sulphate solution. At the end point, colour changes to brilliant green. A blank without soil was similarly treated.

% Org. C = N(S-T)0.3 x F x 100

Where: N = Normality of ferrous ammonium sulphate
S = Volume of ferrous ammonium sulphate required for the blank
T = Volume of ferrous ammonium sulphate required for the Sample
W = Mass of soil sample in gram
F = Correction Factor = 1.33
% Organic matter in soil = % Org. C x 1.729

3.5.6 Organic Carbon Mineralization

One hundred gram of each of the sieved soil samples were weighted into plastic containers. 60ml of distilled water was added to each soil sample to moisten the soil to 70% saturation. Ten milliliters of 1.0 N NaOH was also placed in a blank container without soil sample. The plastic containers were tightly covered; the carbon dioxide liberated from the organic carbon mineralization reacts with the sodium hydroxide solution. At the end of 7 days, the unreacted sodium hydroxide was determined by bringing out each of the beakers and titrating its contents against standard 1.0N HCL using phenolphthalein as the indicator. The amount of CO_2, liberated was calculated as shown below (Stotzky, 1965). At the end of every seven days, after titration, the plastic beakers were washed and 10ml of 1.0N NaOH solution was pipetted into each of them. The beakers were then placed back into the plastic containers, and the amount of CO_2 liberated determined as earlier described. The experiment was carried out for 4 weeks.

The formula is as follows: $MgCO_2$-Cmls = (B-V)(NE),

Where B = Volume of HCL needed to titrate the sodium hydroxide in the empty container (blank)
V = Volume of HCL needed to titrate the sodium hydroxide in the sample container
N = Normality of the acid
E = the equivalent weight of C in CO_2; E = 6

3.6 Shannon-Wiener Diversity Index

Shannon-Wiener Index is denoted by H=-Sum (pi) x In(pi)
Sum = Summation
Pi = Proportion of total sample represented by species: Divide no of individuals of a species: by total number of individuals of all the species
S = Number of species = Species richness

Hmax = In S maximum diversity possible

E = Evenness = Hmax / InS

3.7 Regression Analysis: This was determined using the total population of individual plants and the importance values. The aim was to ascertain the contribution of the Independent variables to the growth and development of the dependent variables. The outcome was expressed in percentages.

CHAPTER FOUR

4.0 RESULTS

4.1a Species Composition and growth Forms

Table 2-6 show the species composition (tree, climber, shrubs, grass and forb) of the five different land use sites. A total of 31 tree species, 18 shrubs species, 9 climber, 37 grass and 97 forbs species distributed over 51 families were found in the sites. The forest site had most of the tree, shrub and climber species while the other sites had most of the Forb and grass species (Table 2-6). The forbs were so preponderant especially in the managed sites (fallow and current usage sites) that they were recorded as (forbs in families)

Table 2. Tree species composition of the different land use sites in Amawbia watershed

S/N	SPECIES	FAMILY	FOREST SITE	SHORT TERM FALLOW	LONG TERM FALLOW	CURRENT USAGE FARMING SLOPE	CURRENT USAGE FARMING FLAT
1	*Afzelia Africana*	Caesalpiniaceae	√	X	X	X	X
2	*Albizia chaevelieri*	Fabaceae	√	X	X	X	X
3	*Anthocleista djalonensis*	Loganiaceae	√	X	X	X	X
4	*Barteria nigritiana*	Ochnaceae	√	X	X	X	X
5	*Bridelia ferruginea*	Euphorbiaceae	√	X	X	X	X
6	*Citrus sinenses (seedlings)*	Rutaceae	X	√	X	X	X
7	*Cocos nucifera (seedlings)*	Arecaceae	X	√	X	X	X
8	*Dactyledenia barteri*	Sterculiaceae	√	X	X	X	X
9	*Dialum guineense*	Caesalpiniaceae	√	X	X	X	X
10	*Dichrostachys cinerea*	Mimosoideae	√	X	X	X	X
11	*Elaeis guineensis*	Arecaceae	√	√	X	X	X
12	*Erythrophleum suavenlens*	Caesalpiniaceae	√	X	X	X	X
13	*Hevea braziliensis*	Euphorbiaceae	√	X	X	X	X
14	*Holarrhena floribunda*	Apocynaceae	√	X	X	X	X
15	*Klausinia anisata*	Fabaceae	X	√	X	X	X
16	*Mangifera indica (seedlings)*	Anacardiaceae	√	√	X	X	X
17	*Milicia excelsa*	Moraceae	√	X	X	X	X
18	*Napoleona imperialis*	Lecithidaceae	√	X	X	X	X
19	*Nauclea latifolia*	Rubiaceae	X	X	√	X	X
20	*Newbouldia laevis*	Bignoniaceae	√	X	X	X	X
21	*Peltoforum pterocarpus*	Fabaceae	√	X	X	X	X
22	*Pentaclethra macrophyla*	Mimosoideae	√	X	X	X	X
23	*Psidium guajava (seedlings)*	Myrtaceae	X	√	X	X	X
24	*Rothmania hispida*	Rubiaceae	X	√	X	X	X
25	*Senna siamea*	Caesalpiniaceae	√	X	X	X	X
26	*Spondias mombin*	Anacardiaceae	√	X	X	X	X
27	*Sporospamum febrifugum*	Bignoniaceae	√	X	X	X	X
28	*Sterculia tragacantha*	Sterculiaceae	√	X	X	X	X
29	*Tetrapleura tetraptera*	Mimosoideae	√	X	X	X	X
30	*Voacanga africana*	Apocynaceae	√	X	X	X	X
31	*Zanthaxylon zanthaxyloides*	Rutaceae	√	X	X	X	X
			25	**7**	**1**	**0**	**0**

Table 3. Shrub species composition of the different land use sites in Amawbia watershed.

S/N	SPECIES	FAMILY	FOREST SITE	SHORT TERM FALLOW	LONG TERM FALLOW	CURRENT USAGE FARMING SLOPE	CURRENT USAGE FARMING FLAT
1	*Alchornea condifolia*	Euphorbiaceae	√	X	X	X	X
2	*Ananas comosus*	Bromeliaceae	√	√	X	X	X
3	*Annona senegalensis*	Annonaceae	X	X	√	X	X
4	*Bambusa vulgaris*	Poaceae	√	X	X	X	X
5	*Byrsocarpus coccineus*	Connoraceae	√	X	X	X	X
6	*Cajanus cajans*	Fabaceae	X	X	X	√	X
7	*Chromolaena odorata*	Asteraceae	X	√	X	X	X
8	*Manihot esculentum*	Euphorbiaceae	X	√	X	√	√
9	*Mimosa invisa*	Mimosoideae	√	X	√	√	√
10	*Ocimum basilicum*	Lamiaceae	X	X	X	X	√
11	*Olax viridis*	Olacaceae	√	X	X	X	X
12	*Phaseolus vulgaris*	Fabaceae	X	X	X	√	X
13	*Piliostigma thonningii*	Caesalpiniaceae	X	X	√	√	X
14	*Rauvolfia vomitoria*	Apocynaceae	√	X	X	X	X
15	*Sarcocephalum laxiflora*	Euphorbiaceae	X	X	X	X	√
16	*Solanum melanguene*	Solanaceae	X	X	X	X	√
17	*Uvaria chamae*	Annonaceae	X	X	√	X	X
18	*Vernonia amygdalina*	Asteraceae	X	X	X	√	√
			7	**3**	**3**	**6**	**6**

Table 4. Climber species composition of the different land use sites in Amawbia watershed.

S/N	SPECIES	FAMILY	FOREST SITE	SHORT TERM FALLOW	LONG TERM FALLOW	CURRENT USAGE FARMING SLOPE	CURRENT USAGE FARMING FLAT
1	*Cissus araliodes*	Ampelidaceae	√	X	X	X	X
2	*Cucurbita pepo*	Cucurbitaceae	X	X	X	√	√
3	*Desmodium scorpiurus*	Fabaceae	X	X	√	X	X
4	*Dioscorea dumentorum*	Dioscoreaceae	√	X	X	X	X
5	*Gongronema latifolium*	Asclepiadaceae	√	X	X	X	X
6	*Mucuna pruriens*	Fabaceae	√	X	X	X	X
7	*Peuraria phaseoloides*	Fabaceae	√	X	X	X	X
8	*Smilax anceps*	Smilaceae	√	X	X	X	X
9	*Telfeiria occidentalis*	Cucurbitaceae	X	X	X	√	√
			6	**0**	**1**	**2**	**2**

Table 5: Grass species composition of the different land use sites in Amawbia watershed

S/N	SPECIES	FAMILY	FOREST SITE	SHORT TERM FALLOW	LONG TERM FALLOW	CURRENT USAGE FARMING SLOPE	CURRENT USAGE FARMING FLAT
1	*Acroceras zizaniodes*	poacea	X	√	x	X	X
2	*Andropogon gayanus*	Poacea	X	√	√	X	X
3	*Andropogon tectorum*	Poacea	X	√	√	X	X
4	*Axonapu compressus*	Poacea-	X	X	X	X	X
5	*Brachiara deflexa*	Poacea	X	X	X	X	X
6	*Brachiara lata*	Poacea	X	√	X	X	X
7	*Chloris pilosa*	poacea	X	X	X	X	X
8	*Cymbopogon cittratus*	Poacea	√	√	X	√	√
9	*Cymbopogon giganteus*	Poacea	X	√	√	X	X
10	*Cynodon dactylon*	poacea	X	√	X	X	X
11	*Digitaria gayana*	Poacea	X	√	X	X	X
12	*Digitaria horizontalis*	Poacea	X	√	X	X	X
13	*Digitaria nuda*	poacea	X	X	X	X	X
14	*Echinochloa colona*	Poacea	X	X	X	X	X
15	*Echinochloa obtusiflora*	Poacea	X	X	X	X	X
16	*Eleusine indica*	poacea	X	X	x	X	X
17	*Eragrostis atrovirens*	Poacea	X	√	X	X	X
18	*Fragrostis tremula*	Poacea	X	X	X	X	X
19	*Hackelochloa granularis*	poacea	X	√	√	√	√
20	*Imperata cylindrical*	Poacea	√	√	√	√	√
21	*Leersia hexandra*	Poacea	X	X	X	X	X
22	*Oryza sativa*	poacea	X	X	X	√	√
23	*Panicum laxum*	Poacea	X	√	X	X	X
24	*Panicum maximum*	Poacea	X	√	√	√	√
25	*Panicum repens*	poacea	X	X	X	X	X
26	*Pennisetum pedicellatum*	Poacea	X	X	√	X	X
27	*Pennisetum polystachion*	Poacea	X	X	√	X	X
28	*Paspalum conjugatum*	poacea	X	√	X	X	X
29	*Paspalum scrobiculatum*	Poacea	X	√	X	√	√
30	*Rhynchelytrum repens*	Poacea	X	√	X	X	X
31	*Rottboelia cochinchinensis*	poacea	X	√	√	X	X
32	*Saccharum officinarum*	Poacea	X	X	X	X	X
33	*Setaria barbata*	Poacea	X	√	X	X	X
34	*Setaria longiseta*	poacea	X	√	X	X	X
35	*Sorghum arundinaceum*	Poacea	X	√	√	√	√
36	*Sporobolus pyramidalis*	Poacea	X	√	X	X	X
37	*Zea mays*	poacea	X	√	X	√	√
			2	**23**	**10**	**8**	**8**

Table 6. Forb species composition of the different land use sites in Amawbia watershed

S/N	NO OF SPECIES	FAMILY	FOREST SITE	SHORT TERM FALLOW	LONG TERM FALLOW	CURRENT USAGE FARMING SLOPE	CURRENT USAGE FARMING FLAT
1	3	Acanthaceae	X	√	√	√	√
2	10	Amaranthaceae	X	√	√	√	√
3	10	Asteraceae	X	√	√	√	√
4	2	Capparidaceae	X	√	√	√	√
5	2	Commelinaceae	X	√	√	√	√
6	5	Convolvulaceae	X	√	√	√	√
7	13	Cyperaceae	X	√	√	√	√
8	6	Euphorbiaceae	X	√	√	√	√
9	01	Rutaceae	X	X	X	√	√
10	4	Lamiaceae	X	√	√	√	√
11	5	Malvaceae	X	√	√	√	√
12	2	Melastomataceae	X	√	√	√	√
13	3	Onagraceae	X	√	√	√	√
14	7	Rubiaceae	X	√	√	√	√
15	01	Sphenocleaceae	X	√	√	√	√
16	2	Stercliaceae	X	√	√	√	√
17	2	Fabaceae	X	√	√	√	√
18	3	Nyctaginaceae	X	√	√	√	√
19	01	Polygonaceae	X	√	√	√	√
20	01	Pontederaceae	X	√	√	√	√
21	01	Loganiaceae	X	√	√	√	√
22	2	Musaceae	X	√	√	√	√
23	01	Piperaceae	X	√	√	√	√
24	01	Mimosaoideae	X	√	√	√	√
25	01	Solanaceae	X	√	√	√	√
26	01	Verbenaceae	X	√	√	√	√
27	2	Portulacaceae	X	√	√	√	√
28	01	Pedaliaceae	X	√	√	√	√
29	02	Urticaceae	X	√	√	√	√
30	01	Hydrophyllaceae	X	√	√	√	√
31	01	Tiliaceae	X	√	√	√	√
			0	**59(23)**	**58(18)**	**61(24)**	**61(24)**

4.1b Growth Forms

In figure 8, 62.5% of plant species of the forest site are trees, 15% are climbers, 17.5% are shrubs, 5% are grasses while there are no herbs in the forest site.

In figure 9, 64.5% of plant species of the short term fallow site are herbs, 24.7% are grass, while 7.5% and 3.2% are trees and shrubs respectively.

In figure 10, 74.1% of plant species of the long term fallow site are herbs, 17.2% are grass, while 1.7%, 1.7% and 5.2% are trees, climbers and shrubs respectively.

In figure 11, 79.2% of plant species of the site in current usage for farming are herbs, 10.4% are grass, 7.8% are shrubs while 2.6 are climbers. There are no trees in the current usage farming site.

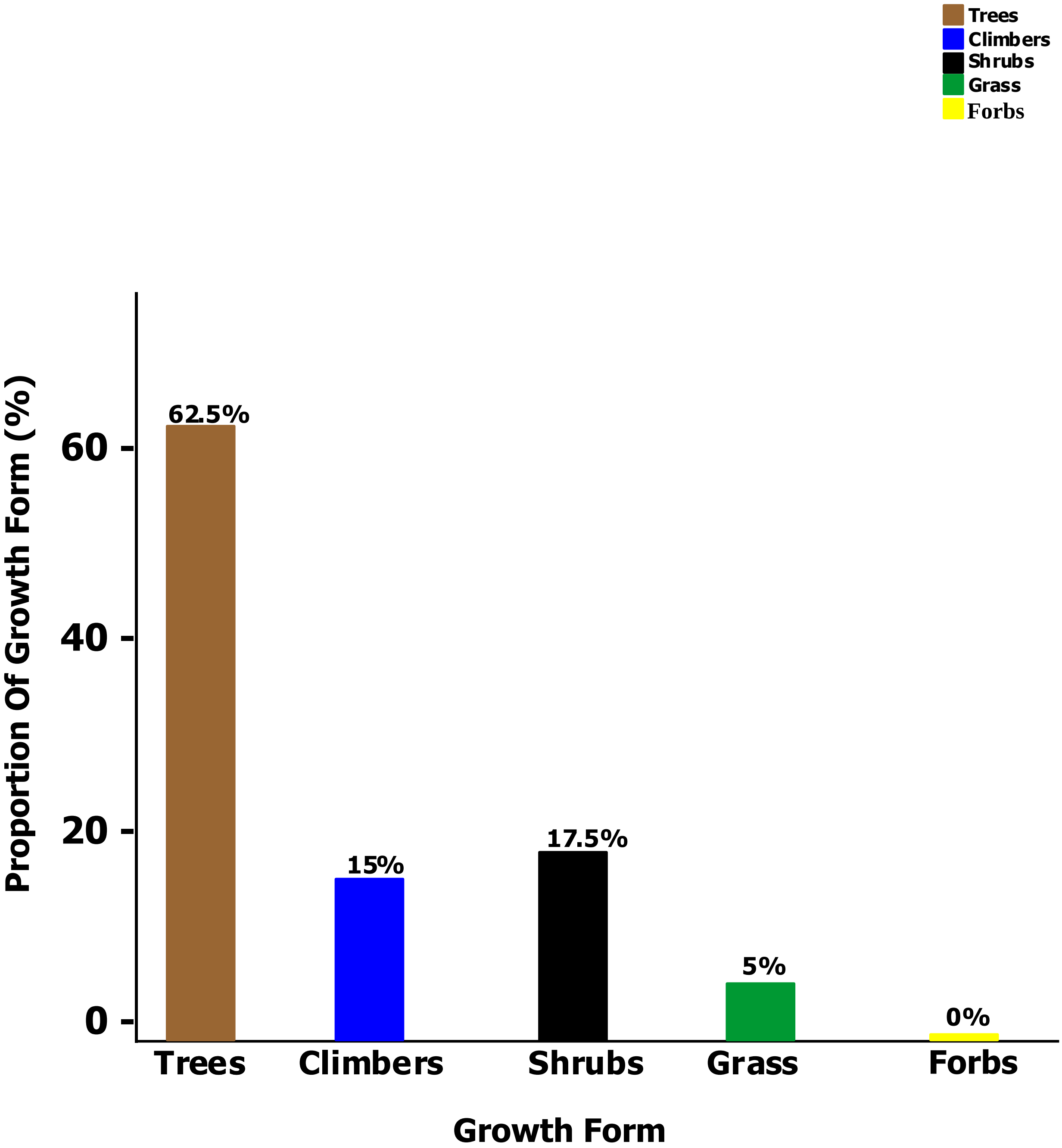

Fig. 8: ***Percentages of growth form of species in the forest site in Amawbia Watershed.***

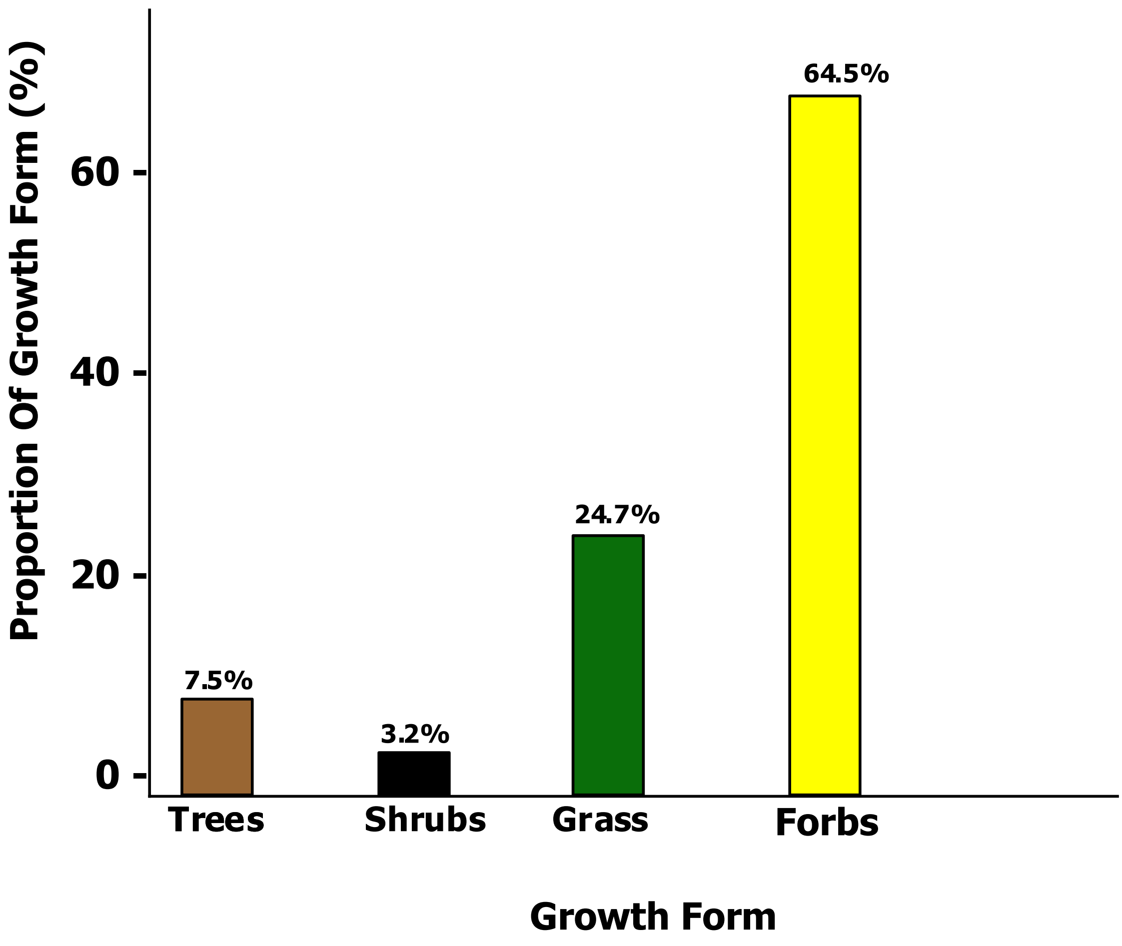

Fig. 9: Percentages of growth forms of species in the short term fallow site in Amawbia watershed

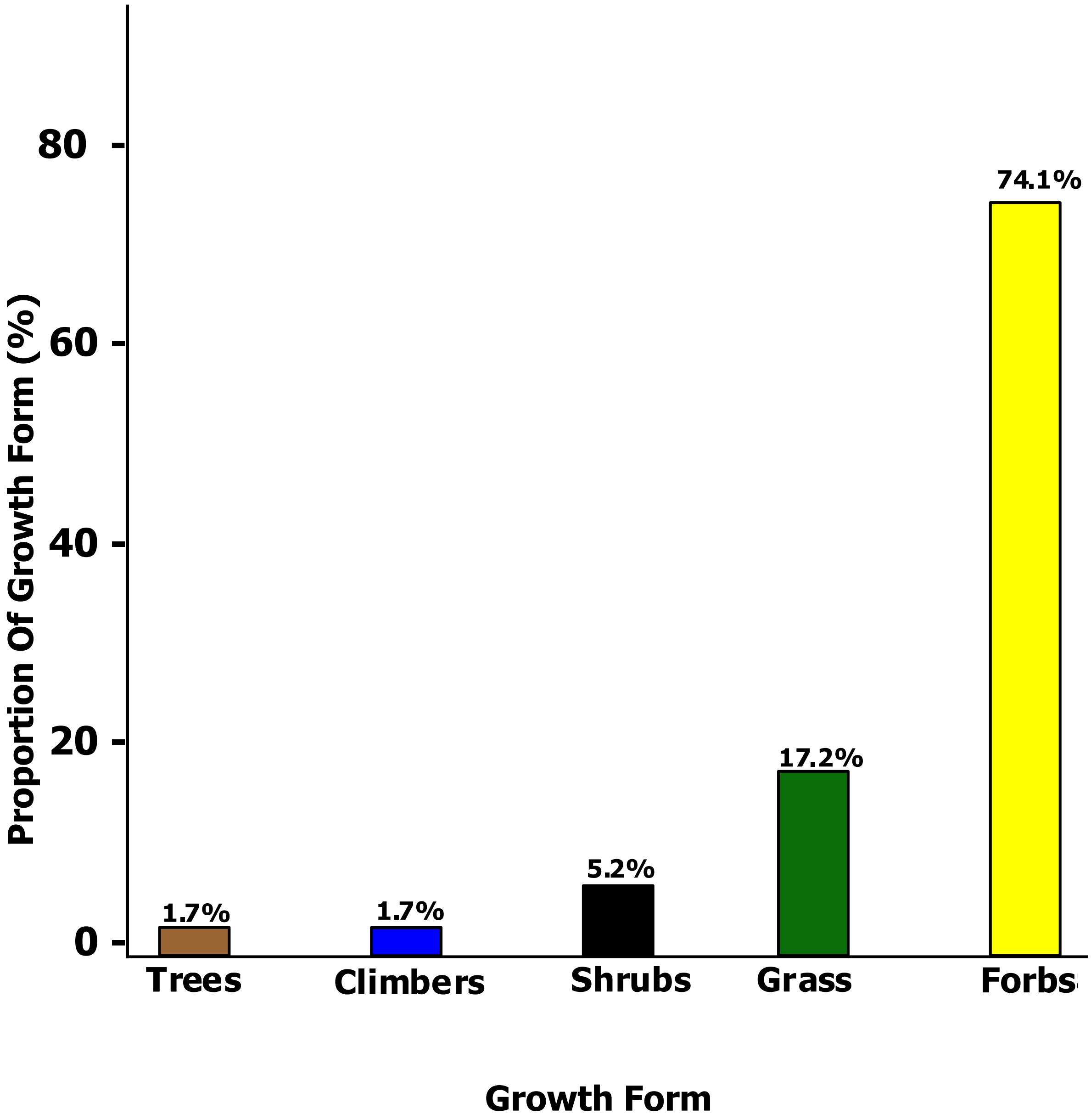

Fig. 10: Percentages of growth form of the species in the long term fallow site of Amawbia watershed.

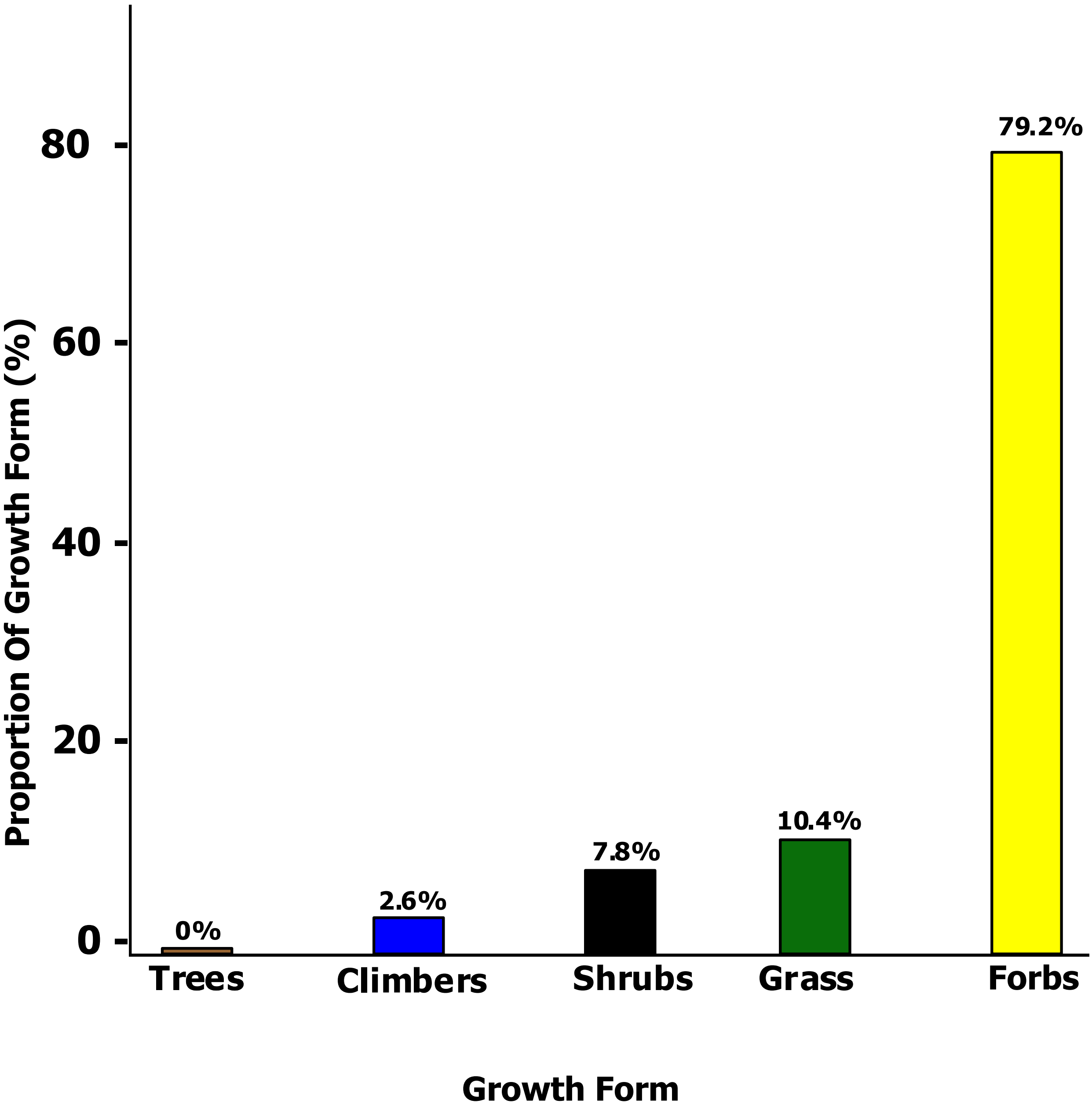

Fig. 11: Percentages of growth form of species in "Current usage Farming Site" of Amawbia watershed

TABLE 7: RESULT OF DIVERSITY INDICES

S/N	Site	Flora	Species Richness		Shannon Weiner Diversity Index (H)		Evenness (E)	
			Rainy	Dry	Rainy	Dry	Rainy	Dry
A1	Forest (Flat)	Trees	25	25	2.69	2.69	0.84	0.84
2	Forest (Flat)	Climbers	6	3	1.03	0.23	0.57	0.21
3	Forest (Flat)	Shrubs	7	6	1.09	1.08	0.56	0.69
4	Forest (Flat)	Grass	2	2	0.63	0.63	0.91	0.91
		TOTAL	**40**	**36**				
B1	Short term fallow	Trees	7	7	1.61	1.61	0.83	0.83
2	Short term fallow	Shrubs	3	3	0.94	0.58	0.86	0.53
3a	Short term fallow	Grass	24 Flat Slope 12 12		2.03	2.08	0.82	0.84
3b	Short term fallow	Grass		19 Flat Slope 12 07	1.83	1.66	0.74	0.85
4a	Short term fallow	Forb (in families)	31 Flat Slope 16 15		1.62	1.24	0.58	0.46
4b	Short term fallow	Forb (in families)		27 Flat Slope 18 09	2.01	1.36	0.70	0.62
		TOTAL	**65** **58 (Flat)**	**56** **43 (Slope)**				
C1	Long term fallow (slope)	Trees	1	1	-	-	-	-
2	Long term fallow (slope)	Climbers	1	-	-	-	-	-
3	Long term fallow (slope)	Shrubs	2	3	0.69	0.85	1	0.77
4	Long term fallow (slope)	Grass	10	3	1.47	0.14	0.64	0.13
5	Long term fallow (slope)	Forbs (in families)	15	15	2.52	2.55	0.93	0.94
		TOTAL	**29**	**22**				
D1	Current usage farming (slope)	Climbers	3	3	0.95	0.99	0.86	0.90
2	Current usage farming (slope)	Shrubs	4	4	1.08	1.07	0.78	0.77
3	Current usage farming (slope)	Grass	4	5	1.05	1.32	0.76	0.82
4	Current usage farming (slope)	Forbs (in families)	24	15	1.90	1.64	0.60	0.60
		TOTAL	**35**	**27**				
E1	Current usage farming (Flat)	Climbers	2	2	0.64	0.60	0.92	0.87
2	Current usage farming (Flat)	Shrubs	3	3	0.96	1.03	0.87	0.94
3	Current usage farming (Flat)	Grass	5	4	1.00	1.37	0.62	0.99
4	Current usage farming (Flat)	Forbs (in families)	17	16	2.07	2.39	0.73	0.86
		TOTAL	**27**	**25**				

4.2 Shannon Wiener and other Diversity Indices for the Floral Resources of the Watershed

Table 7 effectively captures the Shannon Wiener and Diversity indices for the floral resources of the watershed. Starting with species Richness, it is clearly evident that the forest site was the most tree species rich, followed distantly by shrubs, climbers and grasses species in that order. Forbs were not present in the site. Reverse was the case at the short term fallow site where the forbs represented the most species rich, followed distantly by the grasses, the trees, and shrubs. Climbers were not present in the site. The forbs also dominated the long term fallow site followed by the shrubs, with trees and climbers being at par. The grass population though was more in the rainy than in the dry seasons. Generally the forbs dominated the current usage farming slope and flat sites being more preponderant in the rainy than in the dry season. This was followed by grass, climber and shrub in that order. Trees were not seen in this site. The forbs again were dominant over all the other species with the number of rainy season species dominating. The tree species had the highest Shannon Wiener diversity Indices (2.69) for the forest site while the grasses had the least indices (0.63). The highest indices (2.07, 2.08) for the short term fallow site was given by the grasses, while the lowest indices was given by the shrubs (0.94; 0.58). For the long term fallow site, the highest indices were given by the forbs (2.52;2.55), while the grasses at the dry season recorded the lowest index of (0.14). The forbs of the current usage farming site had the highest indices (2.07; 2.39), while the climbers had the lowest indices (0.64;0.60). The grasses had the highest evenness indices (0.91) for the forest site, while the climbers had the lowest (0.21). Grasses had the highest evenness indices (0.82;0.84), for the short term fallow site while the forbs had the lowest indices (0.46). The shrubs had the highest indices (1.00) for the long term fallow site while the grass had the lowest index (0.13). The climbers had the highest evenness indices (0.86;0.90) for the current usage farming site, while the grasses had the lowest index (0.62).

4.3 Economic Relevances of the Floral Resources of the Watershed.

Figure 12, 94 percent of the Encountered trees of the watershed had an Economic relevance value more than 6.5. this implies that almost all tree species of the watershed are useful to man in the areas of income generation, industrial raw materials, food source, fuel wood, pharmaceuticals, erosion control, purification of the atmosphere, ethical and aesthetic relevances. Some of the tree species with high economic relevance include: *Z. zanthaxyloides* (8.5), *S. febrifugum* (8.5), *B. ferruginea* (8.5), *T. tetraptera* (9.0), *B. nigritiana* (8.6), *R. hispida* (8.5), and *S. tragacantha* (8.5). From figure 13, 44.4 percent of the climbers encountered in the watershed, namely: *C. pepo, G. latifolium, D. dumentorum* and *T. occidentalis* had Economic Relevance more than 6.5. the unimportant ones were not planted consciously by man. From figure 14, 9 shrubs (52.9) percent out of a total of 17 had Economic Relevance more than the average value of 6.5. these are therefore more important than others, and they include: *A. comosus*, *M. esculentus*, *S. melanguena* and *C. cajans*. From figure 15 above, the only grasses that had a relevance more than the average value of 6.5 are *S. officinarum*, *Z. mays* and *O. sativa*. This represents just about 8 percent of the total. Therefore the remaining 92 percent had below average economic relevance primarily as fodder for many animals, particularly herbivores in secondary productivity. From figure 16 above, out of over one hundred forbs species, only eight (8) had economic relevance more than the average (6.5). these include: *M. sapientum, T. triangulare, M. koenigii* and *C. olitorius*

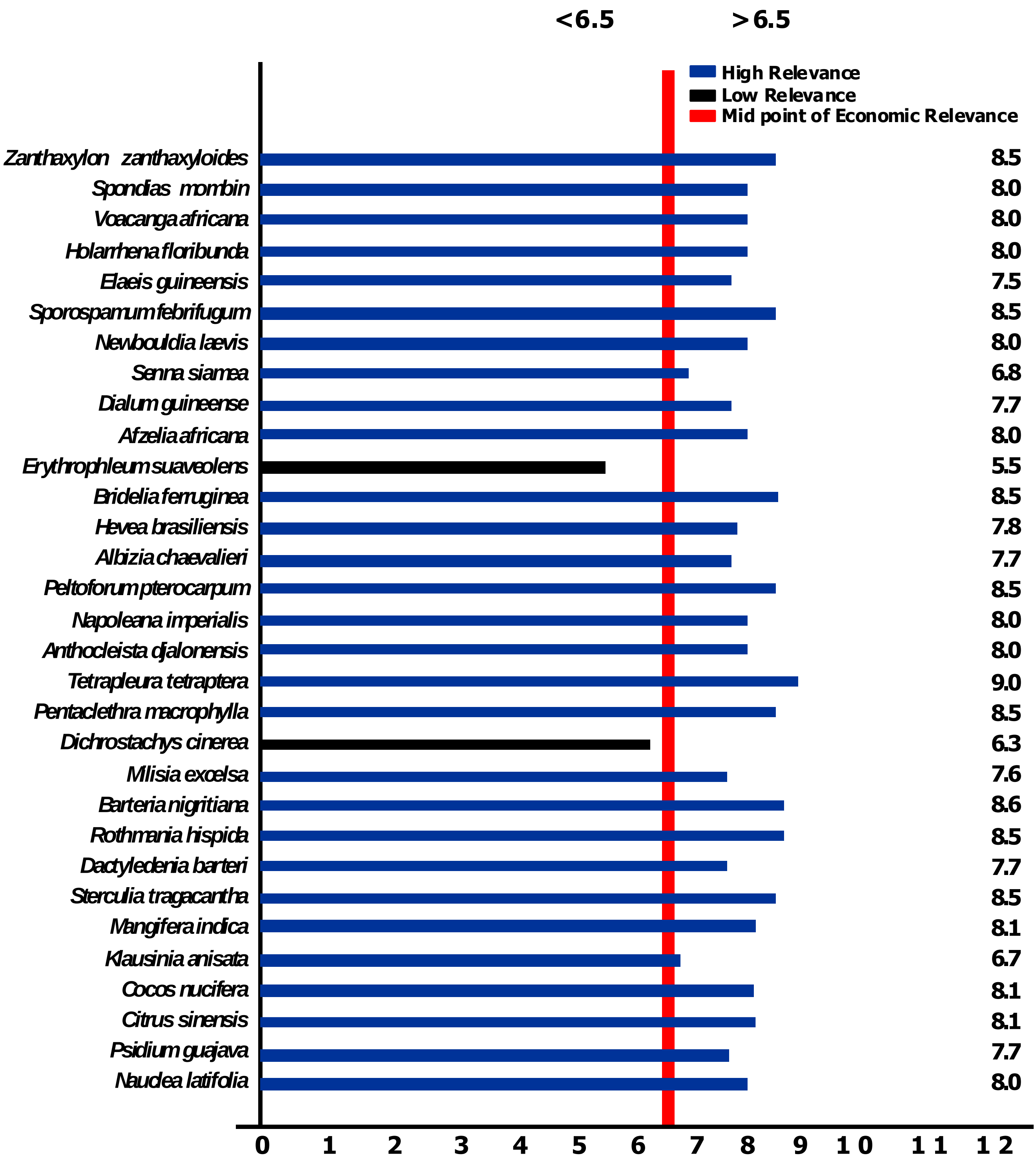

Fig. 12 Economic Relevance of Encountered Trees of the watershed based on standard rating scale

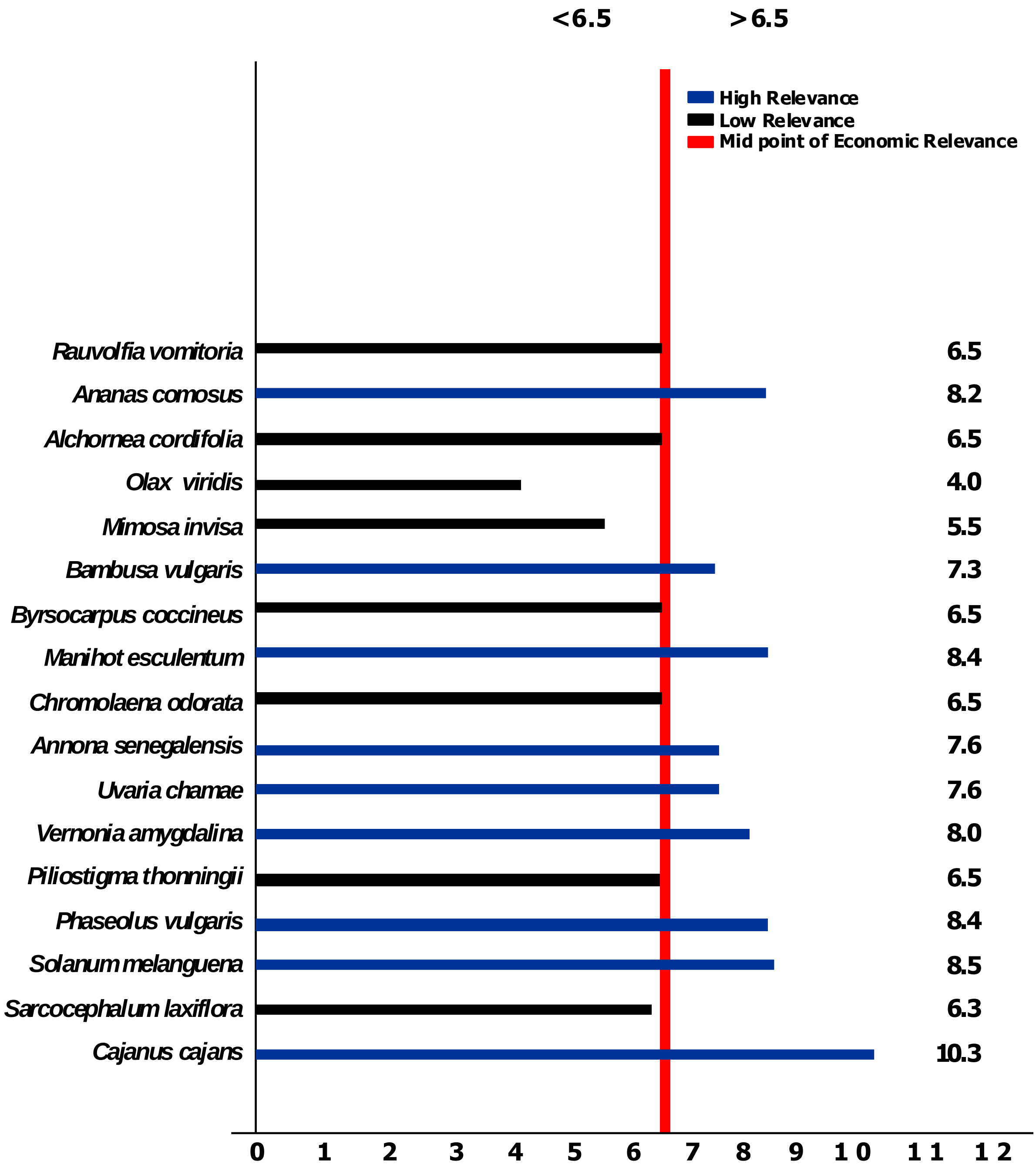

Fig. 13: **Economic Relevance of Encountered shrub of the Watershed based on standard rating scale**

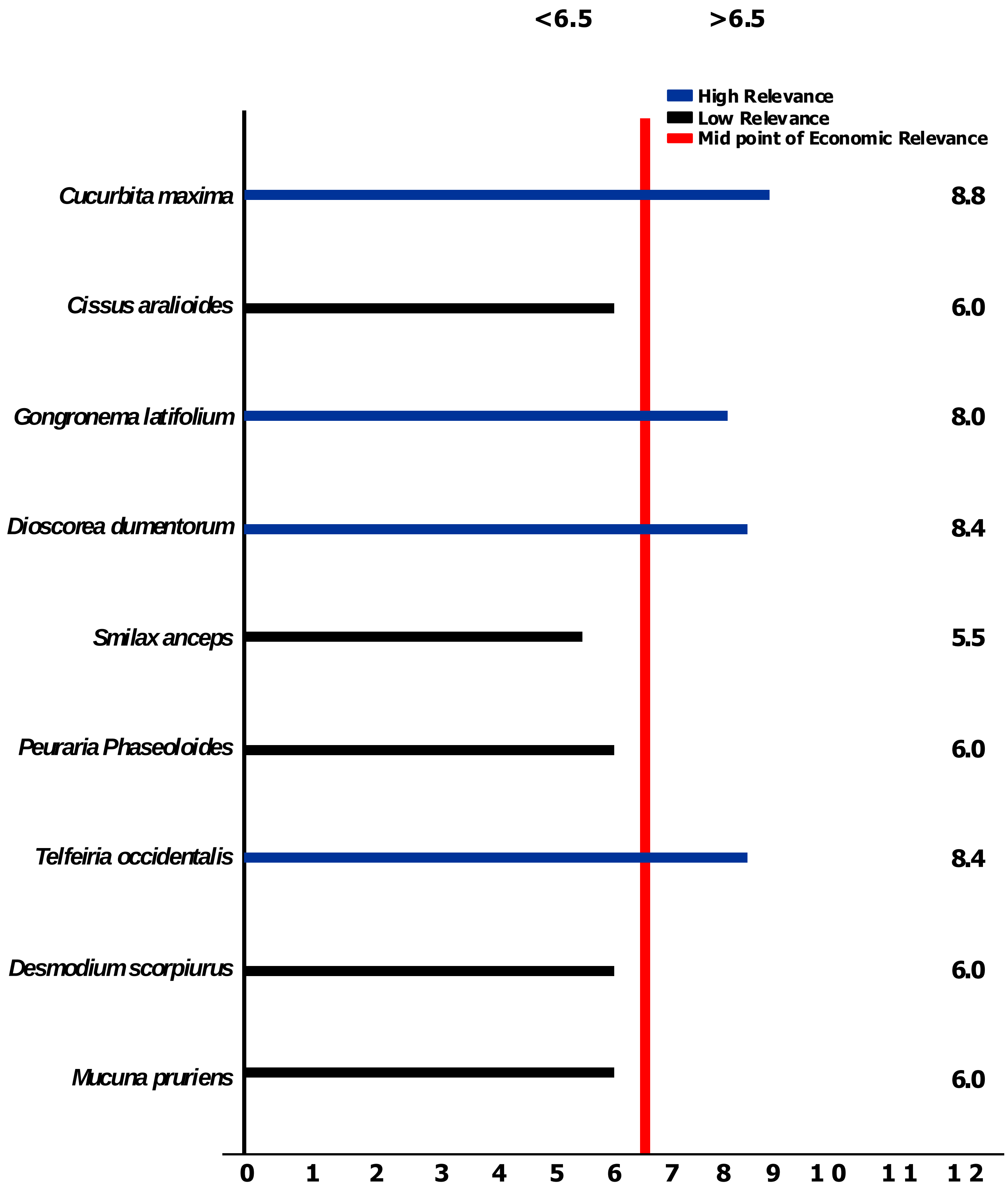

Fig. 14: **Economic Relevance of Encountered climbers of the Watershed based on standard rating scale**

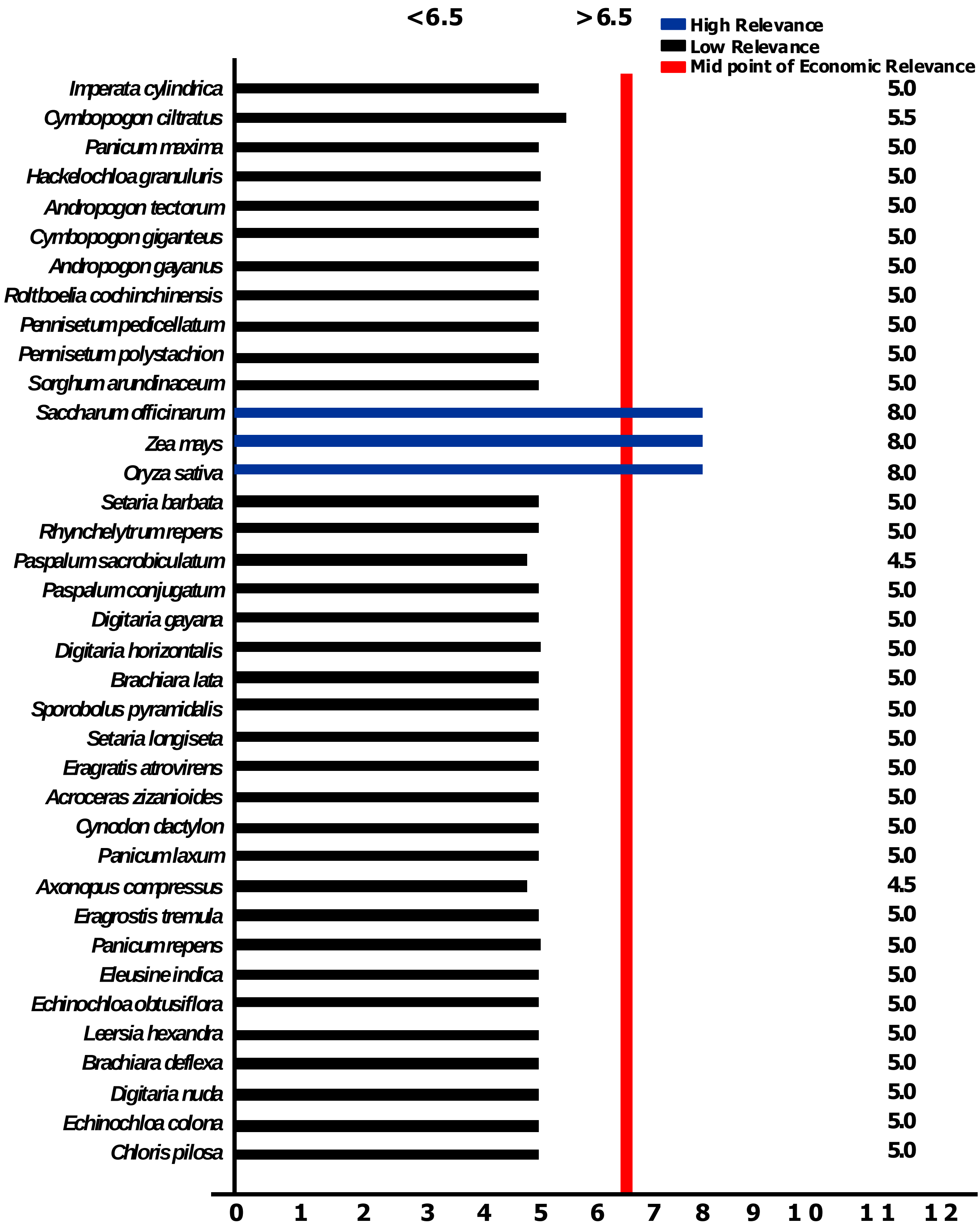

Fig. 15: Economic Relevance of Grasses of the watershed using standard rating scale

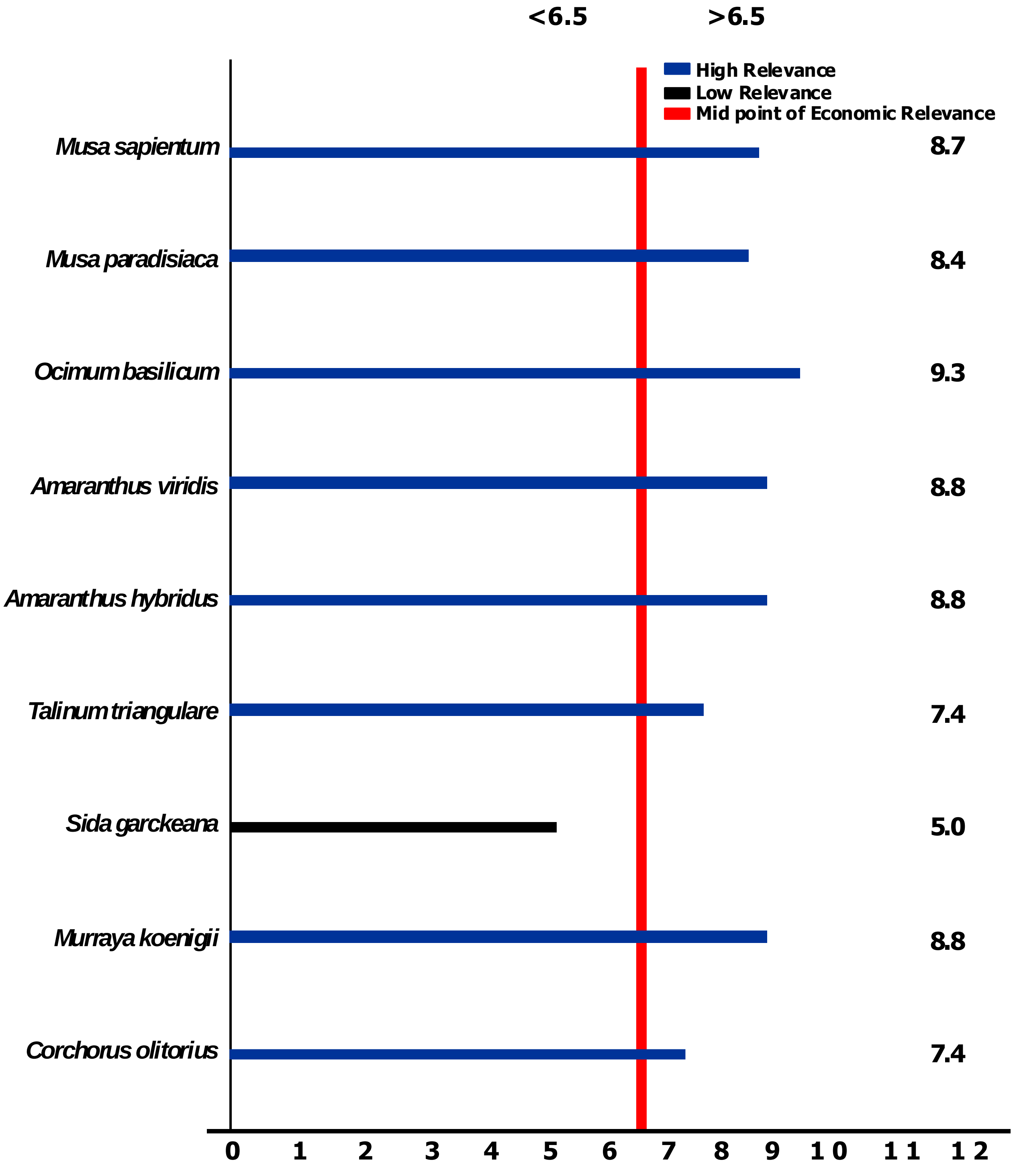

Fig. 16: Economic Relevance of the more useful forbs

4.4 Importance Values indices (IVI) of the Watershed Sites

Short term fallow site. Figure 17 shows the Importance values indices (IVI) of shrub species of the short term fallow site at flat and slopy locations. *Manihot esculentum* had the highest IVI at both flat and slopy sites while *Ananas comosus* had the lowest IVI. Figure 14 shows the Importance Value Index (IVI) for the grass species of the Short term Fallow site. *Panicum maximum* had the highest (IVI) for both rainy and dry seasons while *Rhynchelytrum repens* had the lowest (IVI). From figure 19, which shows the Importance Value Index for grass species of the short term fallow site for both flat and slopy locations, *Panicum maximum* had the highest IVI while *Zea mays* had the lowest (IVI). From figure 20 which shows IVI of forbs families of the short term fallow site during the rainy and dry seasons, the families *Cyperaceae* and *Rubiaceae* recorded the highest (IVI) while the family *Acanthaceae* recorded the lowest (IVI) index. Figure 21 which showed the (IVI) of forb families of the short term fallow site at flat and slopy locations recorded almost the same result. *Cyperaceae* and *Rubiaceae* had the highest (IVI) while Acanthaceae had the lowest (IVI) at both flat and slopy locations.

Long term fallow site. Figure 22 shows the (IVI) of grass species of the long term fallow site during the rainy and dry seasons. *Pennisetum polystachion* recorded the highest (IVI) for the rainy season, *Andropogon tectorum* recorded the lowest (IVI) while *Panicum maximum* recorded the highest (IVI) for the dry season while A *tectorum* and *Pennisetum pedicellatum recorded the lowest dry season* (IVI). Figure 23 showed the (IVI) of forb families of the long term fallow site during the rainy and dry seasons. The highest (IVI) for both the rainy and dry seasons were given by *Euphorbiaceae*, *Asteraceae*, and *Fabaceae* and *Rubiaceae* in that order while the lowest (IVI) were recorded by *compositae* and *melastomataceae*.

Current usage farming site: Figure 24 shows the (IVI) of shrub species of the current usage farming site for flat and slopy locations. *Manihot esculentum* recorded the highest (IVI) while *Sarcocephalum laxifora* recorded the lowest (IVI). For the (IVI) of grass species of the current usage farming site, *Imperata cylindrica* recorded the highest (IVI), *Hackelochloa granularis* recorded the lowest (IVI) for the rainy season while *Cymbopogon cittratus* recorded the highest (IVI) for dry season and *Sorghum arundinaceum* recorded the lowest (IVI) for the dry season. *Zea mays* recorded zero yield (IVI) for the dry season (Figure 25). Figure 26 shows the (IVI) of Grass species of the current usage farming site at flat and slopy locations. The highest (IVI) for the flat location were recorded by *Zea mays* and *Cymbopogon cittratus*; and the lowest (IVI) for the flat by *Panicum maximum*. The highest (IVI) for the slopy location was recorded by *Imperata cylindrca* while the lowest (IVI) for the slopy location was recorded by *Sorghum arundinaceum* and *Hackelochloa granularis.* For the forb families of the current usage farming site during the rainy and dry seasons, the highest (IVI) for both seasons were recorded by *Rubiaceae, Amaranthaceae* and *Euphorbiaceae* while the lowest (IVI) were recorded by *Urbilaceae, Piperaceae* and *Loganiaceae* (fig. 27). For the forb families of the current usage farming site at flat and slopy locations, the same scenario played out. *Rubiaceae, Amaranthaceae* and *Euphorbiaceae* recorded the highest (IVI)at both flat and slopy locations while Urticaceae, Piperaceae and Loganiaceae recorded the lowest (IVI) relief (fig. 28).

Scale X = 1:10 cm
Y = 1:10 cm

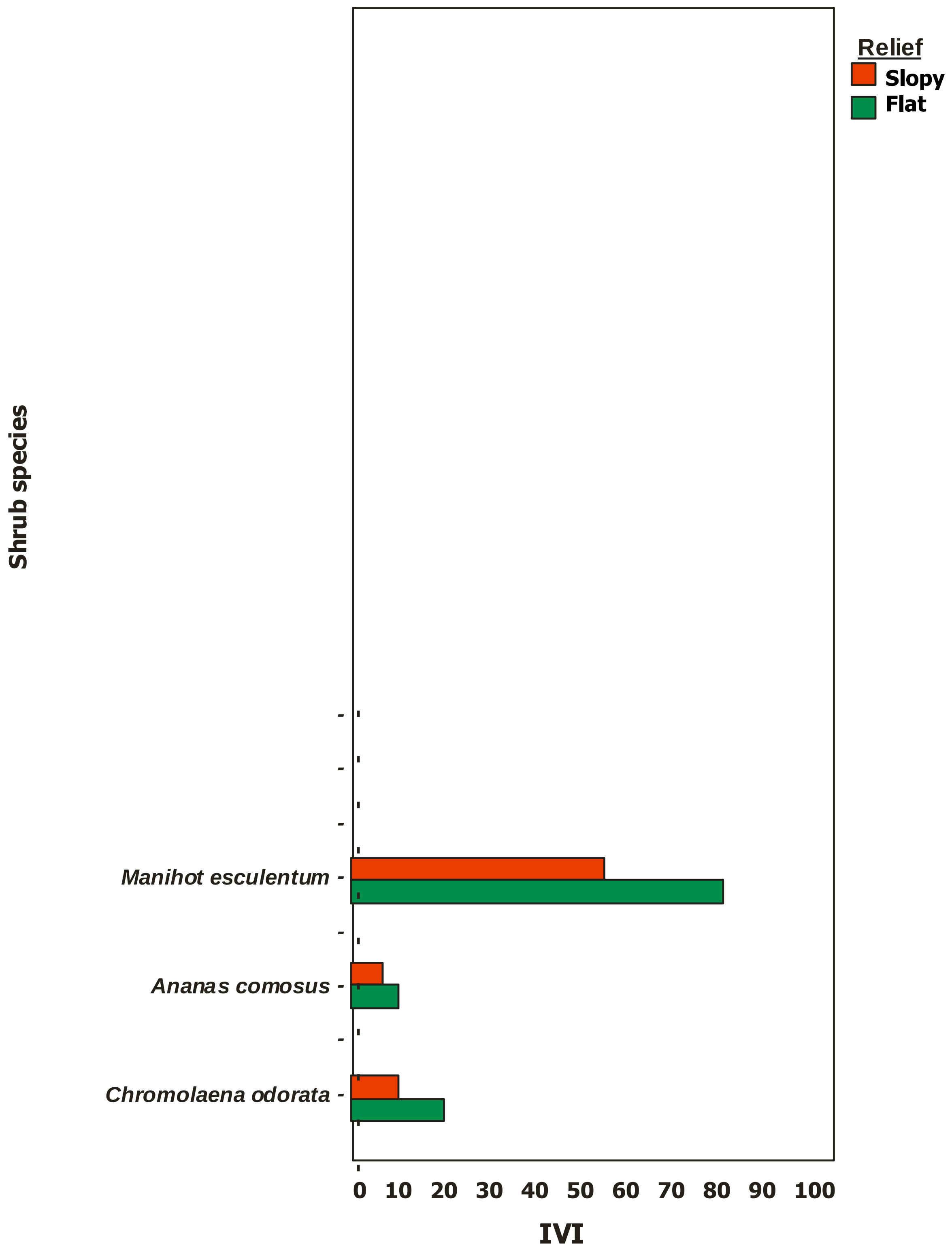

Fig. 17: Importance values of shrub species of the short term fallow site at flat and slopy locations

Effects of season and relief on Importance values of the watershed sites

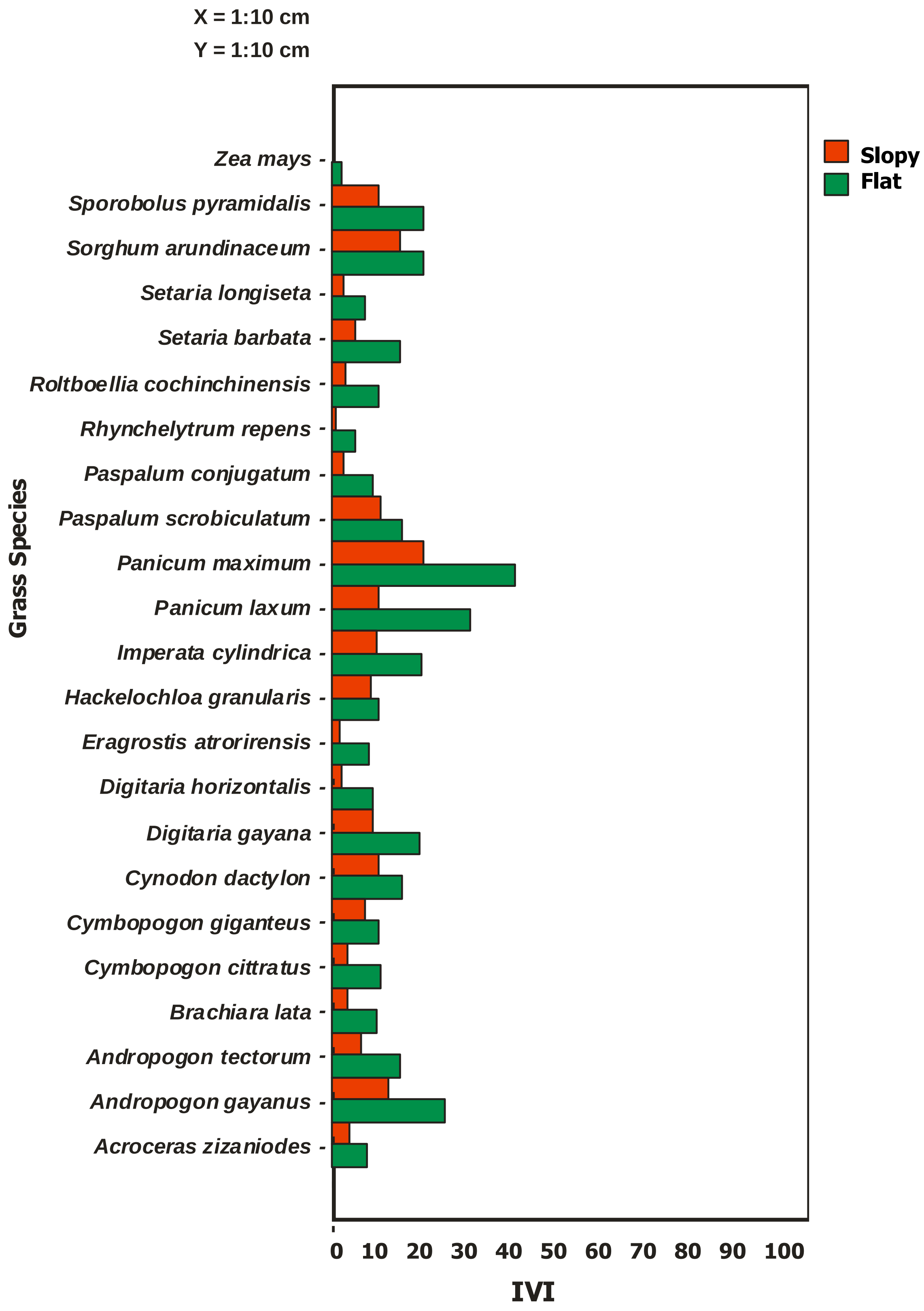

Fig. 18: Importance values of grass species of the short term fallow site during the rainy and dry season.

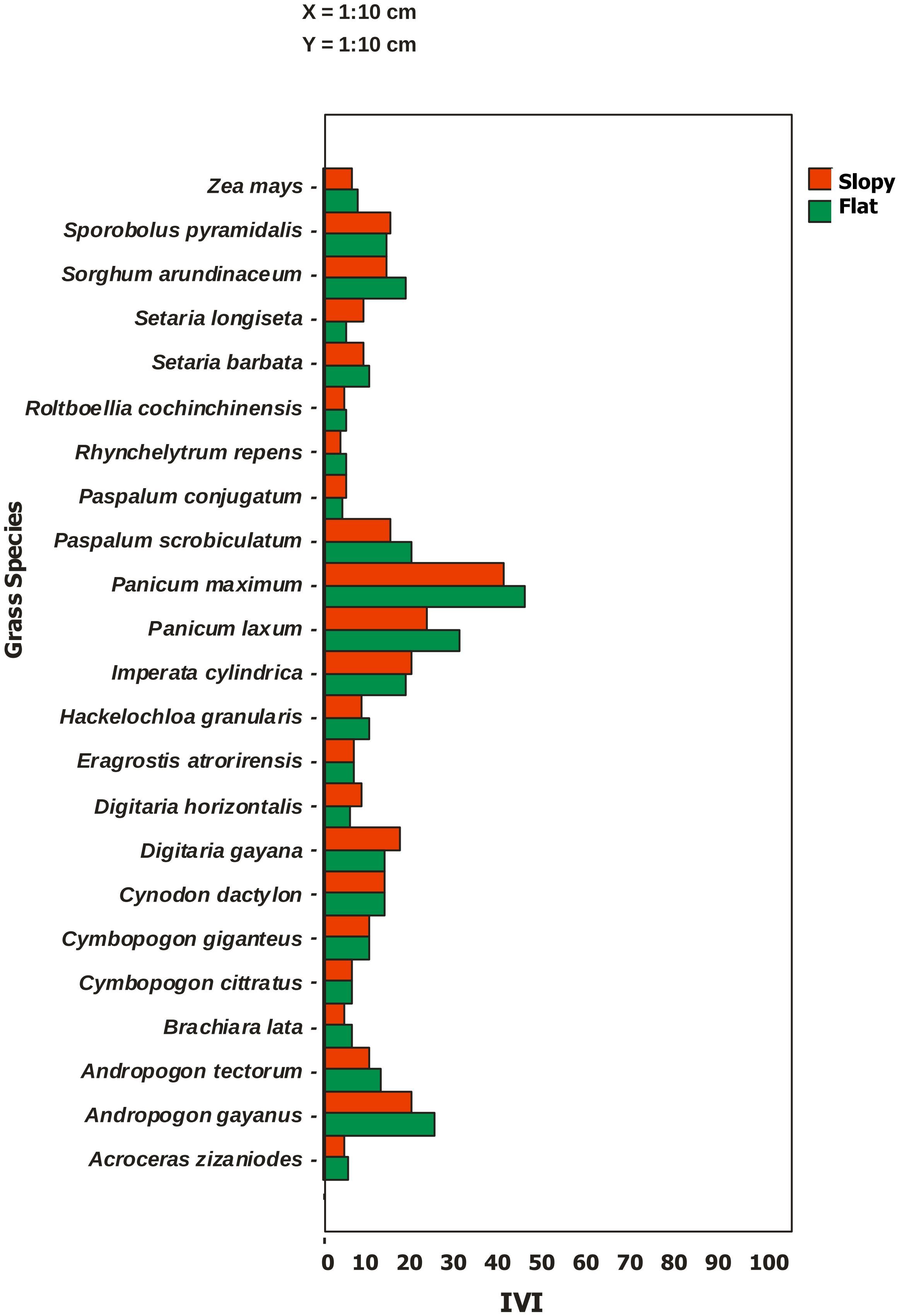

Fig. 19: Importance values of grass species of the short term fallow site at flat and slopy locations

X = 1:10 cm
Y = 1:10 cm

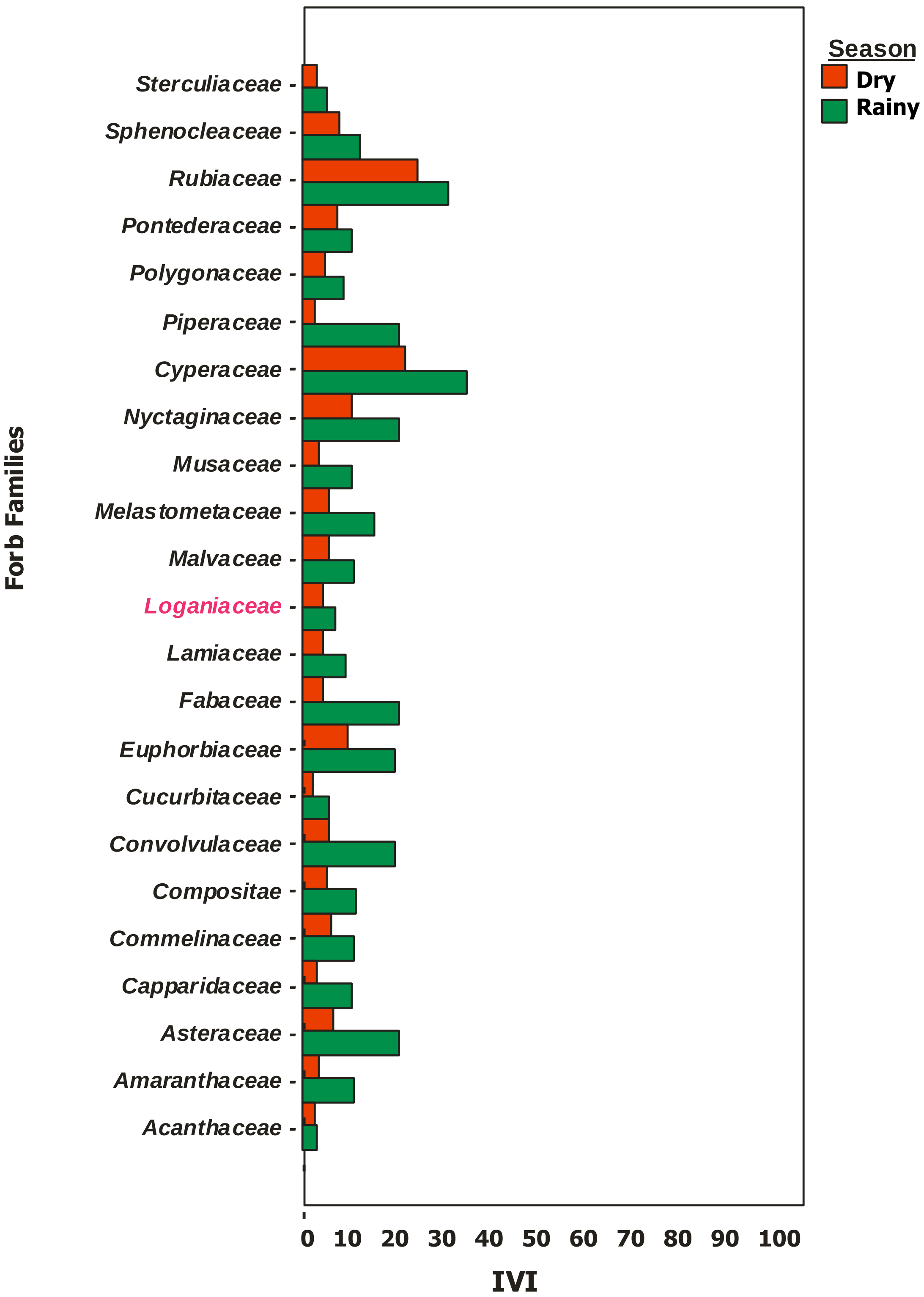

Fig. 20: Importance values of forb families of the short term fallow site during the rainy and dry seasons.

X = 1:10 cm
Y = 1:10 cm

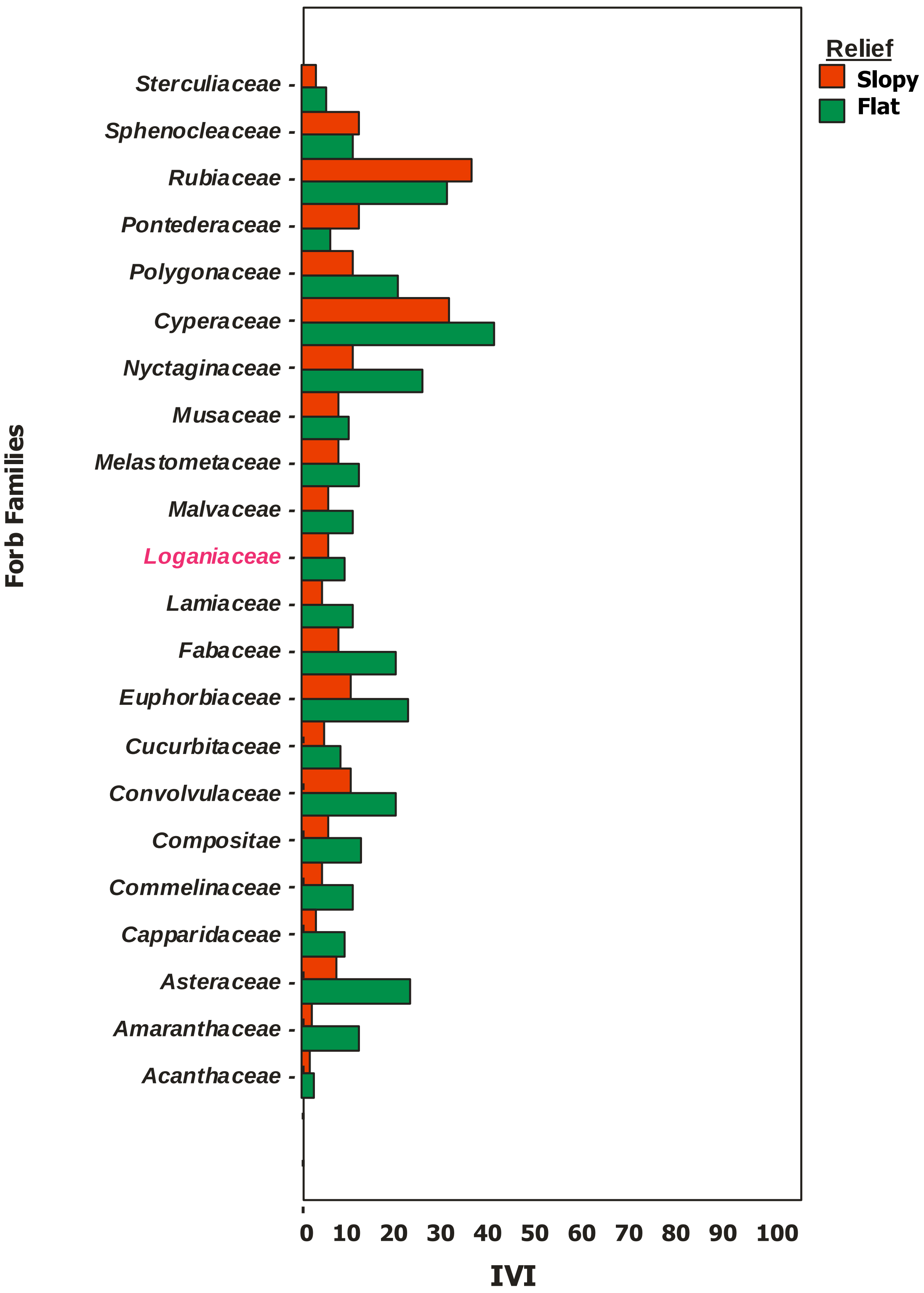

Fig. 21: Importance values of forb families of the short term fallow site at flat and slopy locations

X = 1:5 cm

Y = 1:10 cm

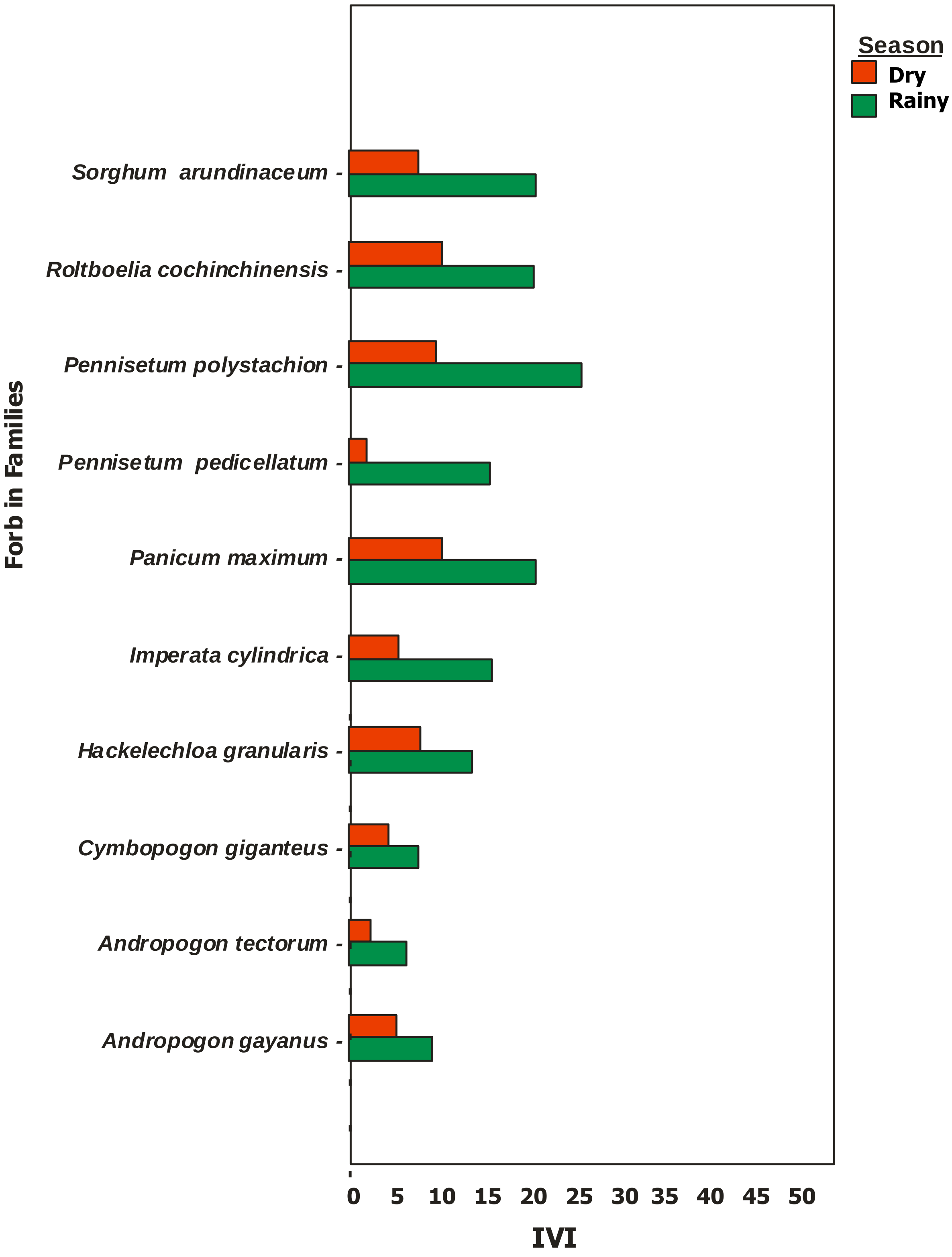

Fig. 22: Importance values of grass species of the long term fallow site during the rainy and dry seasons

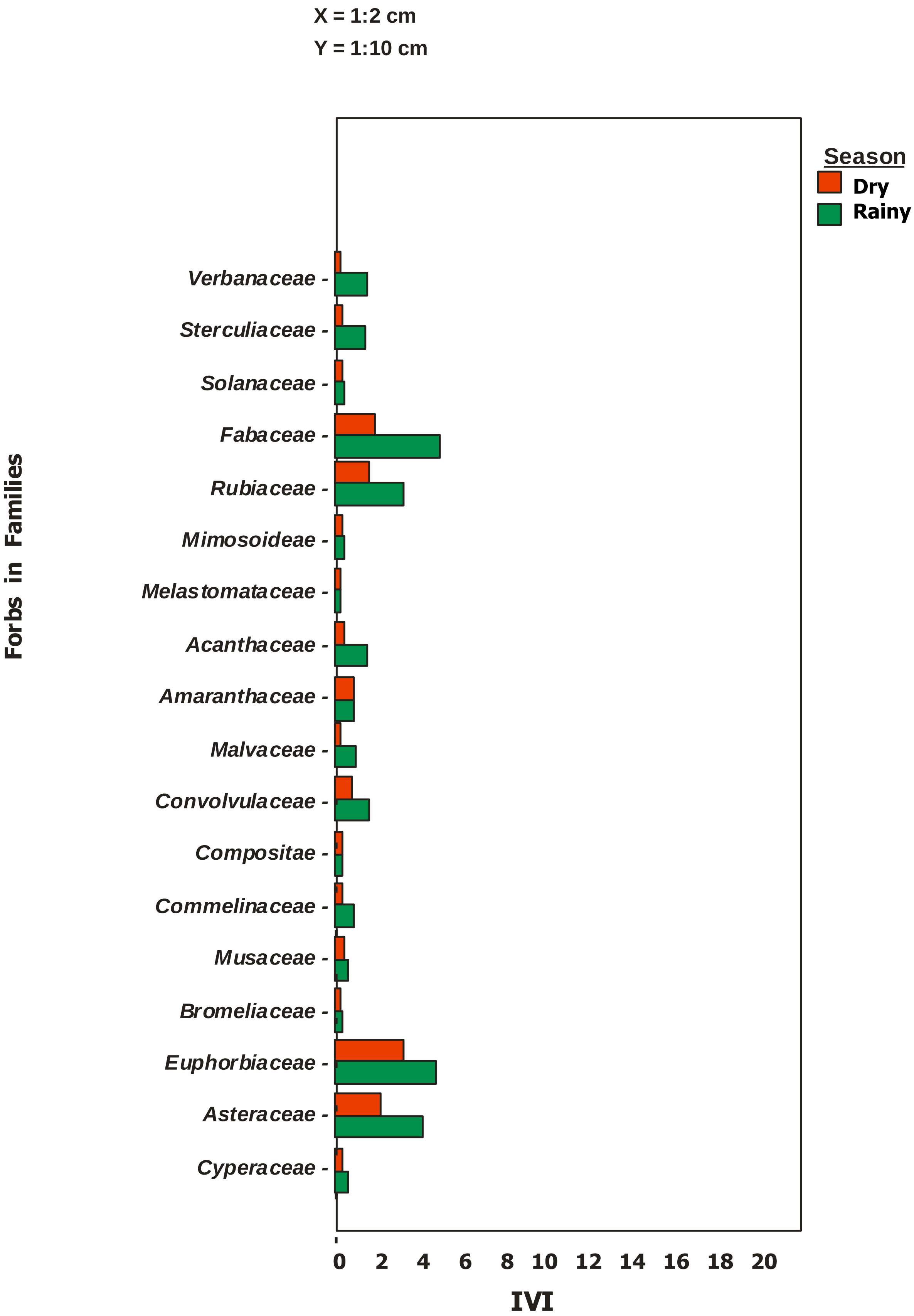

Fig. 23: Importance values of forb families of the long term fallow site during the rainy and dry seasons

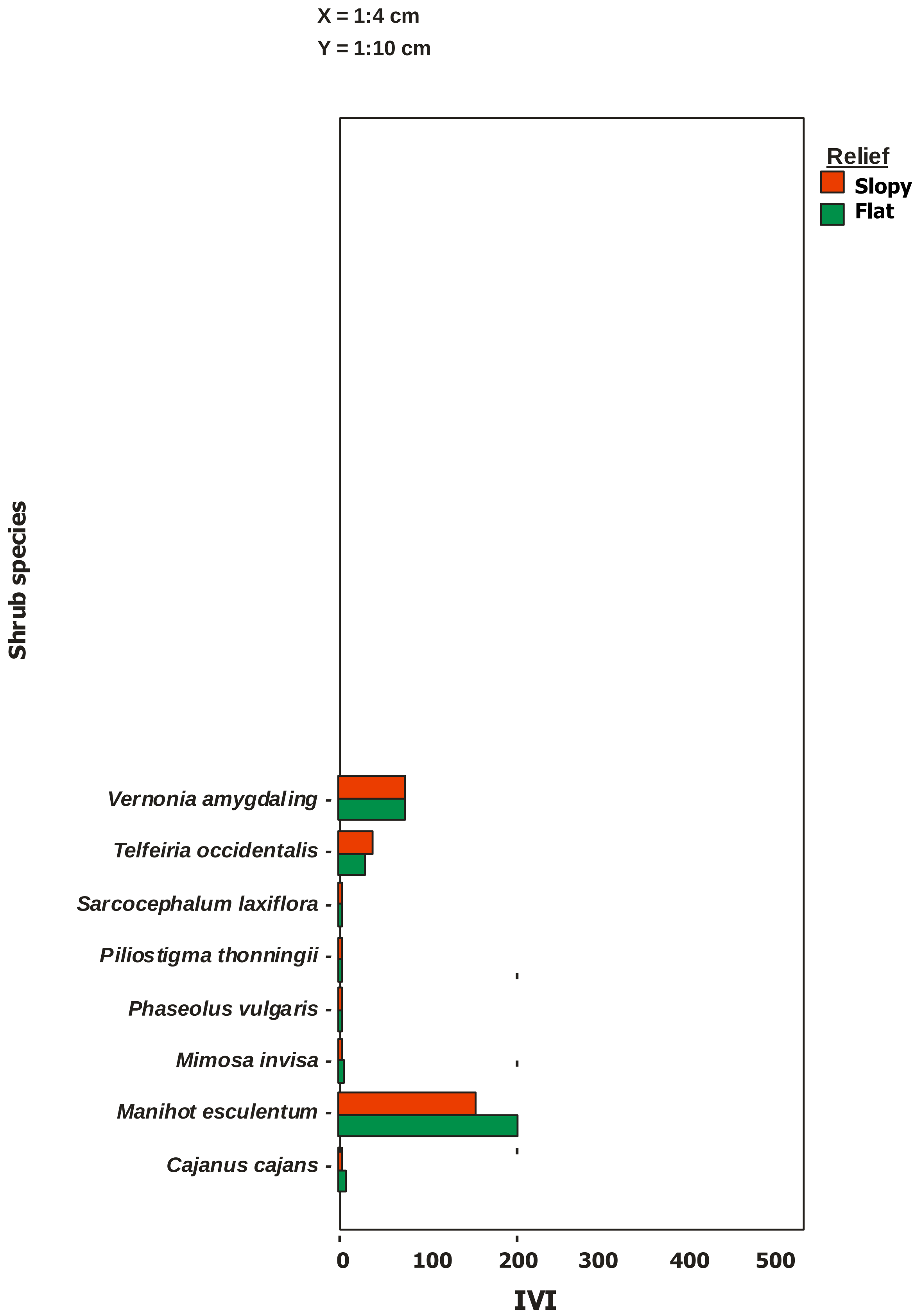

Fig. 24: Importance values of shrub species of the current usage farming site at flat and slopy locations.

X = 1:2 cm
Y = 1:20 cm

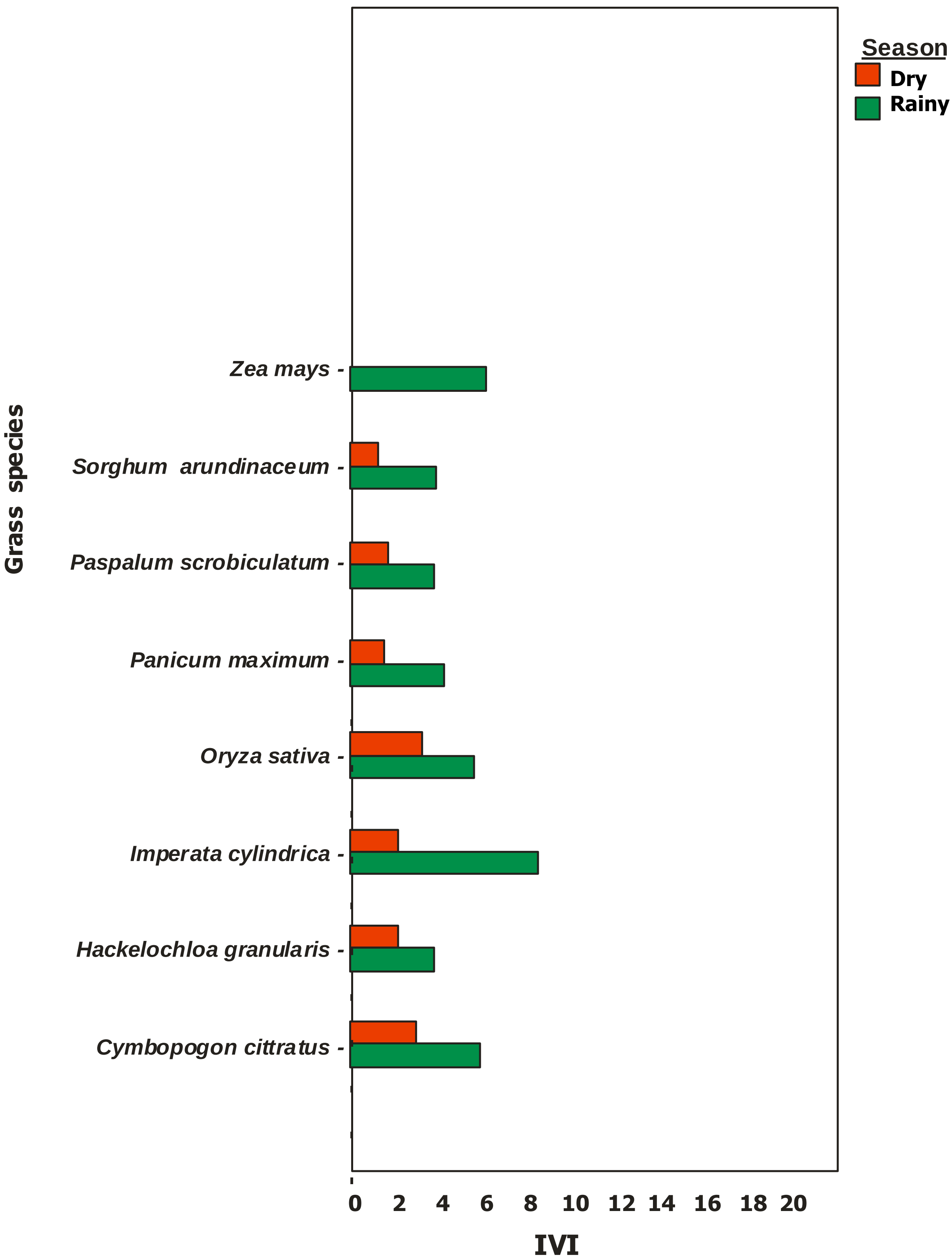

Fig. 25: Importance values of grass species of the current usage farming site during the rainy and dry seasons

X = 1:5 cm
Y = 1:20 cm

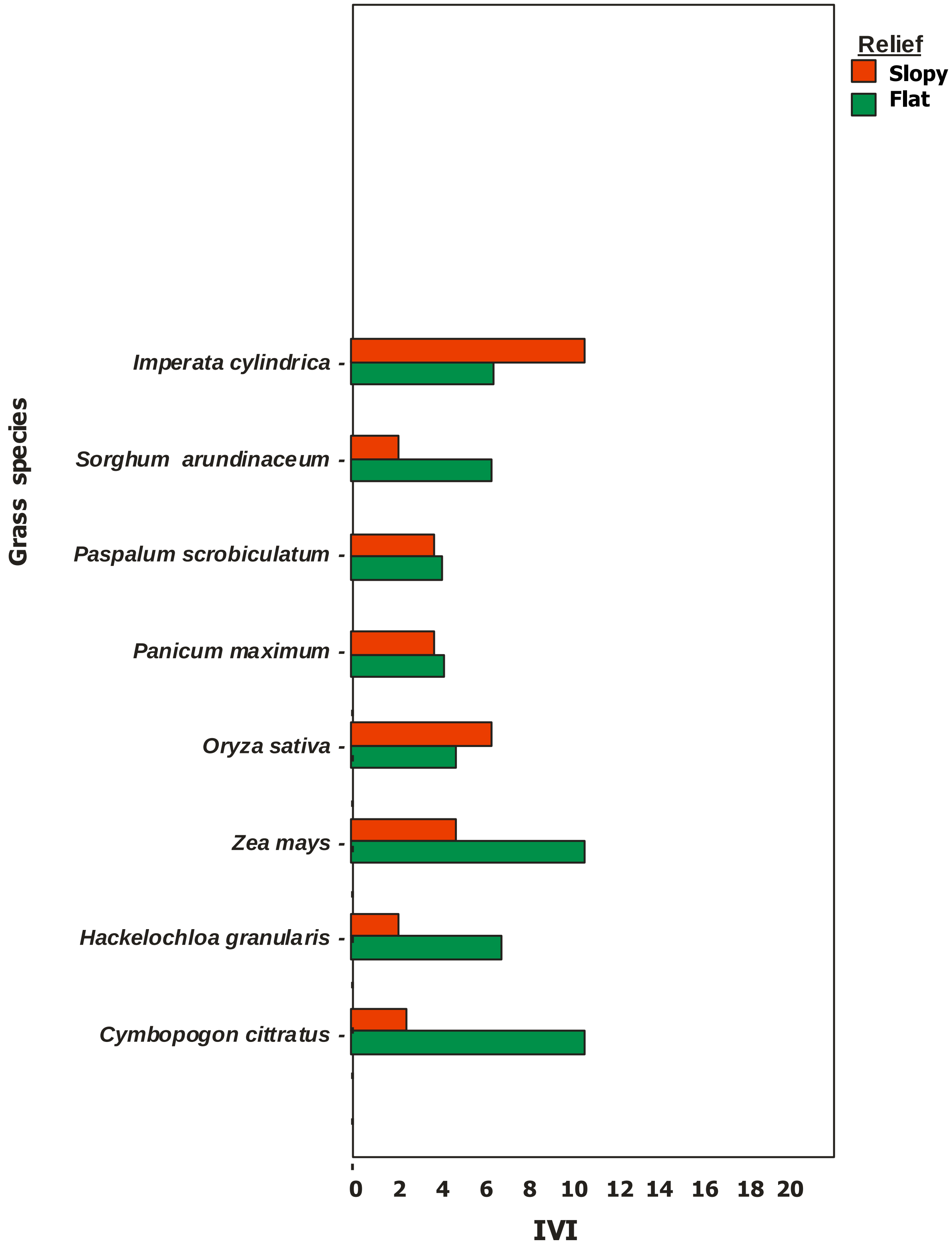

Fig. 26: Importance values of grass species of the current usage farming site during at flat and slopy locations

X = 1:5 cm
Y = 1:10 cm

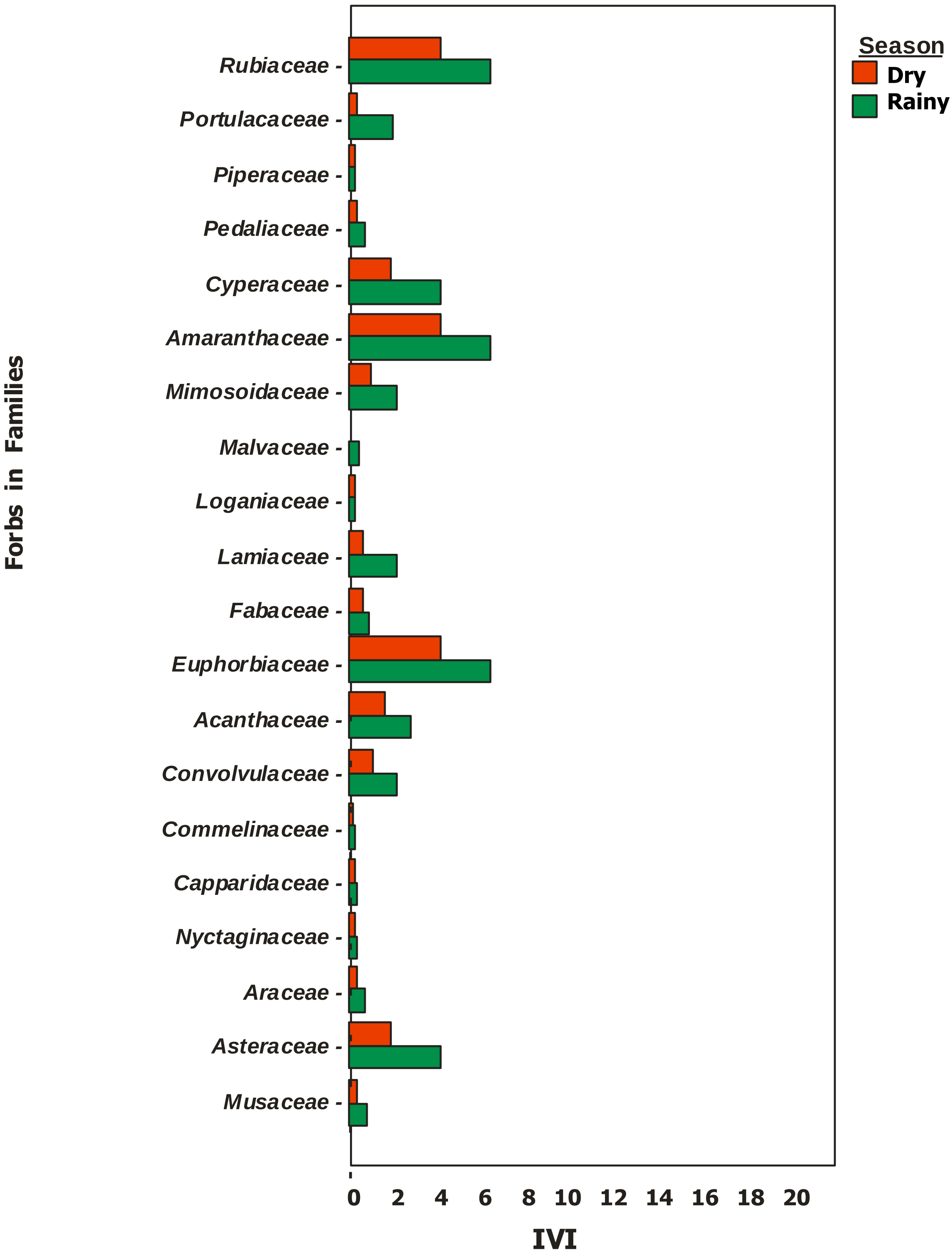

Fig. 27: Importance values of forb families of the current usage farming site during the rainy and dry seasons

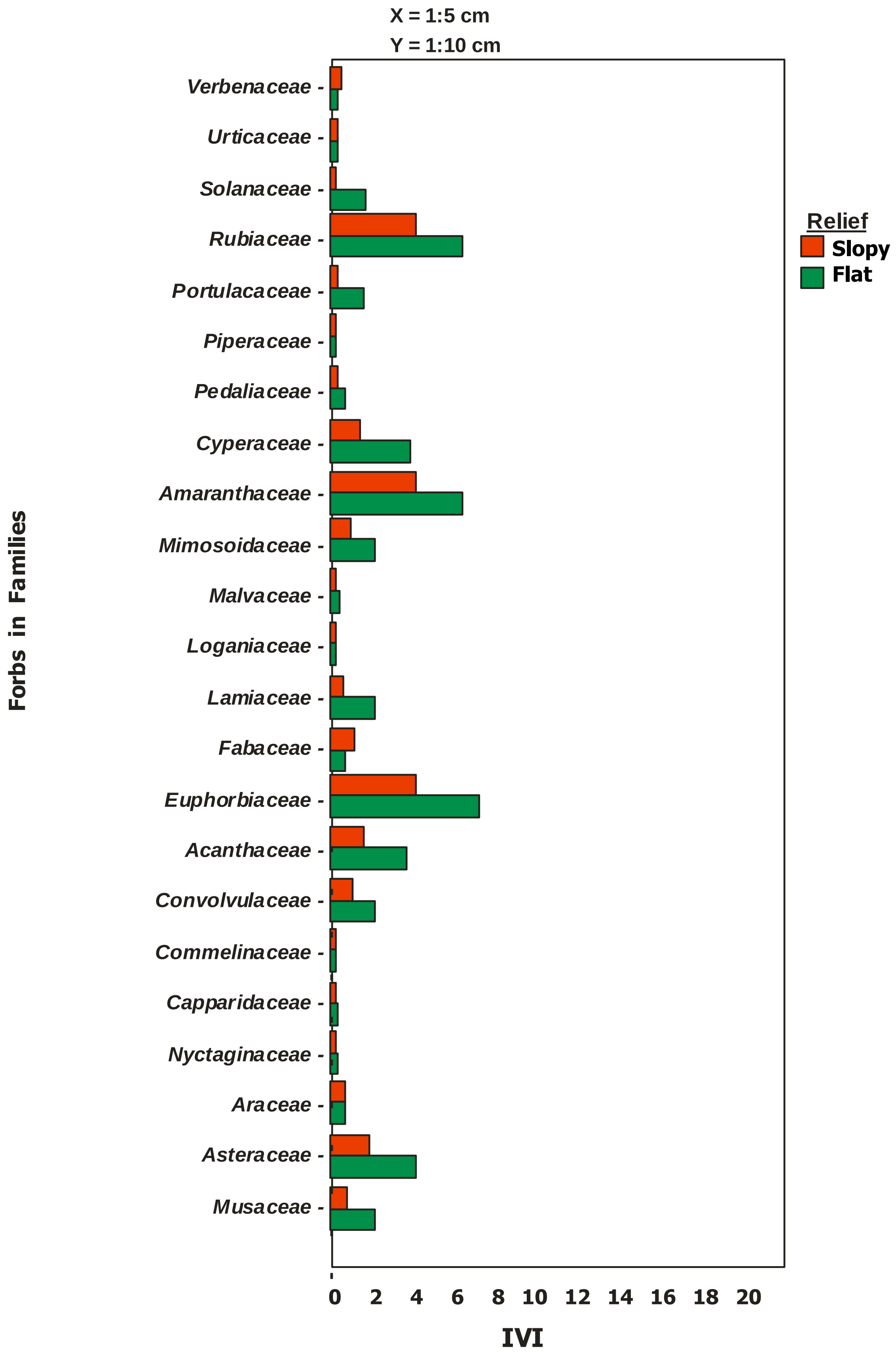

Fig. 28: Importance values of forb families of the current usage farming site during flat and slopy location

Table 8: T-test results on Effects of Independent variables on Dependent variables (Growth Forms)

S/N	Fully Independent Variable	Sites	Growth Form	Effects (value)	Remarks
1	Season (Rainy and dry)	Short term fallow site	Grass	0.0095<0.05	Significant Difference
2	Season (Rainy and dry)	Short term fallow site	(Forbs in families)	0.04<0.05	Significant Difference
3	Season (Rainy and dry)	Long term fallow site	Grass	-0.004<0.05	Significant Difference
4	Season (Rainy and dry)	Long term fallow site	(Forbs in families)	0.099>0.05	Non- Significant Difference
5	Season (Rainy and dry)	Current usage farming site	Grass	-0.05<0.05	Significant Difference
6	Season (Rainy and dry)	Current usage farming site	(Forbs in families)	0.07>0.05	Non- Significant Difference
7	Season (Rainy and dry)	Current usage farming site	Grass	-0.115<0.05	Significant Difference
8	Season (Rainy and dry)	Current usage farming site	(Forbs in families)	-4.45<0.05	Significant Difference
	6/8				**6:8 (3:4)**
9	Land use (Managed and Not Managed)	Short term fallow site	Grass	0.06>0.05	Non- Significant Difference
10	Land use (Managed and Not Managed)	Short term fallow site	(Forbs in families)	0.08>0.05	Non- Significant Difference
11	Land use (Managed and Not Managed)	Long term fallow site	Grass	-0.07<0.05	Significant Difference
12	Land use (Managed and Not Managed)	Long term fallow site	(Forbs in families)	0.11>0.05	Non- Significant Difference
	3/4				**3:4**
13	Relief (Flat and slopy)	Short term fallow site	Grass	0.16>0.05	Non-Significant Difference
14	Relief (Flat and slopy)	Short term fallow site	(Forbs in families)	-0.06<0.05	Significant Difference
15	Relief (Flat and slopy)	Current usage farming site	Grass	-0.053>0.05	Non- Significant Difference
16	Relief (Flat and slopy)	Current usage farming site	(Forbs in families)	-0.05<0.05	Significant Difference
	2/4($^1/_2$)				**1:2**

4.5: Effects of Seasons, Land use and Relief on Importance values of Encountered species

From Table 8, for seasons there was a great significant difference between Rainy season and Dry season values. This significance was 75% showing that plant growth and development between the rainy season and dry season was not equal, growth and development indices therefore was higher in the rainy season. Again for land use, there was a very reasonable non significant difference between plant growth and development between the managed and not managed sites. This non significance was 75%, depicting that plant growth and development to a large extent was not dependent on management indices (factors). Finally, for the relief (flat and slopy) Topography, significance and non significance levels were at par (50%). This depicts that Relief was not a very important factor (determining factor) on plant growth and Development at the project site (Amawbia watershed)

4.6 Soil Properties of the Watershed

4.6.1 Effect of Season and Soil Depth on the Soil Properties of the Watershed

Figure 33 shows the effect of season on the soil pH of the watershed. The figure depict that during the dry season the soil pH of the watershed is highest in the long term fallow site while during the rainy season the soil pH is highest in the current usage farming site. The figure also depict that in most of the site (with the exception of current usage farming site) the soil pH is highest during the dry season than in the rainy season.

Figure 34 shows the effect of season on the percentage total nitrogen of the watershed. The figure depict that during the dry season the percentage total nitrogen of the watershed is highest in the forest site while during the rainy season the percentage total nitrogen is lowest in the forest site.

Figure 35 shows the effect of season on the percentage organic carbon of the watershed. The figure depict that during the dry season the percentage organic carbon of the watershed is highest in the long term fallow site while during the rainy season the percentage organic carbon is highest in the short term fallow site. The figure also depict that in all the site percentage organic carbon is highest during the dry season than in the rainy season

Figure 36 shows the effect of season on the percentage organic matter of the watershed. The figure depict that during the dry season the percentage organic matter of the watershed is highest in the long term fallow site while during the rainy season the percentage organic matter is highest in the current usage farming site. The figure also depict that in all the site percentage organic matter is highest during the dry season than in the rainy season

Figure 37 shows the effect of soil depth on the percentage total nitrogen of the watershed. The figure depict that at soil depth of 0-20, the percentage total nitrogen of the watershed is highest in the forest site while at soil depth of 20-40 cm the percentage total nitrogen is highest in the short term fallow site. The figure also depicts that in most of the site (with the exception of short term fallow site) that the percentage total nitrogen is highest at soil depth of 0-20 cm than 20-40 cm depth.

Figure 38 shows the effect of soil depth on the soil pH of the watershed. The figure depict that at soil depth of 0-20 cm, the soil pH of the watershed is highest in the current usage farming site while at soil depth of 20-40 cm the soil pH is also highest in current usage farming site. The figure also depicts that in most of the site (with the exception of forest site) that the soil pH is highest at soil depth of 0-20 cm than 20-40 cm depth.

Figure 39 shows the effect of soil depth on the percentage organic carbon of the watershed. The figure depict that at soil depth of 0-20 cm, the percentage organic carbon of the watershed is highest in the long term fallow site while at soil depth of 20-40 cm the percentage organic carbon is also highest in the long term fallow site. The figure also depicts that in all site the percentage organic carbon is highest at soil depth of 0-20 cm than 20-40 cm depth.

Figure 40 shows the effect of soil depth on the percentage organic matter of the watershed. The figure depict that at soil depth of 0-20, the percentage organic matter of the watershed is highest in the long term fallow site while at soil depth of 20-40 cm the percentage organic matter is also highest in the long term fallow site. The figure also depicts that in all site the percentage organic matter is highest at soil depth of 0-20 cm than 20-40 cm depth.

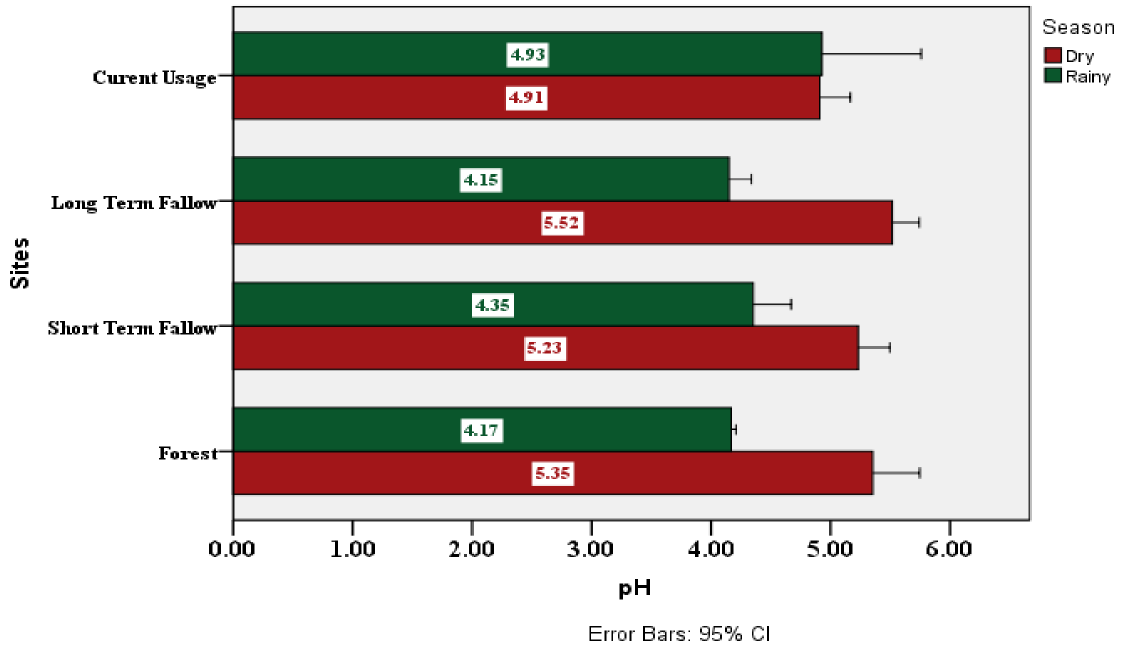

Figure 29: Effect of season on the soil pH of the watershed

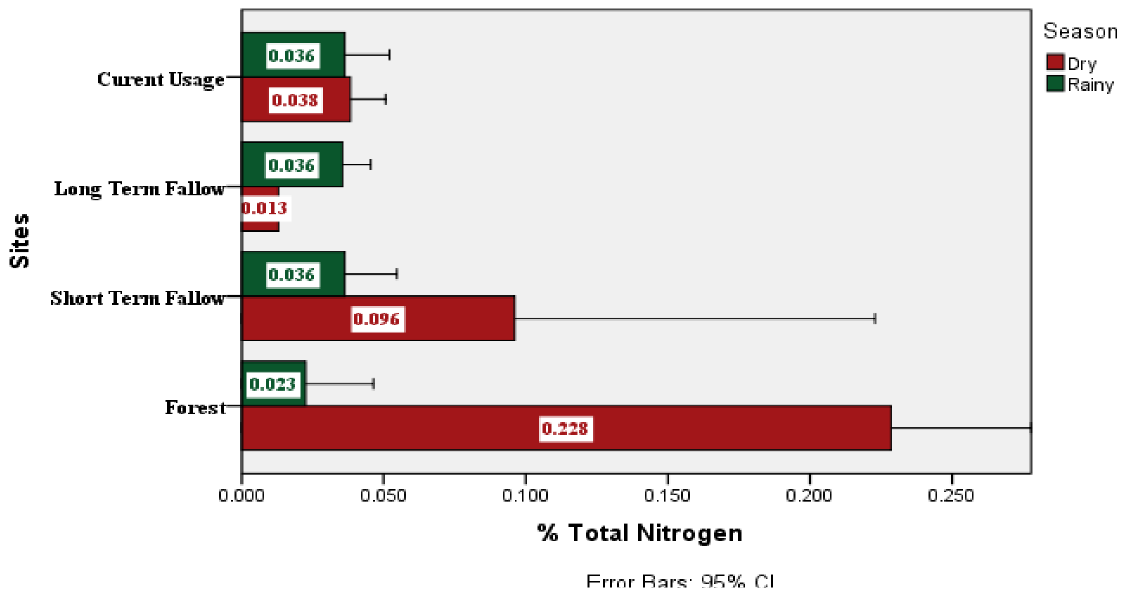

Figure 30: Effect of season on the percentage total nitrogen of the watershed

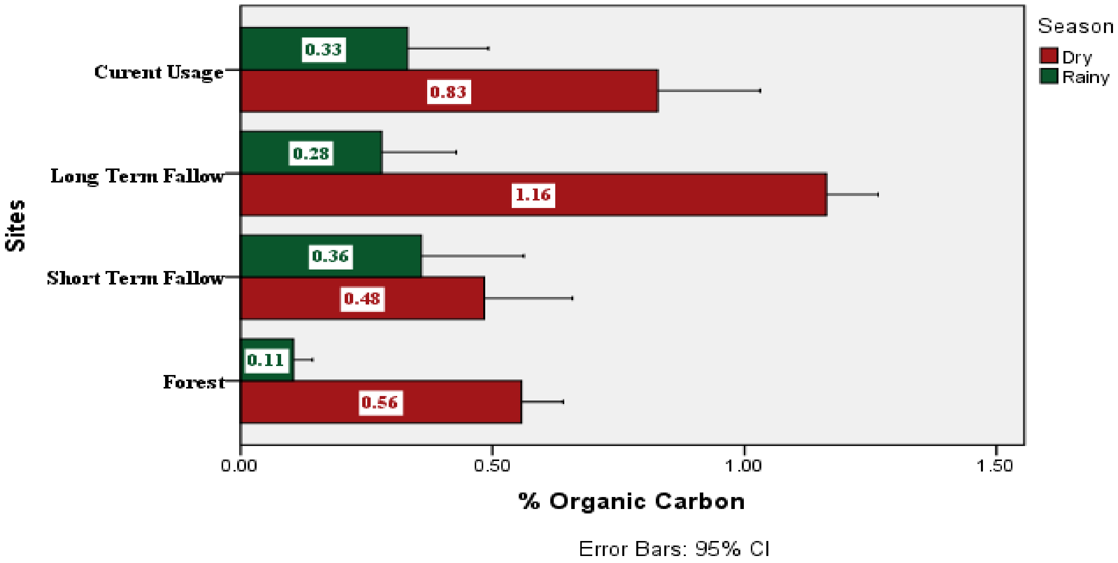

Figure 31: Effect of season on the percentage organic carbon of the watershed.

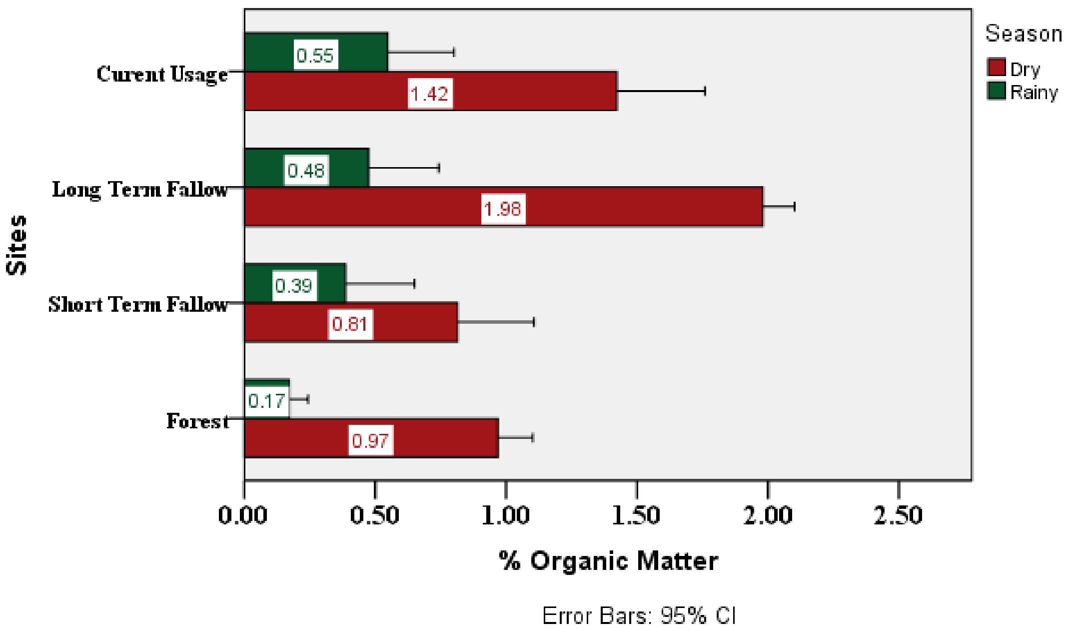

Figure 32: Effect of season on the percentage organic matter of the watershed

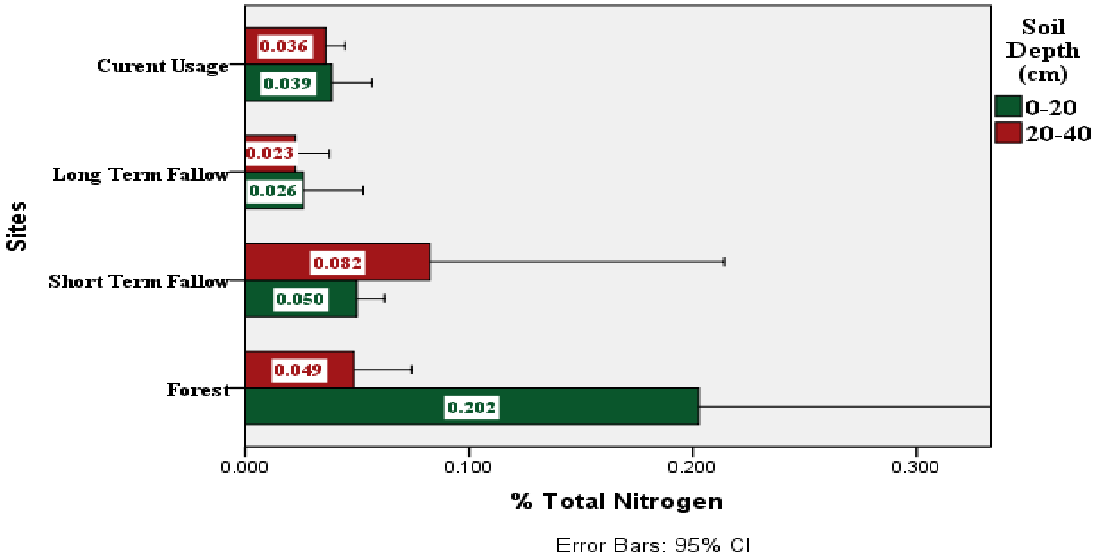

Figure 33: Effect of soil depth on the percentage total nitrogen of the watershed.

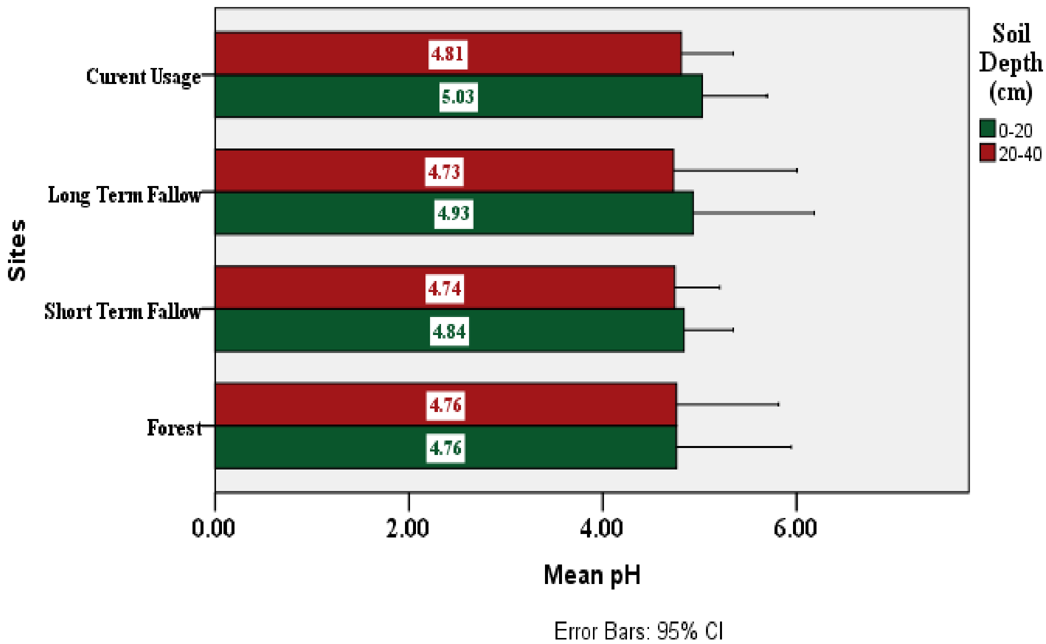

Figure 34: Effect of soil depth on the soil pH of the watershed

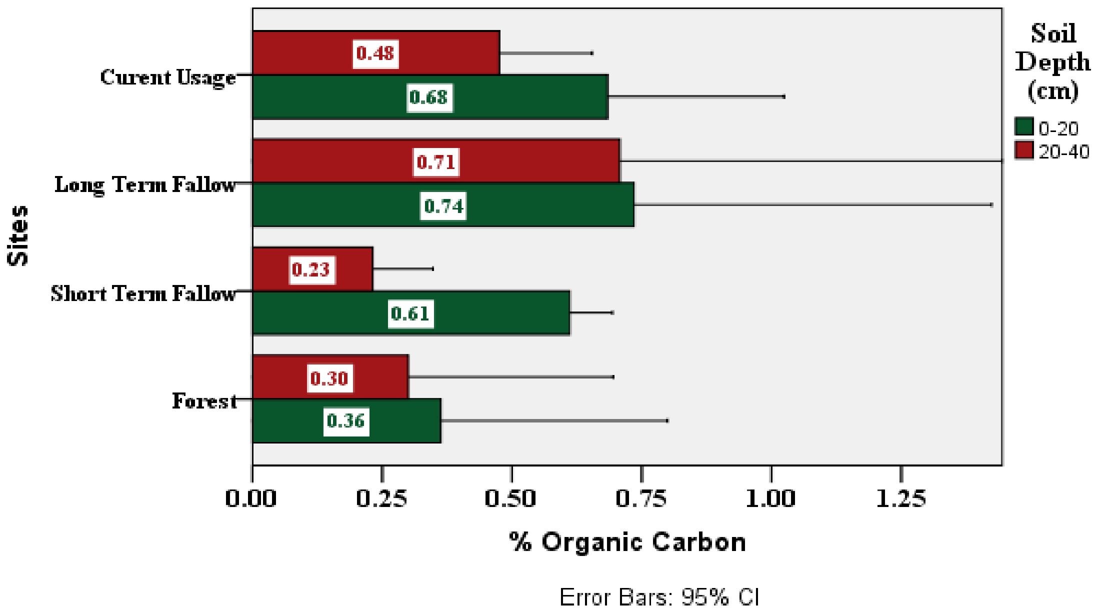

Figure 35: Effect of soil depth on the percentage organic carbon of the watershed

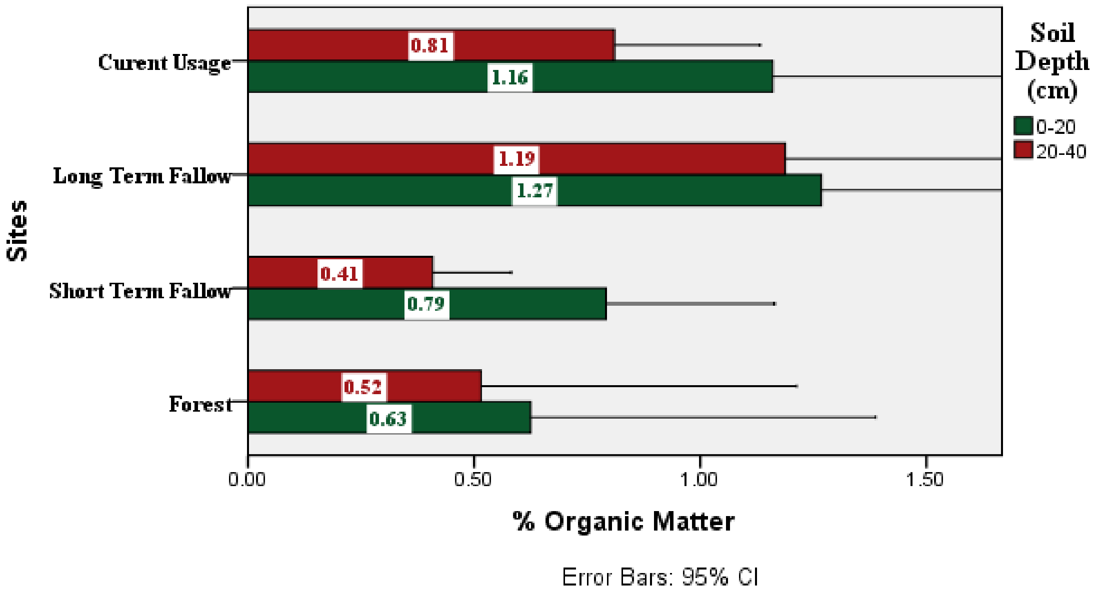

Figure 36: Effect of soil depth on the percentage organic matter of the watershed

Table 9: shows the analysis of variance of the soil properties of the watershed by site, season and soil depth. With respect to percentage total nitrogen the table indicates that there is no significant difference in the percentage total nitrogen between sites, soil depth and season (P>0.05). There is also no interaction between sites, soil depth and season on the percentage total nitrogen of the watershed (P>0.05). With respect to soil pH the table indicates that there is only significant difference in soil pH of the watershed between season (P<0.05) but no significance between site and between soil depth (P>0.05). There is no interaction between site, soil depth and season (P>0.05). With respect to percentage organic carbon, the table indicates that there is a significant difference in the percentage organic carbon of the watershed between site, soil depth and season (P<0.05). There is only interaction between site and soil depth, and between site and season (P<0.05) but no interaction between season and soil depth. With respect to organic matter, the table indicates that there is a significant difference in the organic matter of the watershed between site, season and soil depth (P<0.05). There is only interaction between site and season (P<0.05) but no interaction between site and soil depth and between soil depth and season (P<0.05).

Table 9: Analysis of Variance of the soil properties of the watershed by site, season and soil depth

		Main Effects			Interaction Effect			
Soil Properties		Site	Soil Depth	Season	Site* Soil Depth	Site* Season	Soil Depth* Season	Site* Soil Depth*Season
% Total Nitrogen	F-ratio	1.603	0.978	3.614	1.457	2.064	0.521	2.524
	P-value	0.208	0.330	0.066	0.245	0.125	0.476	0.075
Soil pH	F-ratio	0.220	0.605	26.986	0.091	4.096	0.041	0.032
	P-value	0.882	0.442	0.000	0.964	0.019	0.840	0.992
% Organic Carbon	F-ratio	16.000	18.076	150.151	4.428	15.698	0.014	2.542
	P-value	0.000	0.000	0.000	.015	.005	0.907	.074
% Organic Matter	F-ratio	17.258	9.677	147.570	1.133	8.914	0.769	1.752
	P-value	0.000	0.004	0.000	0.351	0.000	0.387	0.176

4.5.2 Effect of Relief on Soil Properties of the Short Term Fallow Site and Current Usage Farming Site

Figure 37 shows the effect of relief on the percentage total nitrogen of the current usage farming site and short term fallow site. The figure depict that the percentage total nitrogen of both site is highest at flat relief and lowest at slopy relief. In table 10 the analysis of variance shows no significant difference in the percentage total nitrogen between flat and slopy relief (P>0.05).

Figure 38 shows the effect of relief on the soil pH of the current usage farming site and short term fallow site. The figure depict that the soil pH of the current usage farming site is highest at flat relief and lowest at slopy relief while that of short term fallow site is highest at slopy relief and lowest at flat relief. In table 10 the analysis of variance shows no significant difference in the soil pH between flat and slopy relief (P>0.05)

Figure 39 shows the effect of relief on the percentage organic carbon of the current usage farming site and short term fallow site. The figure depict that the percentage organic carbon of the short term fallow site is highest at flat relief and lowest at slopy relief while that of current usage farming site is highest at slopy relief and lowest at flat relief. In table 10 the analysis of variance shows no significant difference in the percentage organic carbon between flat and slopy relief (P>0.05).

Figure 40 shows the effect of relief on the percentage organic matter of the current usage farming site and short term fallow site. The figure depict that the percentage organic matter of both sites is highest at slopy relief and lowest at flat relief. In table 10 the analysis of variance shows no significant difference in the percentage organic matter between flat and slopy relief (P>0.05).

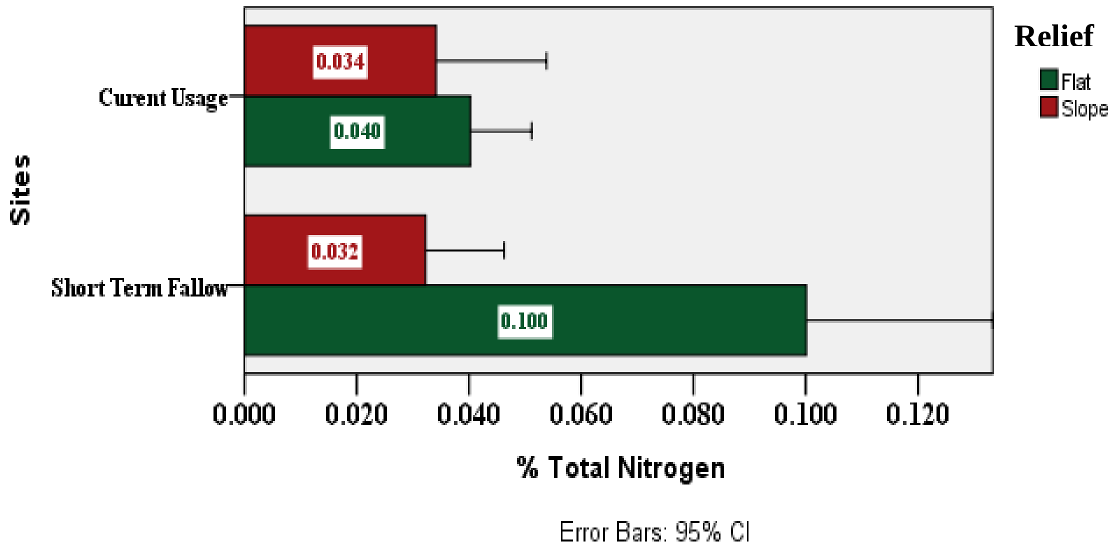

Figure 37: Effect of relief on the percentage total nitrogen of the current usage farming site and short term fallow site

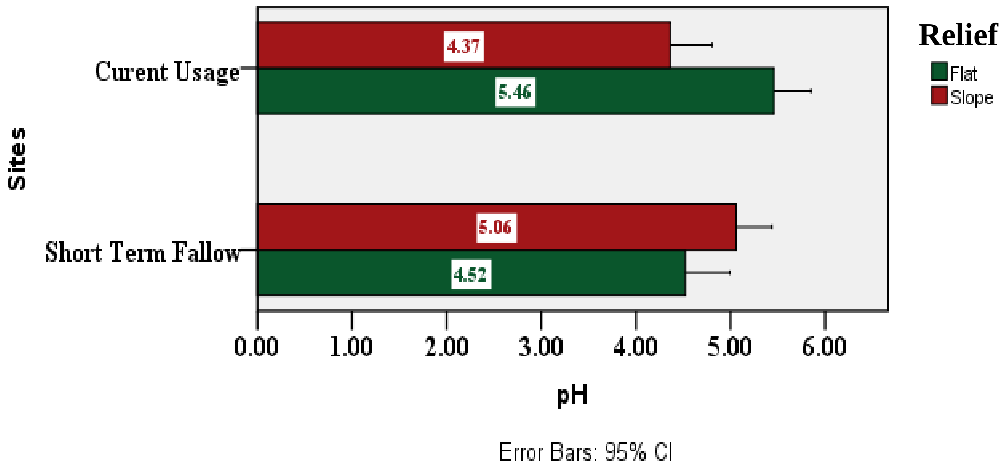

Figure 38: Effect of relief on the soil pH of the current usage farming site and short term fallow site

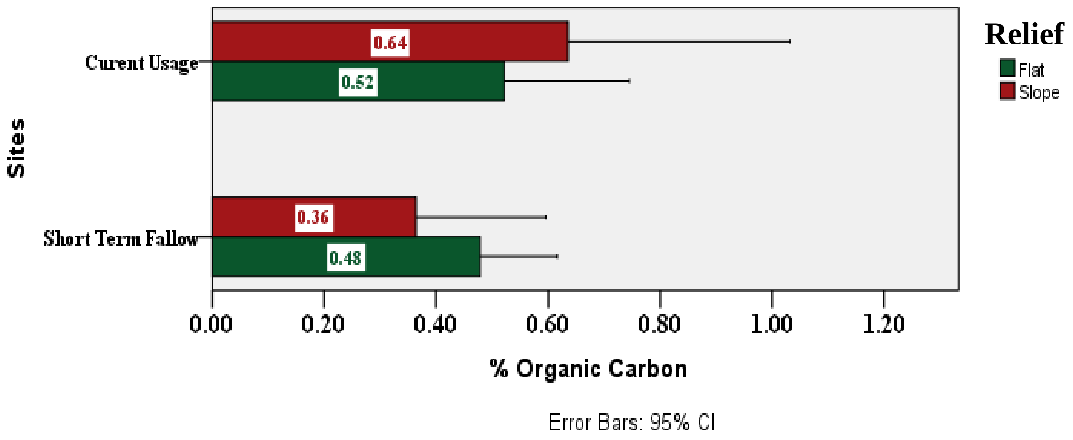

Figure 39: Effect of relief on the percentage organic carbon of the current usage farming site and short term fallow site

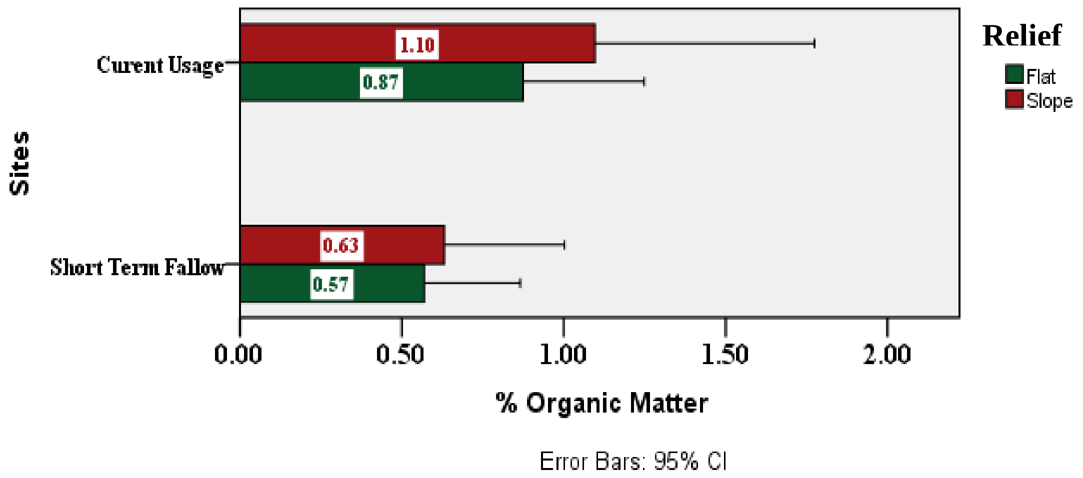

Figure 40: Effect of relief on the percentage organic matter of the current usage farming site and short term fallow site

Table 10: Analysis of variance of Effect of Relief on soil Properties of the short term fallow and Current Usage Farming site.

Soil Properties	F-ratio	p-value
% Total Nitrogen	1.738	.198
pH	.596	2.458
% Organic Carbon	.000	.998
% Organic Matter	.156	.611

4.5.3 Effect of Season on $MgC0_2$/kg content of the Watershed

Figure 45 shows the weekly $MgC0_2$/kg content of the different sites of the watershed. The figure depicts that the $MgC0_2$/kg content of the watershed is highest in the forest and short term site and lowest in the current usage site. There is also a weekly increase in the $MgC0_2$/kg content of the watershed. In table 26 the analysis of variance shows that there is a significant difference in the $MgC0_2$/kg content between the sites of the watershed ($P<0.05$).

Figure 46 shows $MgC0_2$/kg content of the different sites of the watershed by soil depth. The figure depicts that at soil depth of 0-20 cm the $MgC0_2$/kg of the watershed is highest in the forest while at soil depth of 20-40 cm $MgC0_2$/kg of the watershed is highest at short term fallow site. In table 27 the analysis of variance shows that there is a significant difference in the $MgC0_2$/kg content between the soil depth of the watershed ($P<0.05$). There is also interaction between soil depth and sites ($P<0.05$).

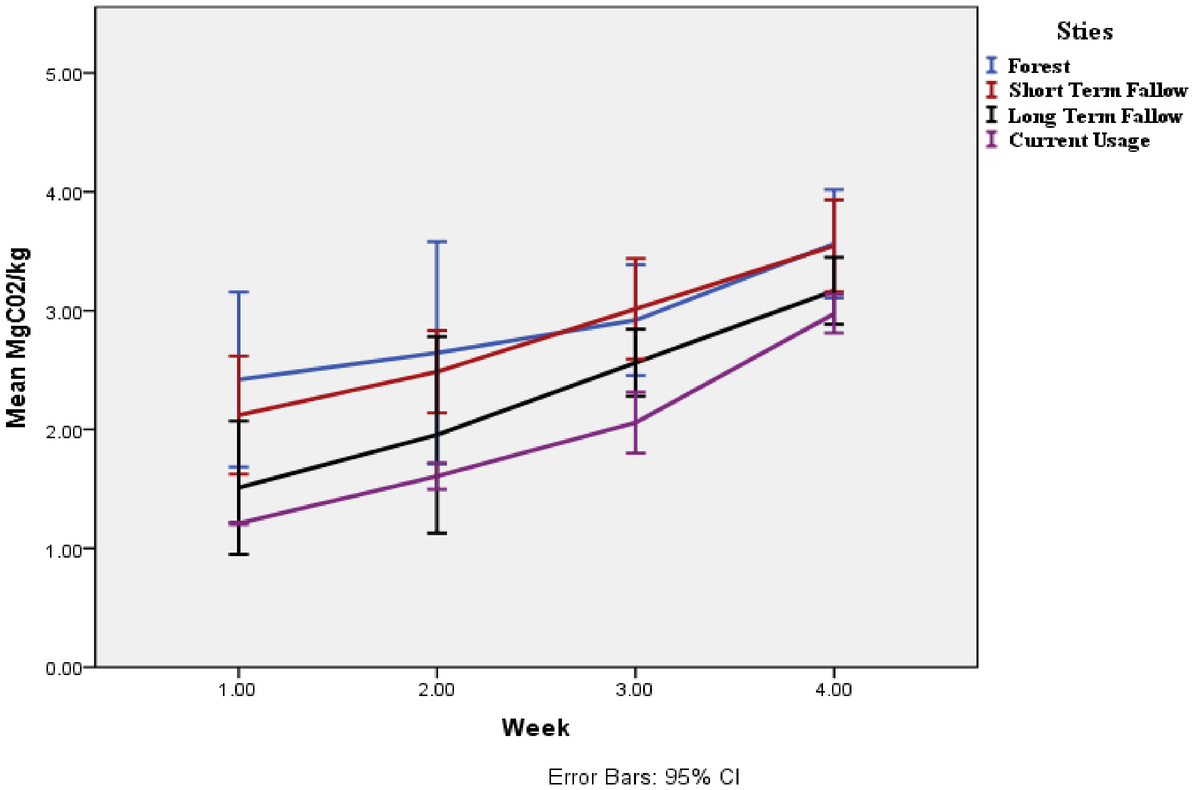

Figure 41: The weekly $MgC0_2$/kg of the different sites of the watershed

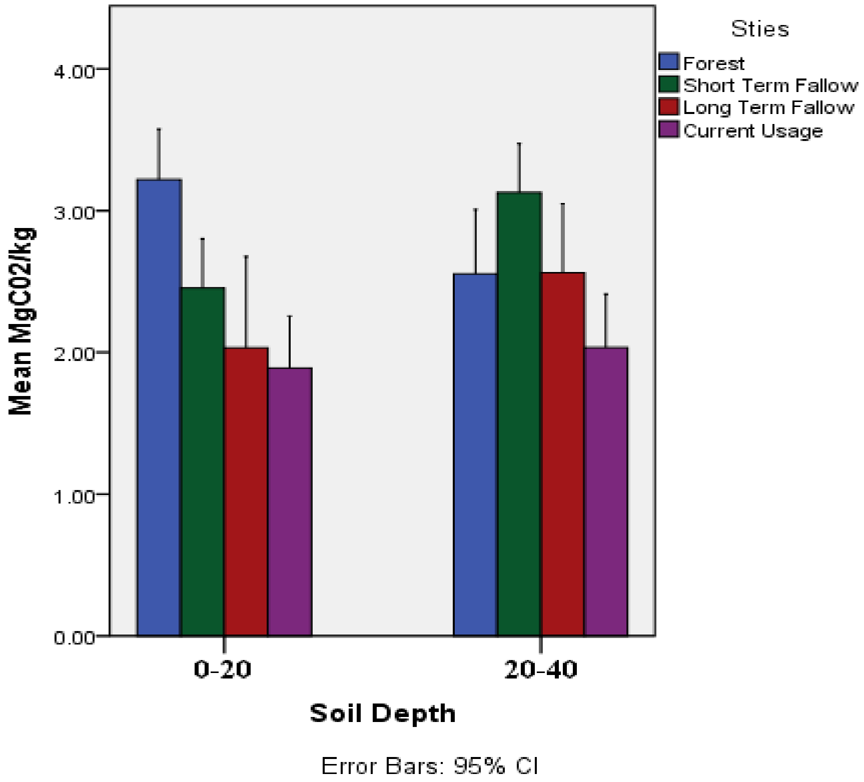

Figure 42: The MgC0$_2$/kg content of the different sites of the watershed by soil depth

Table 11: Analysis of Variance of the Effect of Season on MgC0$_2$/kg content of the Watershed

Source of Variation	F-ratio	p-value
Sites	78.039	0.000
Soil Depth	9.846	0.000
Week	141.353	0.000
Sites* Soil Depth	27.432	0.000

4.5.4: Effect of Relief on MgC0$_2$/kg content of the short term fallow site and current usage farming site

Figure 43 shows the effect of relief on the MgC0$_2$/kg content of the short term fallow site and current usage farming site. The figure depict that in short term fallow site the MgC0$_2$/kg content is highest at flat surface while that of current usage farming site is highest at the slopy relief. In table 12 the analysis of variance indicates no significant difference in the MgC0$_2$/kg content between flat and slopy relief of the short term fallow site and current usage farming site but significant between sites ($P<0.05$)

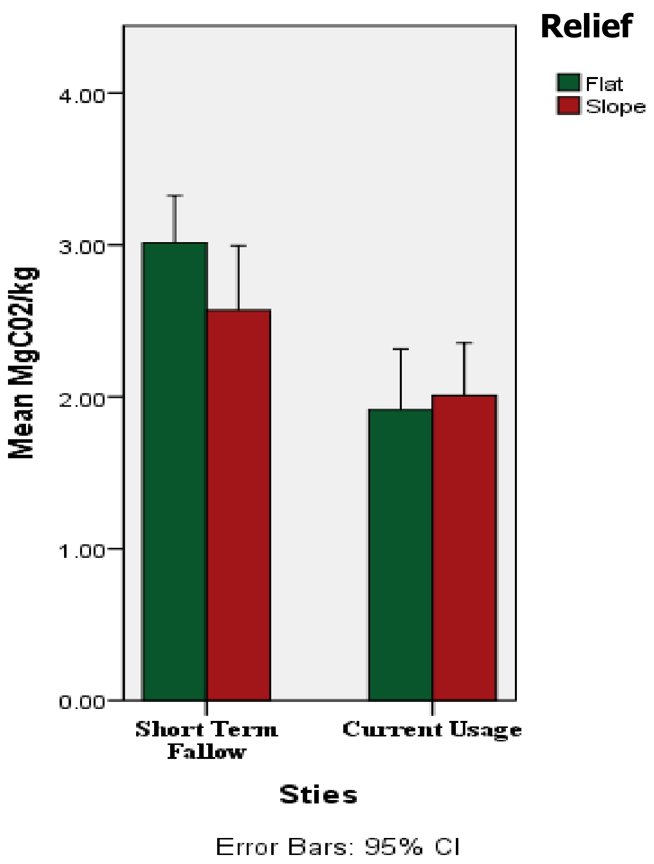

Figure 43: Showing the effect of relief on the $MgC0_2$/kg content of the short term fallow site and current usage farming site.

Table 12: Analysis of Variance of Effect of Relief on $MgC0_2$/kg content of the short term fallow site and current usage farming site

Source of Variation	F-ratio	p-value
Sites (STF & CUF)	22.43	0.000
Relief (Slope & Flat)	0.99	0.322
Sites* Relief	2.289	0.127

TABLE 45 RESULT OF REGRESSION ANALYSIS (CONTRIBUTION OF THE INDEPENDENT VARIABLE TO THE GROWTH AND DEVELOPMENT OF THE DEPENDENT VARIABLE)

Spp	Site	Season	Land use	Relief	Dependent Variable (Spp Popn)	Independent Variable (Abundance measure)	Contribution (Abundance measure)	Over all Model Explanation
Trees	Forest	Rainy	Forested	Flat	Spp Popn	Abundance Measure	Positive (0.738)	66.6%
Trees	Forest	Dry	Forested	Flat	Spp Popn	Abundance Measure	Positive (0.738)	66.6%
Climbers	Forest	Rainy	Forested	Flat	Spp Popn	Abundance Measure	Positive (2.708)	86.1%
Climbers	Forest	Dry	Forested	Flat	Spp Popn	Abundance Measure	Positive (2.898)	100%
Shrubs	Forest	Rainy	Forested	Flat	Spp Popn	Abundance Measure	Positive (2.526)	70.8%
Shrubs	Forest	Dry	Forested	Flat	Spp Popn	Abundance Measure	Positive (2.293)	71.9%
Grasses	Forest	Dry	Forested	Flat	Spp Popn	Abundance Measure	Positive (0.568)	100%
Grasses	Forest	Rainy	Forested	Flat	Spp Popn	Abundance Measure	Positive (0.568)	100%
Trees	S.T.F.S	Rainy	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.494)	8-0%
Trees	S.T.F.S	Dry	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.494)	8.0%
Shrubs	S.T.F.S	Rainy	Cultivated	Slope	Spp Popn	Abundance Measure	Negative (-2.254)	41.2%
Shrubs	S.T.F.S	Dry	Cultivated	Slope	Spp Popn	Abundance Measure	Negative (-2.171)	12.2%
Grass	S.T.F.S	Rainy	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.452)	98.6%
Grass	S.T.F.S	Dry	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.410)	99.3%

TABLE 47b: REGRESSION ANALYSIS – RESULT CONTD

Plant Growth Form	Site	Season	Land use	Relief	Dependent Variable (Spp Popn)	Independent Variable (Abundance measure)	Contribution (Abundance measure)	Over all Model Explanation
Grass	S.T.F.S	Rainy	Cultivated	Slope	Spp Popn	Abundance Measure	Positive (0.333)	84.3%
Grass	S.T.F.S	Dry	Cultivated	Slope	Spp Popn	Abundance Measure	Positive (0.472)	91.7%
Forb	S.T.F.S	Rainy	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.039)	87.9%
Forb	S.T.F.S	Dry	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.039)	87.9%
Forb	S.T.F.S	Rainy	Cultivated	Slope	Spp Popn	Abundance Measure	Negative (0.004)	15.6%
Forb	S.T.F.S	Dry	Cultivated	Slope	Spp Popn	Abundance Measure	Negative (0.004)	15.6%
Grass	L.T.F.S	Rainy	Forested	Slope	Spp Popn	Abundance Measure	Positive (0.623)	93.4%
Grass	L.T.F.S	Dry	Forested	Slope	Spp Popn	Abundance Measure	Positive (0.656)	100%
Forb	L.T.F.S	Rainy	Forested	Slope	Spp Popn	Abundance Measure	Positive (0.021)	8-1%
Forb	L.T.F.S	Dry	Forested	Slope	Spp Popn	Abundance Measure	Positive (0.023)	74.1%
Shrubs	F.U.C.U	Rainy	Cultivated	Slope	Spp Popn	Abundance Measure	Positive (-5.053)	98.3%
Shrubs	F.U.C.U	Dry	Cultivated	Slope	Spp Popn	Abundance Measure	Positive (-0.419)	82.5%
Shrubs	F.U.C.U	Rainy	Cultivated	Flat	Spp Popn	Abundance Measure	Negative (0.389)	08.8%
Shrubs	F.U.C.U	Dry	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.134)	05.8%

TABLE 46C. REGRESSION ANALYSIS – RESULT CONTD

Plant Growth Form	Site	Season	Land use	Relief	Dependent Variable (Spp Popn)	Independent Variable (Abundance measure)	Contribution (Abundance measure)	Over all Model Explanation
Grass	F.U.C.U	Rainy	Cultivated	Slope	Spp Popn	Abundance Measure	Negative (-0.593)	53.2%
Grass	F.U.C.U	Dry	Cultivated	Slope	Spp Popn	Abundance Measure	Positive (0.894)	82.9%
Grass	F.U.C.U	Rainy	Cultivated	Flat	Spp Popn	Abundance Measure	Negative (-0.152)	03.4%
Grass	F.U.C.U	Dry	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0..037)	03.7%
Forb	F.U.C.U	Rainy	Cultivated	Slope	Spp Popn	Abundance Measure	Negative (0.005)	01.4%
Forb	F.U.C.U	Dry	Cultivated	Slope	Spp Popn	Abundance Measure	Negative (0.001)	0.1%
Forb	F.U.C.U	Rainy	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.034)	84.5%
Forb	F.U.C.U	Dry	Cultivated	Flat	Spp Popn	Abundance Measure	Positive (0.021)	79.9%

Table 14: Summary of Regression Analysis Result

S/N	Parameters	Contribution (%)	Position
A	**Site**		
1	Forest	30.56	1st
2	Short term fallow site (S.t.f.s)	30.02	2nd
3	Long term fallow site (l.t.f.s)	16.13	4th
4	Current Usage farming (f.u.c.u)	23.29	3rd
B	**Season**		
1	Rainy	50.04	1st
2	Dry	49.96	2nd
C	**Relief**		
1	Flat	57.14	1st
2	Slope	42.86	2nd
D	**Land Use**		
1	Managed	53.31	1st
2	Not managed	46.69	2nd
E	**Species success**		
1	Grasses	42.03	1st
2	Herbs	24.42	2nd
3	Shrubs	18.07	3rd
4	Climbers	8.59	4th
5	Trees	6.88	5th

Table 14 could well serve as a summary of plant growth form success in the project site, parameters assessed through regression analysis included: sites, seasons, Relief, Land use and plant growth forms. The forest site represented 30.56% of total output, the short term fallow site represented 30.02%, the long term fallow site represented 16.13% while the current usage farming sites represented 23.29%. For the seasons, the rainy season contributed 50.04% while the dry season contributed 49.96%. For the relief, the flat topography contributed 57.14%, while the slopy topography contributed 42.86%. For land use, the managed areas contributed 53.31%, while the non-managed area contributed 46.69%. For individual growth form success at the watershed, the grasses polled 42.03% to come out as the most dominant or successful plant growth form of the watershed, followed by the forbs (24.42%); the shrubs (18.07%); the climbers (8.59%) and the trees (6.88%), as the least dominant growth form of the watershed.

CHAPTER 5

5.0 DISCUSSION

5.1 Species composition, Growth and diversity at the Amawbia watershed

The characterization of a degraded watershed in Amawbia was aimed at identifying and characterizing those factors that were responsible for the degradation of the watershed; identifying the various plant species (Growth forms) of the watershed and establishing their diversity status; determining the Economic relevances of identified species, and finally the effects of the independent variables: seasons; relief, land use and soil depth on the Importance values of the species and the effect of these independent variables on soil factors like-pH, percentage nitrogen, percentage organic carbon and percentage organic matter of the watershed. The essence is to appreciate the 'typical tropical watershed 'as a whole, in terms of climatic, edaphic and manmade influences with a singular short and long term objective of ultimately restoring this and other degraded tropical ecosystems from what they were presently (depauperized) to what they were in the past, which is what is anticipated for them in the future (optimal luxuriance, and majestic natural splendour). The watershed gives us a glimpse of the original forest that had been lost! From tables 2-6, it is not surprising that the forest site had most of the tree, shrub and climber species, while the other sites had more of the forbs and grass species. The current usage farming site had mostly edible (cultivated) shrubs, climber, grasses and forbs. (Fig. 8) which represents the forest site lists a total of 25 trees, 6 climbers, 7 shrubs and 2 grass species. The only significant timber species represented was *Milicia excelsa*. This is a far cry from what typical forested natural tropical watersheds should be. The climatic conditions of this part of the world is so favourable that whatever is planted on it grows. According to Ayensu (1980), 'unlike the monsoon forest, where the climate has a fairly marked dry season, tropical rainforests occur where the climate is hot and wet all year round! What has become of the array of lush tropical forest species that littered the entire South East in precolonial times? *Ceiba pentandra, Nauclea diderichii, Terminalia superba, Khaya ivorensis, Mansonia altissima, Triplochiton scleroxylon, Entandrophragma cylindricum, Diospyros mespiliformis, Brachystegia nigerica, Canarium schweinfurthii, lophira alata, Bombax buonopozense, Mitragyna stipulosa, Hura crepitans, Piptadeniastrum africanum, Entandophragma utile*-to mention just a few? Old field *et al.* (1998) in their world list of threatened trees, listed about 120 Nigerian species as either endangered or vulnerable, and those affected were predominantly members of the Leguminosae family. All these notwithstanding, it is satisfying to note that tree, climber and shrub species dominated the forest site (Fig. 8). Ayensu (1980), further contributes, 'in West Africa, many of the rainforests have been disturbed by man. Only a few hundred years ago, they were rich in African manoganies and other important commercial species. Eventually however, these valuable trees die and are replaced by those of lower commercial value. In some nations, the forest approach EXHAUSTION (emphasis mine) or, as in Nigeria, the internal market consumes the whole harvest. Unlike the forest site though, the short and long term fallow sites were dominated by forbs and grasses (Fig. 9 and 10). This is very much to be expected as grasses and forbs (weeds) are hardy, opportunistic, early successional species that once given the opportunity of space and light, takes up every inch of ground (soil). According to Chapman and Reiss (1992), vegetation is not static and unchanging. It can be altered in many ways' Whenever land is left fallow, it is exposed to secondary succession-colonisation and change on areas disturbed by fire, flood or cultivation where some weeds, vegetation, animals or soil structure remain. It is salient to point out, that the dominant family of plants encountered in this study is poaceae (42.03%, Table). With regard to this point, Meuller-Dombois and Ellenberg (1974), had this to say. 'Generally speaking, the competitive ability of a species depends on its genetic potential which is manifested in its morphological structure and physiological requirements. The following properties can be considered particularly important. Each of these may be especially decisive when others are equal!.

1. **Morphological structure:** (largely expressed in the life form).

a. Germination and growth rate in the early stages of development.

b. **Ontogenetic rhythm (duration of photosynthesis).** Species with the same rythms are strong competitors, species with different rythms are more or less 'complementary'.

c. **Height**: The final height according to Boysen-Jensen (1949) is the most important property in the competition struggle. The final stage in vegetation development is usually marked by the tallest plants, smaller plants can succeed only if they can grow in the shade of the taller ones.

d. **Longevity**: Longer living plants succeed by their 'lasting ability' (Knapp and Knapp 1954).

e. **Root System:** In particular density, depth and morphology of the water-and nutrient-absorbing roots.

f. **Means of Reproduction:** Reproduction from seeds, favours the migration into other communities, while vegetative reproduction is favourable for the maintenance and enlargement of an already established growth position. Vegetatively spreading herbaceous plants with a dense or closed growth habit,, succeed by 'lateral exclusion' (e.g Arrhenatherum, Dactylis, Knapp 1954, 1967), plants with a loose or open growth habit succeed by 'penetration' (e.g., phragmites, *Ranunculus repens*).

g. **Regenerative capacity of the short system:** This is of particular Importance after temporary suppression (e.g, *Melica uniflora* in cutover vegetation) and upon mechanical disturbance (by logging, fire, mowing, grazing, trampling etc).

2. Physiological Requirements i.e the requirements for particular quantities and combinations of environmental resources and the response to these resources. The most important properties are:
   a. Light requirements
   b. Heat requirements
   c. Water requirements
   d. Nutrient requirements and response to other chemical influences.
   e. Response to mechanical influences. To a reasonable extent, members of the poaceae family met all these requirements. For current usage farming site, no trees were encountered because man must have cleared them during the planting season to make room for the climbers, shrubs, grass and forbs species, most of which were purposely cultivated for their high economic values (Figs. 11, 13-16).

On Shannon Wiener Diversity indices, species richness, regarding forb population for the managed sites totaled 41 and 31 as follows: Current usage farming site (slope) – 24 and 15 respectively; Current usage farming site (flat)- 17 and 16 respectively (rainy/dry season values, as opposed to the forb population of the (not managed) sites- 31 and 24 for the rainy and dry seasons respectively (Table 7). This is in agreement with the work of Okereke and Mbaekwe (2011) in which they reported that 'the summary of the calculated species diversity of the 4 sampled plots showed that the two uninfested (cultivated) plots had much higher mean species diversity than the means of the ones infested with *Mimosa invisa* (forested). Disparity between rainy and dry season diversity generally were not so much except probably in the case of the grass of the long term fallow site which was much more uneven at the rainy than at the dry season (Table 7). Of course, trees had higher diversity indices at the forest site than at other sites (Table 7). Long term fallow site had significantly more grass in the rainy than in the dry season, this was also reflected in the other diversity indices ((Table 7). For the current usage farming site, species richness was more balanced at the flat site (Table 7) than at the slopy site (Table 7) especially in terms of the dry and rainy seasons. This could be explained by the fact that rainwater drains away faster from the slopy site than from the flat site where it may be given some time to percolate and therefore be retained by the soil. Finally, generally speaking, there was less disparity in Diversity indices at the managed sites than at the not managed sites (Table 7). This is very much in agreement with the observations of Onyekwelu *et al.* (2008), that species diversity index, species richness and species evenness decreased as forest degradation increases, thus indicating that these indices depended on site conditions.

Economic Relevances of encountered floral species based on standard rating schedule

From figure 12, trees like *Hevea braziliensis, Afzelia africana, Tetrapleura tetraptera, Citrus sinensis, Mangifera indica, Elaeis guineensis* etc. were shown to have an Economic Relevance higher than 6.5, which according to the rating schedule, depicts very useful plants. Climbers namely: *Cucurbita pepo, Telfeiria occidentalis and Gongronema latifolium* etc. also had an Economic Relevance higher than 6.5 (Fig 14). In the shrub category, we have: *Vernonia amygdalina, Uvaria chamae, Manihot esculentum Solanum melanguena, Ananas comosus* and *Bambusa vulgaris* (Fig 13). For the grass species, only *Saccharum officinarum, Zea mays* and *Oryza Sativa* (Fig 15), had a reasonable Economic relevance: while for the forbs, only 10 species out of a total of 97 had economic relevances higher than 6.5; *Talinum triangulare, Corchorus olitorius, Sida garckeana, Ocimum basilicum, Musa sapientum, M. paradisiaca, Murraya koenigii, Amaranthus viridis* and *A. hybridus* (Fig 16). Oldfield *et al.* (1998) stated that, information on use and level of use of tree species is recorded in the Tree conservation Database. The information collated on globally threatened tree species illustrates that 25% have at least one recorded use: Timber was represented by 1351 species; fuel was represented by 254 species; medicinal plants were represented by 193 species; food was represented by 241 species, oil, gum and resin were represented by 170 species. Meanwhile the Economic relevances used in this study were collectively represented by Edible food, export commodity, cash crops, erosion controls/soil protection, fuel wood, medicinal plants, industrial raw materials, Non wood forest products, fodder crop, ornamental plants, weed crop, and any other identified value. Out of fifteen major African timber species recorded by Ayensu (1980), in the book jungles, only one species, Afzelia was encountered in this work. For fibres and canes, out of eight species recorded in their work, only one specie was encountered in this work and that is Bambusa species. Of 11 essential oil species recorded in their work, only one appeared in this work, and that is citrus species. For gums and resins, of those recorded by Ayensu, none was represented in this work. Of pharmaceuticals, tanning agents and dyes, Ayensu recorded 14 species and 2 (Dioscorea and Rauvolfia) species were also represented in this work. Burkill (1985), in his, 'the useful plants of West Tropical Africa' recorded the following species which were also encountered in this work: *Mangifera indica, Voacanga africana, Holarrhena floribunda! Acioa barteri,* and *Newbouldia laevis*-for the trees. *Annona senegalensis, Uvarea chamae, Rauvolfia vomitoria, Gongronema latifolium, Ananas comosus, Telfeiria occcidentalis, Dioscorea dumentorum*- for the shrubs; and *Cleome* r*utidosperma, Cleome viscosa, Commelina diffusa, C.erecta, Palisota hirsuta, Ageratum conyzoides, Aspilia africana, Bidens pilosa, Chromolaena odorata, Eclipta alba, Emilia coccinea, Melanthera scandens, Synedrella nodiflora, Tridax procumbens, Evolvulus alsinoides, Ipomoea aquatica, I.eriocarpa, I. involucrata, I. triloba, I. vagans, Citrullus lanatus, Cyperus difformis, C. alternifolia, C. haspan, C. iria, C. rotundus, Fimbristylis littoralis, Kyllinga erecta, K. pumilla, K. squamulata, Mariscus alternifolia, M. flabelliformis,* and

Scleria verrucosa, for the forbs as having multiple economic relevance particularly- medicinal properties. On *Vernonia amygdalina* particularly, Ibrahim, *et al.* (2004) had this to say, 'The parts of this plant are used in folk medicine as antihelminths, laxatives and fertility inducers in barren women, also in Tanzania, some wild Chimpanzees were observed to use it for the treatment of parasite related diseases. Also leaves of this plant were found to be of nutritional importance. In Nigeria, the plant is used as vegetable and as spices. Phytochemical screening of the plant revealed the presence of steroid, in the entire plant, sesquiterpenes in the leaves, fruits and flowers and also tannins, as well as flavonoids in the leaves; in this present work, the Economic rating, for *V. amygdalina* was 8.0 (Fig. 14) which is 1.5 points ahead of the midpoint score of 6.5. This shows that it has very high Economic relevance. Boateng, *et al.* (2004), in a survey of Medicinal plants of Ghana, mentioned the following plants, encountered also in this work as having the therapeutic uses also mentioned.

Newbouldia laevis - (Chronic sores)
Rauvolfia vomitoria - (Swellings on the body; lumbago, hernia)
Tatrapleura tetraptera- (Anaemia, Blood purifier; Dizziness)
Dialum guineense - (Bleeding during pregnancy).

Amaranthus spinosus, Piliostigma thonningii and *Portulaca oleraceae* which were encountered in this work, were also reported by Ibewuike, *et al.* (1997) as having anti-inflammatory activities. In Nigeria's first Biodiversity Report (2001), some of the species encountered in this study that were also recorded under threatened Biodiversity species in Nigeria, with their uses and status given, include:

1.	*Milicia excelsa*	Timber	Endangered
2.	*Kigelia africana*	General	Endangered

Others listed under selected plants commonly used in Nigeria include:

1. *Annona senegalensis* Leaves- Leaves are good strength food for human and horses. Flowers are used for flavouring food. Ripe fruits are edible and has a pleasant taste.
2. *Boerhavia diffusa* Leaves - The leaf is used occasionally as a course kind of pot-herb in soup.
3. *Dialum guineense* Seed kernel - Seed kernel powder is used as condiment.
4. *Napoleana vogelli* Fruit Pulp -Ripe fruit pulp and seed mucilage are sucked.
5. *Pentaclethra macrophylla* Seed Kernel – Kernel of cooked seed is sliced, washed and allowed to ferment a few days after which it is eaten as salad or used as condiment in other food preparations. The leaves and fruits are edible and are used as spice in soup and other foods all over Nigeria.
6. *Portulaca oleracea* leaves are used as vegetable.
7. *Trianthema portulacastrum* leaves are used as vegetable
8. *Uvaria chamae* Fruit pulp Ripe fruit is sweet and is widely eaten.

5.2 Effects of Seasons, relief and land use on plant species Important values (IVI).

Ifabiyi and Omoyosoye (2011), completely agreed with the findings of this work with regards to rainfall as stated earlier on, when they postulated as follows; 'Rainfall within the tropics is highly variable and is the most important variable affecting crop yield. Of course in the project site, overall plant growth was clearly more luxuriant in the rainy season than in the dry season. Lyocks, *et al.* (2012) also agreed with the findings of this work with regards to the dominant role the rainy season plays in plant productivity in the tropics. It is pertinent to note though that seasonality in the tropics is determined by moisture availability/rainfall. Growth and productivity of vegetation is influenced by rainfall. Temperature is not a problem in all tropics because it is evenly high throughout the year. The rainy season stimulates phenological activities in plant germination, growth, leaf flushing etc. It is believed that plants generally thrive more on flat lands than slopy lands, because slopy lands that are not well managed as is the case in this work, enable water to flow away to lower ground with leachetes, thus impoverishing the higher (slopy) land in terms of nutrient; but in a flat land, the rain is not able to carry the nutrients away, instead, the nutrient rich water percolates in the same site. This is no doubt why basic soil conservation techniques like terracing, strip cropping and contour ploughing etc are practiced on the slopes. On steep slopes, soil depth is shallow and do not hold much moisture which often dries up during the dry season, subjecting plants to drought stress. From the work also, it was obvious that the forest site was dominated by trees, climbers and shrubs; the short term fallow site was dominated by forbs, the long term fallow site was dominated almost completely by grasses while the current usage farming site was dominated by the forbs and shrubs which man planted purposefully for economic benefit and overall subsistence (survival). The Amawbia watershed is subjected to 'slash and burn' Agriculture before every planting season. This deleterious Agricultural practice causes the normal successional process from true forest under deforestation to secondary forest to be circumvented, thereby leaving the way open for permanent colonization by grasses (which are fire tolerant) and forbs (weeds) which gradually replace the original forest species. This was in tandem with the submission of Aregheore (2012) who stated that, 'ordinarily the natural vegetation zones of the country resulted from the interaction of the climate, humidity and rainfall (Oyenuga, 1967), and soils (Iloeje, 2001). These factors have been modified by human activities (deforestation, bush fires) and man's pattern of land use (Oyenuga 1967; Iloeje 2001).

5.4 Soil properties of the Watershed

(Effects of seasons on soil properties). Fig. 8, 25-32, show that in most of the sites (with the exception of the current usage farming site), the soil pH is higher during the dry season than during the rainy season. This is in agreement with the postulation of Sullivan (2004). There is increase leachate of soluble macro/micro elements during the rainy season, unlike during the dry season. According to the base saturation theory, the pH will be correct when the level of bases are correct; positively charged bases include: calcium, magnesium, potassium, sodium, ammonium and several trace minerals. When optimum ratios of bases exist, the soil is believed to support high biological activity, have optimal physical properties (water intake and aggregation), and become resistant to leaching. Plants growing on such a soil are also balanced in mineral levels and are considered to be nutritious to humans and animals alike. Again, from Fig. 30 percentage total N is higher in the dry season at the forest/short term fallow sites than during the rainy season. Sullivan (2004), states also that excess nitrogen results in decomposition of existing organic matter at a rapid rate (because it stimulates increased microbial activity). Of course, organic decomposition is mainly during the rainy season and not during the dry season. Eventually soil carbon content may be reduced to a level where the bacterial populations shrink, and less of the free nitrogen is absorbed. Thereafter, applied nitrogen, rather than being cycled through microbial organisms and re-released to plants slowly over time, becomes subject to leaching. This does not mean that plants do not absorb some during the rainy season. Leaching of course is by water. This may explain why percentage total Nitrogen was higher in the dry season than in the rainy season. Again, from fig.31, it was observed that for all sites, percentage organic carbon was higher during the dry season than during the rainy season and also that percentage organic carbon was higher in the long term fallow site during the dry season and higher in the short term fallow site during the rainy season. This is supported by the assertion from Sullivan (2004) that most natural manure of organic origin contain both carbon and nitrogen. During wet conditions, microbial decomposition of these manure is very high. This considerably reduces organic carbon in the wet season more than in the dry season, when there is less water. Percentage organic matter was also higher in the dry season for all sites more than in the rainy season (Fig.32). Sullivan (2004) completely supported this development. He states as follows, 'High rainfall and temperature promote rapid organic matter decomposition and loss. Low rainfall or low temperatures slow both plant growth and organic matter decomposition. Rapid decomposition of organic matter returns nutrients back to the soil, where they are almost immediately taken up by rapidly growing plants. This also agrees with the finding (fig.32) that percentage organic matter was highest in the long term fallow site during the dry season and highest in the current usage farming site during the rainy season. Low microbial activity was responsible for this scenario during the dry season, while steady availability of farmyard manure/agricultural wastes (from constant weeding) during the rainy season accounted for this higher figure for current usage farming site. Fig 33 depicts that in most of the sites (excepting the short term fallow site), that the percentage total N was higher at soil depth of 0-20 cm, than at that of 20-40 cm. At soil depth of 0-20 cm percentage total N was also higher at the forest site, while at soil depth of 20-40 cm, the percentage total N was higher in the short term fallow site. This is in agreement with Anikwe (2001), in an earlier work in which he stated that 'The highest total N content of the soils were found at artificially and naturally planted undisturbed forests, whereas the sites that recorded low nitrogen content corresponded to plots that were conventionally-and continuously tilled.

Fig. 34 depicts that in most of the sites (with the exception of the forest site) that the soil pH is higher at soil depth of 0-20 than 20-40 cm soil depths. The differences in pH for all sites were not pronounced, they were only subtle differences. This was in agreement with the results of Anikwe (2001), who reported that there were slight differences in pH values for the different soils studied. Fig. 35 shows that for all sites, the percentage organic carbon was higher at soil depth of 0-20 than 20-40 cm. It also depicted that percentage organic carbon was highest in the long term fallow site at both 0-20 and 20-40 cm soil depths when compared to other sites. This agreed to a very large extent with the work done by Anikwe (2001) as follows, 'The highest quantities of soil organic carbon were stored in the artificial grassland, artificial forest and natural undisturbed forest sites at the 0-30cm soil depth, while the lowest carbon stocks were found in the conventionally tilled and continuously –cropped (current usage farming plots). When compared to the site with the highest carbon stocks (forest and grassland use types), results showed 71% depletion in carbon stocks for tilled cropped plots. Fig 36 shows that for all the sites studied, 'percentage organic matter was higher at soil depth of 0-20 cm than at 20-40 cm. This is because, most plant roots are concentrated in the top 0-20 cm soil layer, at which layer, litter disposal and decomposition mostly takes place. Fig. 32 also depicted that at both soil depths of 0-20 and 20-40 cm, percentage organic matter was highest for the long term fallow site. According to Sullivan (2004), the top soil (0-20 cm) is where the biological activity happens-it's where the oxygen is! Generally, for Anikwe (2001), soil pH increased with soil depth in most of the sites studied, but for this work, reverse was the case, soil pH decreased with depth. For Anikwe (2001), SOC reduced with sampling depth at all sites used for the study. The continuously and conventionally tilled plots were among the plots with the lowest soil pH probably because they are more susceptible to leaching of basic cations for the fact that plant cover is non-existent. Table shows the analysis of variance of the soil properties of the watershed by site, season and soil depth. With respect to percentage total nitrogen, the table indicates that there is no significant difference in this variable between sites, soil depths and seasons ($P<0.05$). The site that is expected to record higher total N concentrations is the current usage farming site because this is the only site that receives additional inputs of fertilizer during the growing season, and it has earlier on been noted that there is more N in the dry season than in the rainy season. With respect to pH, the table indicates that there is only significant difference in soil pH of the watershed between seasons ($P<0.05$) but no significant difference between sites, soil depths and seasons ($P>0.05$). Of course, the organic carbon of the forest-which has a greater plant biomass, is not expected to correlate positively with that of the grass-dominated long term fallow site or forb-dominated short term fallow site. It has earlier been observed also, that all these soil indices are higher in the dry season compared to the rainy season, in this work. Again, with respect to organic matter, the table indicates that there is a significant difference in the organic matter of the watershed between sites, seasons and soil depths ($P<0.05$). Sullivan (2004), in a related work stated that 'extra nitrogen, (though it stimulates increased microbial activity, which in turn speed up organic matter decomposition) narrows the ratio of carbon to nitrogen in the soil. Native or uncultivated soils have approximately 12 parts of carbon to each part of nitrogen, or a C:N ratio of 12:1. At this ratio, populations of decay bacteria are kept at a stable level, since additional growth in their populations is limited by a lack of nitrogen. When large amounts of inorganic nitrogen are added, the C:N ratio is reduced, which allows the population of decay organisms to explode as they decompose more organic matter with the now abundant nitrogen. While soil bacteria can efficiently handle moderate applications of inorganic nitrogen accompanied by organic amendments, excess nitrogen results in decomposition of existing organic matter at a rapid rate. Eventually, soil carbon content may be reduced to a level where the bacterial populations are on a starvation diet. With little carbon available, bacterial populations shrink, and less of the tree soil nitrogen is absorbed. Thereafter, applied nitrogen, rather than being cycled through microbial organisms and re-released to plants slowly over time, becomes subject to leaching. This can greatly reduce the efficiency of fertilization and lead to environmental problems. To minimize the fast decomposition of soil organic matter, carbon should be added with nitrogen. Typical carbon sources-such as green manure, animal manure, and compost-serve this purpose well (Sullivan, 2004).

5.5 Effect of Relief on Soil Properties of the various sites

Generally, analysis of variance results show no significant differences between the soil properties and relief. Where the relief is quite steep without proper land use strategies in place, rain water washes away the top soil, leaching soil nutrients away as well. It is noteworthy that there was more $MgCO_2$/kg in the forest and short term fallow sites, than in the current usage farming site (Fig 41). Also in table 11 the analysis of variance show that there is significant difference in the $MgCO_2$/kg content between the soil depths of the watershed ($P>0.05$). Sites that recorded the highest (high) $MgCO_2$/kg concentrations, by implication are the sites having the highest soil respiration. This translates to soil quality meaning therefore that sites that had been in fallow and have a higher diversity of flora as represented by the forest and short term fallow sites were more conducive towards favourable plant growth.

5.6. Regression Analysis

The results of the Regression analysis (Table 14) shows that the forest and the fallow sites yielded 76.71 in terms of importance –value index (IVI) while the only currently cultivated site-the current usage farming site yielded only 23.29%. When land is left fallow for increasing periods of time, fertility increases, microbial activities increase, because harvesting is not done, nutrients are not carried away from the site, the soil has adequate rest and maximal plant productivity is ensured. The difference between plant (IVI) indices for the rainy and dry season was very subtle (50-04 – 49.96 $\pm$ 0.08). Their T-test also showed non-significance. For the watershed, it was clear that plant development (growth) was independent of relief (flat or slopy topography). For land use, the difference in IVI indices between the cultivated (managed) and forested areas (not managed) was quite reasonable (69.44 – 30. 56 $\pm$ 38.88%) and their T-test showed significance. The outstanding finding of the watershed was the superlative performance of the r-strategists (grasses and forbs) as opposed to the K-strategists (trees and shrubs) of the watershed. Throughout the duration of the study, the watershed was in a continual state of successional flux as a result of multiple anthropogenic factors (disturbance). This gave undue advantage to the opportunistic species. According to Chapman and Reiss (1992) 'An r-selected population can take advantage of a favourable situation by having the ability to increase population size rapidly. This means having many offsprings which under normal circumstances die before reaching maturity, but which may survive if circumstances change. Similarly, a k-selected population is associated with a steady carrying capacity. K-selected populations are less able to take advantage of particular opportunities to expand than are r-selected populations. They are in general more stable and less likely to suffer high mortality rates of immature individuals. Usually, k-selected organisms have few, well cared for young (Chapman and Reiss, 1992).

6 CONCLUSION

The Amawbia watershed is situated on a high elevation making it possible for the water therefrom to flow downstream into surrounding watersheds. The implication is that degradation of this watershed filters down to neighbouring ones. This makes protection of the Amawbia watershed paramount! Originally it was forested but the reality on ground is that the forested areas have shrunk very considerably. Biodiversity is very poor. (Only 191 plant species and very sparce animal populations. Available species population have very low economic relevance. Importance values of the species is nothing to write home about as a result of deforestation and overexploitation. Conversion of the watershed into a market garden has taken away its natural status. Amawbia soil which were among the richest in the state now require artificial fertilizers to perform as a result of declining, pH, percentage Nitrogen, percentage Organic carbon and percentage organic matter levels. Slash and burn agricultural practice in the watershed has discouraged deforestation and is entrenching permanent savannah. Government should move in very fast, by fencing off the watershed from surrounding influences, reforestation and involvement of professional scientists to restore this watershed to its original glory. Sustainable management is the panacea!

7 RECOMMENDATIONS

- One way to recover our extinct flora species is to allow some of our watersheds, undergo natural successional processes. This is because every tree is unique, none is useless. When any is destroyed, man loses irretrievable benefits.
- Leaving a tropical site under long term fallow is the best management technique that will assured maximal Agricultural productivity.
- Siltation has been responsible for the disappearance of most watersheds in Anambra State. All efforts ought to be made to checkmate erosion and flooding that brings this about.
- The plant growth form-Grasses are hardy, highly competitive opportunistic species that can out-thrive and out-compete other species, in the absence of shade especially after "slash and burn" agricultural practice prevalent in the Amawbia watershed.
- Among the relevance of flora to mankind, the most all encompassing, in terms of number of plant populations involved, is soil protection.
- Most lower plants e.g grasses and herbs are very sensitive to rainfall because there are sharp differences between their rainy season and dry season values (Table 7).
- "Cut and burn" agriculture prevalent in Amawbia watershed, as opposed to the more beneficial "cut and trash" has progressively encouraged the eradication of forests in the watershed and

promotion of persistent savannah. Adoption of 'cut and thrash' here will also help to protect our soil, leading to increases in yield and fertility.

- The rate at which land speculators/developers invade/encroach into our watersheds is alarming. Watersheds which are often located on marginal lands ought to be protected by Government from this form of abuse. There should be an established boundary between residential houses, industries, Government offices and, watersheds.
- Most of our watersheds are converted into market gardens. This gives accessibility to the influx of men and materials which pollute the water, hardpan the soils, and destroy surrounding vegetation. This practice ought to be stopped because it is retrogressive to watershed development and negates the principles of watershed conservation (protection).
- Establishment of forest Reserves, Nature Protection and other flora conservancy projects especially on the sites of existing watersheds is a very vital need in Anambra State because it will help to conserve particularly the climbers, epiphytes, soil and rare species of plants and animals which are mutualistically interdependent on forests.

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PPENDIX 1

AMAWBIA WATERSHED-DEPICTING SITES AND SPECIES (LUXURIANCE, RELIEF , LAND USE AND INDIVIDUALS)

List of Plates

Ad Forest site

Ab forest site

Short term Fallow site

Site C Long term Fallow site

Plate 1a

List of Plates

Farm in current usage (slope site Da
with Zea mays in the background)

Db farm in current usage (flat)

Plate 1b

List of Plates

Milisia excelsa

Peltoforum pterocarpum

Nauclea latifolia

Diallum guineense

Pl. 2a

List of Plates

Tetrapleura tetraptera

Hevea brasiliensis

Piliostigma thonningii

Mangifera indica

Pl.2b

List of Plates

Elaeis guineense

Cocos nucifera

Pentacletra macrophyla

Zanthaxylum xanthaxyloides

Pl. 2c

List of Plates

Anthocleista djalonensis

Napolenana imperialis

Dichrostachys cinerei

Hollarrhena floribunda

Pl. 2d

List of Plates

Smilax anceps

Olax viridis

Bambusa vulgaris

Annona senegalensis

Pl. 3a

List of Plates

Ananas comosus

Klausinia anisata

Mimosa invisa

Manihot esculentum

Pl. 3b

List of Plates

***Panicum maximum* (stand)**

***Hackelochloa granularis* (stand)**

Zea mays

***Oryza sativa* (stand)**

PL 4a

List of Plate

Dactyledenia barteri

Vernonia amygdalina

PL 4b

APPENDIX 2

QUESTIONNAIRE

NNAMDI AZIKIWE UNIVERSITY
DEPARTMENT OF BOTANY
QUESTIONNAIRE ON ECONOMIC IMPORTANCE OF FLORAL RESOURCES ENCOUNTERED AT THE ADP MARKET GARDEN WATERSHED AT AMAWBIA, AWKA NORTH LGA ANAMBRA STATE
- A PH.D PROJECT –
YOU ARE REQUESTED TO KINDLY ESTABLISH THE MAJOR ECONOMIC RELEVANCE(S) OF THEUNDERLISTED FLORAL SPECIES OF ANAMBRA STATE
(Select the correct Economic relevance from the right and link it with the appropriate floral spps. On the left- please tick (√) the corresponding number (1-11) in the given space)

KEY:
1. Edible Food
2. Export commodity
3. Cash crop
4. Fuel wood
5. Medicinal plant
6. Industrial raw material
7. Non wood forest product
8. Fodder crop
9. Erosion control
10. Ornamental plant
11. Weed crop
12. Any other identified value

PERSONAL INFORMATION

Name:……………………………………………………………………………………
Age:…………………………………………………………………..Sex:…………………..
Status:……………………………………………………………Town:…………………….
L.G.A:……………………………………………………………………………………

S/N	**TREES**	**OTHER NAMES**		**ECONOMIC RELEVANCE**											
			1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	*Milisia excelsa*	Orji		1		1		1		1	1			1	6
2	*Hevea brasiliensis*	Rubber		1	1	1		1	1		1				6
3	*Tetrapleura teteptera*	Oshosho				1	1	1			1				4

4	*Erythrophleum suaveolens*	Inyi									1				1
5	*Pentaclethra macrophyla*	Ukpaka	1	1		1	1		1		1				6
6	*Mangifera indica*	Mango	1	1	1	1	1	1	1	1	1				9
7	*Senna siamea*					1		1			1	1			4
8	*Albizia chaevelieri*					1	1	1			1				4
9	*Spondias monibin*	Ijikala				1	1	1			1				4
10	*Dactyledenia barteri*	Ahaba				1	1	1		1	1				5
11	*Voacango africana*					1	1				1				3
12	*Diallum guincense*	Icheku	1			1	1	1	1	1	1				7
13	*Sterculia tragaclantha*	Oloko				1	1	1			1				4
14	*Peltofoia pterocapum*					1		1			1				3
15	*Bridelia ferruginea*	Ola				1	1				1				3
16	*Klausinia anisata*					1					1	1			3
17	*Barteria nigritiana*					1					1				2
18	*Sporospamum febrifugum*					1					1	1			3
19	*Dichrostachys cinerea*	Ami ogwu				1	1				1				3
20	*Elaeis guineenses*	Nkwu	1	1	1	1	1	1	1	1	1	1		1	11
21	*Anthocleista djalonensis*					1	1	1			1				4
22	*Holarrhena floribunda*	Cornessi				1	1				1				3
23	*Afzelia africana*	Apa		1		1	1	1			1				5
24	*Zanthaxylon zanthaxyloides*	Uko				1	1				1				3
25	*Rothmania hispida*	Ulioba				1	1				1				3
26	*Nauclea latifolia*		1			1	1	1			1				5
27	*Napoleana imperialis*	Ukpodu				1	1	1			1				4
28	*Newbouldian laevis*	Ogirisi				1	1	1			1			1	5
29	*Cocos nucitera*	Akioyibo	1	1	1	1	1	1		1	1				8
30	*Citrus sinensis*		1	1	1	1	1	1		1	1				8
	SHRUB SPPS.	**Total 138**	**7**	**8**	**5**	**29**	**22**	**19**	**5**	**7**	**30**	**3**	**-**	**3**	**138**
31	Annona senegalensis					1	1		1		1				4
32	*Alchomea cordifolia*	Xmas bush				1	1				1				3
33	*Smilax anceps / climber*	West African sarsapavilla (jiabanamko)					1				1		1		3
34	*Olax viridis*	Igbulu				1	1				1		1		34
35	*Uvaria chamae*	Utu (mmimi ohia)	1			1	1	1			1				5
36	*Rauwalfia vomitona*	Serpent wood urubia				1	1				1				3

		(akata)													
37	*Manihot esculentum*	Akpu	1	1	1	1	1	1		1	1				8
38	*Telfeiria occidentalis / climber*	Ugu	1	1			1			1	1				5
39	*Peuraria phaseoloides /climber*	Ahihia nwosu					1				1		1		3
40	*Colocasia esculentum*	Ede	1	1		1	1	1		1	1				7
41	*Veronica amygdalina*	Onugwu	1			1	1			1	1				5
42	*Ananas comosus*	Pineapple	1	1	1		1	1	1	1	1				8
43	*Mimosa invisa*	Giant sensitive plant									1		1		2
	Mimosa pruriens							1					1		2
44	*Piliostigma thonningi*	Okpoatu				1	1		1		1			1	5
45	*Bambusa vulgaris*	Achara / otosi		1	1	1	1	1		1	1				7
46	*Byrsocarpus caccineus (climber)*	Oka abiola				1	1				1				3
47	*Cajanus cajans*		1		1		1			1	1				5
48	*Cissus aralioides*										1		1		2
49	*Gongronena latifolium*	Utazi	1				1			1	1				4
50	*Dioscorea dumentorum*	Bifolate yam (Ona)	1				1			1	1				4
	GRASS SPP.	**TOTAL 90**	**9**	**5**	**4**	**10**	**19**	**5**	**3**	**9**	**20**	**-**	**5**	**1**	**90**
51	*Sorghum arundinaceum*									1	1		1		3
52	*Panicum maxima*	Guinea grass								1	1		1		3
53	*Hackelochloa granularis*							1		1	1		1		4
54	*Andropogon tectorum*	Giant bluesterm								1	1		1		3
55	*Cymbopogon giganteus*						1			1	1	1	1		5
56	*Imperata cylindrica*	Spear grass								1	1		1		3
	Andropogon gayanus	Gamba grass								1	1		1		3
57	*Rottboellia cockinchinensis*	Itchgrass corn grass								1	1		1		3
58	*Pennisetum pediceliatum*									1	1		1		3
59	*Pennisetum polystachion*	Feathery pennisetun								1	1		1		3
60	*Oryza sativa*	Rice								1	1		1		3
61	*Zea mays*	Oka	1	1	1		1	1		1	1				7

62	*Saccharum officinarum*	Cane sugar	1	1	1		1	1		1	1				7
	HERBS SPP.	**Total 53**	**3**	**3**	**3**	**1**	**3**	**4**		**13**	**13**		**10**		**5**
63	*Chromoleana odorata*	Obachiri Awobowo weed					1				1		1		3
64	*Ocimum basilicum*	Nchuanwu sweet basil	1				1				1				3
65	*Euphorbia hirta*	Asthma plant					1				1		1		3
66	*Euphorbia heterophylla*						1				1		1		3
67	*Euphorbia hysopifolia*						1				1		1		3
68	*Ageratum conyzoides*	Goat weed					1			1	1		1		4
69	*Sporobolus pyramidalis*										1		1		2
70	*Paspalum scrobiculatum*										1	1	1		3
71	*Cynodon dactylon*										1		1		2
72	*Brachiara lata*										1		1		2
73	*Commelina erecta*						1				1		1		3
74	*Ludwigia hyssopifolia*						1				1		1		3
75	*Bidens pilosa*						1				1		1		3
76	*Kyllinga pumila*						1				1		1		3
77	*Digitaria gayana*										1		1		2
78	*Culcasia scandens*										1	1	1		3
79	*Desmodium scorpiurus*						1				1		1		3
80	*Hyptis lanceolata*						1				1		1		3
81	*Asystasia gangentica*	Nriaturu					1			1	1		1		4
82	*Sataria barbata*									1	1		1		3
83	*Ipomoea triloba*										1		1		2
84	*Synedrella nodiflora*						1				1		1		3
85	*Amaranthus viridis*		1				1			1	1				4
86	*Polygonium salicifolium*						1				1		1		3
87	*Scleria verrucosa*										1		1		2
88	*Cyperus haspan*										1		1		2
89	*Spermacoce ocymoides*										1		1		2
90	*Phyllantus amarus*						1				1		1		3
91	*Panicum laxum*										1		1		2
92	*Kyllinga squamulata*										1		1		2
93	*Lyffa cylinfrica*	Smooth loafah					1	1			1		1		4
94	*Mitracarpus villosus*						1				1		1		3
95	*Oldenlandlia*						1				1		1		3

	corymbosa														
96	*Gomphrena celosioides*										1		1		2
97	*Mariscus flaberlliformis*										1		1		2
98	*Mariscus alternifolia*										1		1		2
99	*Ludwigia decurrens*						1				1		1		3
100	*Ipomoea involucrata*						1				1		1		3
101	*Tridax procumbens*										1		1		2
102	*Cyperus difformis*										1		1		2
103	*Heterotis rotundifolia*										1		1		2
104	*Musa sapientum*	Banana	1	1	1		1	1	1	1	1				8
105	*Solanum melangena*	Garden egg	1	1	1		1			1	1				6
106	*Eragrostis atrovirens*	Wiry love grass								1	1				2
107	*Amaranthus hybridus*	Inine	1				1			1	1				4
108	*Boerhavia diffusa*	Hogweed					1			1	1		1		4
109	*Acroceras zizanioides*										1		1		2
110	*Oldenlandlia herbacea*										1		1		2
111	*Commelina diffusa*	Obogwu					1				1		1		3
112	*Axonopus compressus*	Broad leaf carpet grass									1	1	1		3
113	*Peperomia pellucida*						1				1		1		3
114	*Ludwigia abyssinica*	Water primrose					1				1		1		3
115	*Setaria longiseta*	Foxtail									1		1		2
116	*Diodia sarmentosa*										1		1		2
117	*Kyllinga erecta*										1		1		2
118	*Eragrostis tremula*	Love grass									1		1		2
119	*Cyperus esculentus*										1		1		2
120	*Spermacoce octdon*										1		1		2
121	*Panicum repens*							1			1	1	1		4
122	*Digitaria horizontalis*	Digit grass / crab/ grass									1		1		2
123	*Solenostemon monostachyus*						1				1		1		3
124	*Laggera aurita*										1		1		2
125	*Paspalum conjugatum*										1		1		2
125	*Eleucine indica*									1	1		1		3
126	*Pupalia lappaca*	Omo-agbo					1				1		1		3
127	*Aspilia africana*	Oranjine					1			1	1		1		4
128	*Boerhavia erecta*						1				1		1		3

129	*Cyathula prostrate*						1				1		1		3
130	*Rhynchelytrum repens*	Blanket grass/vita 1 grass									1		1		2
131	*Acanthospermum hispidium*	Stat bus					1				1		1		3
132	*Sphenoclea zeylanica*										1		1		2
133	*Luwigia decurrens*						1				1		1		3
134	*Alternanthera sessilis*										1		1		2
135	*Hypoesthes cancellata*						1				1		1		3
136	*Eclipta alba*						1				1		1		3
137	*Cucurbita maxima*	Winter squash					1				1		1		3
138	*Cyperus rotundus*										1		1		2
139	*Leucas martinicensis*						1				1		1		3
140	*Ipomoea aguatica*	Swamp morning glory/water spinach									1		1		2
141	*Fimbristylis littoralis*										1		1		2
142	*Malvastrum coromandelianum*	False mallow					1				1		1		3
143	*Boehavia coccinea*										1		1		2
144	*Melochia corchorifolia*										1		1		2
145	*Cleome nutidosperma*	Wild mustard					1				1		1		3
146	*Acalypha fimbriata*	Ash-colored fleabane					1				1		1		3
147	*Vernonia cinerea*						1				1		1		3
148	*Musa paradisiacal*	Plantain	1	1	1		1	1	1	1	1				8
149	*Schwenkia Americana*						1				1		1		3
150	*Crotolaria retusa*	Rattle box					1				1		1		3
151	*Stachytarpheta jamaicensis*	Bastard vabain					1				1		1		3
152	*Croton lobatus*	Cascarilla					1				1		1		3
153	*Sida acuta*	Udo				1		1		1	1		1		5
156	*Ipomoea eriocarpa*						1				1		1		3
157	*Cymbopogon cittratus*						1	1			1		1		4
158	*Alternanthera bettzickiana*									1	1		1		3
159	*Hibiscus asper*										1		1		2
160	*Spermacoce verticillata*										1		1		2
161	*Zornia latifolia*										1		1		2
162	*Melastromastrum capitatum*										1		1		2

163	*Echinochloa obtusiflora*										1		1		2
164	*Leersia hexandra*										1		1		2
165	*Mimosa pigra*										1		1		2
166	*Talinum triangulare*	Waterleaf	1				1			1	1		1		5
167	*Brachiaria deflexa*										1		1		2
168	*Spigelia anthelmia*	Pink root					1				1		1		3
169	*Digitaria nuda*										1		1		2
170	*Celosia leptostachya*										1		1		2
171	*Mimosa pudica*	Sensitive plant					1				1		1		3
172	*Cleome viscosa*						1				1		1		3
173	*Cyperus iria*										1		1		2
174	*Celosia isertii*										1		1		2
175	*Portulaca oleracea*	Prusiana					1			1	1		1		4
176	*Sida garckeana*					1				1	1		1		4
177	*Sida linifolia*					1					1		1		3
178	*Echinochiloa colona*	Jingle rice									1		1		2
179	*Murraya kornigii*	Curry leaf	1		1		1				1				4
180	*Evolvulus alsinoides*										1		1		2
181	*Chloris pilosa*	Finger grass									1		1		2
182	*Pouzolzia guineensis*										1		1		2
183	*Hydrolea palustris*										1		1		2
184	*Pentodon pentandrus*										1		1		2
185	*Laportea aestuans*	Tropical nettle weed					1				1		1		3
186	*Heteranthera califolia*	Duck salad									1		1		2
187	*Corchorus olitorius*	Karen keren	1							1	1		1		4
		Total 346	**9**	**3**	**4**	**3**	**58**	**6**	**2**	**18**	**123**	**5**	**115**		
		Grand total 627	**28**	**19**	**16**	**43**	**102**	**34**	**10**	**47**	**186**	**98**	**130**	**4**	

<u>REQUIRED INFORMATION</u>

Ukpaka Chukwujekwu .G.

APPENDIX 3

HERB INVENTORY OF THE WATERSHED

S/NO	No of species	Family
1	Acanthaceae	*Asystasia gangetica, Justicia flava, Hypoesthes cancellata.*
2	Amaranthaceae	*Alternanthera sessilis, Celosia isertii, Alternanthera bettzickiana, Celosia leptostachys, Puppalia lappaceae, Cyathula prostrata, Gomphrena celosoides, Amaranthus hybridus, Amaranthus viridis, Amaranthus spinosus*
3	Asteraceae	*Acanthospermum hispidium* *Eclipta alba, Bidens pilosa, Chromolaena odorata, Ageratum conyzoides, Laggera aurita, Synedrella nodiflora, Vernonia cinerea, Tridax procumbens, Aspilia africana*
4	Capparidaceae	*Cleome rutidosperma, Cleome viscosa*
5	Commelinaceae	*Commelina erecta, Commelina diffusa*
6	Convolvulaceae	*Ipomoea triloba, ipomoea eriocarpa, Ipomoea aquatica, Evolvulus alsinoides, Ipomoea involucrate*
7	Cyperaceae	*Fuirena ciliaris, Kyllinga squamulata, Cyperus haspan, Scleria verrucosa, Cyperus rotundus, Cyperus difformis, Cyperus esculentus, Cyperus iria, Mariscus flabelliformis, Kyllinga erecta, Mariscus alternifolia, Kyllinga pumila, Fimbrystylis littoralis*
8	Euphorbiaceae	*Acalypha fimbriata, Euphorbia hirta, Croton hirtus, Euphorbia heterophylla, Croton lobatus, Phyllantus amarus*
9	Lamiaceae	*Ocimum basilicum, Hyptis lanceolata, Leucas martinicensis, Solenostemon monostachyus*
10	Malvaceae	*Malvastrum coromandelianum, Sida acuta, Sida garckeana, Sida linifolia, Hibiscus asper*
11	Melastomataceae	*Heterotis rotundifolia, Melastomastrum capitatum*
12	Nyctaginaceae	*Boerhavia diffusa, Boerhavia coccinea, Boerhavia erecta*
13	Onagraceae	*Ludwigia hyssopifolia, Ludwigia decurrens, Ludwigia abbysinica*
14	Rubiaceae	*Diodia sarmentosa, Pentodon pentandrus, Mitracarpus villosus, Oldenlandlia corymbosa, Spermacoce ocymoides, Spermacoce verticillata, Oldenlandlia herbaceae*
15	Sphenocleaceae	*Sphenoclea zeylanica*
16	Sterculiaceae	*Melochia corchorifolia, Waltheria indica*
17	Fabaceae	*Crotolaria retusa, Zornia latifolia*
18	Polygonaceae	*Polygonium salicifolium*
19	Pontederaceae	*Heteranthera callifolia*

20	Loganiaceae	*Spigelia anthelmia*
21	Musaceae	*Musa paradisiaca, Musa sapientum*
22	Piperaceae	*Peperomia pellucida*
23	Solanaceae	*Schwenkia Americana*
24	Verbenaceae	*Stachytarpheta jamaicensis*
25	Portulacaceae	*Talinum triangulare, Portulaca oleraceae*
26	Pedaliaceae	*Sesamum indicum*
27	Urticaceae	*Pouzolzia guineensis, Laportea aestuans*
28	Mimosoideae	*Mimosa pudica*
29	Hydrophyllaceae	*Hydrolea palustris*
30	Tiliaceae	*Cochorus olitorius*
31	Rutaceae	*Murraya koeningii*

APPENDIX 4
RAW DATA FOR T-TEST
1. SEASONS

A. Short term fallow site (GRASS)

i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
14+10+15	15+16+06
+17+63+35	+08+07+01
+02+25+07	+01+70+47
+04+01+03	+07+05+05
+12+02	+01+01

Sum

200	190

Mean (14)

14.3	13.6

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\frac{1}{n}\sqrt{(S_1^2 + S_2^2)}}$$ for equal sample size

where 1 = Rainy season
2 = Dry season

$\overline{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{14.3 - 13.6}{\sqrt{1/14(200^2 + 190^2)}}$$

$$:- ts = \frac{0.7}{\sqrt{1/14(40000 + 36100)}}$$

$$:- ts = \frac{0.7}{\sqrt{1/14(76100)}}$$

$$:- ts = \frac{0.7}{\sqrt{5435.714}}$$

$$:- ts = \frac{0.7}{\sqrt{73.777}}$$

= 0.0095

= 0.0095<0.05 :- Significance

B. Short term fallow site (FORBS)

i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
12+60+143	45+33+55
+21+12+04	+03+08+115
+49+21+23	+02+47+35
+12+63+24	+14+01+01
+01+66+10	+30+01+34
+05+01	+02+01

Sum

527	427

Mean (17)

31	25.12

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\frac{1}{n}\sqrt{(S_1^2 + S_2^2)}}$$ for equal sample size

where 1 = Rainy season
2 = Dry season

$\overline{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{31 - 25.12}{\sqrt{1/17(527^2 + 427^2)}}$$

$$:- ts = \frac{5.88}{\sqrt{1/17(277729 + 182329)}}$$

$$:- ts = \frac{5.88}{\sqrt{1/17(460058)}}$$

$$:- ts = \frac{5.88}{\sqrt{27062.24}}$$

$$:- ts = \frac{5.88}{\sqrt{27062.24}}$$

= 0.04

= 0.04<0.05 :- Significance

RAW DATA FOR T-TEST

1. SEASONS

C. Long term fallow site (GRASS)

i. Rainy Season **(ii) Dry season**

Importance values (IVI)

i. Rainy Season	(ii) Dry season
75+35+33	115+02+03
+07+13+02	+15+12+03
+03+02+03	+01+07+18

Sum

173	176

Mean (9)

19.22	19.56

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

$\overline{Y}$ = mean

n = number of values

S = sample size

$$:- ts = \frac{19.22 - 19.56}{\sqrt{1/9(173^2 + 176^2)}}$$

$$:- ts = \frac{-0.34}{\sqrt{1/9(29929 + 30976)}}$$

$$:- ts = \frac{-0.34}{\sqrt{1/9(60905)}}$$

$$:- ts = \frac{-0.34}{\sqrt{6767.22}}$$

$$:- ts = \frac{-0.34}{82.26}$$

= 0.0041

= 0.004<0.05 :-Very Significance

D. Short term fallow site (FORBS)

i. Rainy Season **(ii) Dry season**

Importance values (IVI)

i. Rainy Season	(ii) Dry season
03+52+45	24+02+09
+05+47+37	+11+43+12
+10+40+10	+30+14+01
+05+17+13	+04+03+01
+07	+17

Sum

291	171

Mean (17)

22.38	13.15

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

$\overline{Y}$ = mean

n = number of values

S = sample size

$$:- ts = \frac{22.38 - 13.15}{\sqrt{1/13(291^2 + 171^2)}}$$

$$:- ts = \frac{9.23}{\sqrt{1/13(84681 + 29241)}}$$

$$:- ts = \frac{9.23}{\sqrt{1/13(113922)}}$$

$$:- ts = \frac{9.23}{\sqrt{8763.23}}$$

$$:- ts = \frac{9.23}{93.61}$$

= 0.099

= 0.099<0.05:-Not Significance

RAW DATA FOR T-TEST (SEASONS)

E. Current Usage Farming site (GRASS) (FLAT)

i. Rainy Season **(ii) Dry season**

Importance values (IVI)

i. Rainy Season	(ii) Dry season
58+47+25	73+50+10
+15+15+13	+18+02+05
+10+05+05	+60+05+10
+08+05+03	+02+05+20
+03+02	+20+02
Sum	
214	282
Mean (14)	
15.29	20.14

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Rainy Season
ii = Dry season

$\overline{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{15.29 - 20.14}{\sqrt{1/14(214^2 + 282^2)}}$$

$$:- ts = \frac{-4.85}{\sqrt{1/14(45796 + 79524)}}$$

$$:- ts = \frac{-4.85}{\sqrt{1/14(125320)}}$$

$$:- ts = \frac{-4.85}{\sqrt{8951.43}}$$

$$:- ts = \frac{-4.85}{94.612}$$

= 0.05

= 0.05<0.05 :-Significance

F. Current Usage farming site (FORBS) (FLAT)

i. Rainy Season **(ii) Dry season**

Importance values (IVI)

i. Rainy Season	(ii) Dry season
28+57+02	02+08+25
+08+05+88	+05+13+02
+17+80+05	+33+03+55
+14+05+65	+03+02+28
+02	+78
Sum	
376	257
Mean (13)	
28.92	19.77

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Rainy Season
ii = Dry season

$\overline{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{28.92 - 19.77}{\sqrt{1/13(376^2 + 257^2)}}$$

$$:- ts = \frac{9.15}{\sqrt{1/13(141376 + 66049)}}$$

$$:- ts = \frac{9.15}{\sqrt{1/13(207425)}}$$

$$:- ts = \frac{9.15}{\sqrt{15955.77}}$$

$$:- ts = \frac{9.15}{126.32}$$

= 0.072

= 0.07<0.05 :-Not Significance

RAW DATA FOR T-TEST (SEASONS)

G. Current Usage Farming site (GRASS) (Slope)

i. Rainy Season **(ii) Dry season**

Importance values (IVI)

i. Rainy Season	(ii) Dry season
23+17+15	03+60+07
+10+05+10	+10+05+10
+16+08+05	+02+15+70
+04+05+02	+18+10+10
+03+03	+02+03
Sum	
116	225
Mean (14)	
8.29	16.07

Formula

$$ts = \frac{\bar{Y}_1 - \bar{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Rainy Season
ii = Dry season

$\bar{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{8.29 - 16.07}{\sqrt{1/14(116^2 + 225^2)}}$$

$$:- ts = \frac{-7.78}{\sqrt{1/14(13456 + 50625)}}$$

$$:- ts = \frac{-7.78}{\sqrt{1/14(64081)}}$$

$$:- ts = \frac{-7.78}{\sqrt{4577.21}}$$

$$:- ts = \frac{-7.78}{67.666}$$

= 0.115

= 0.115<0.05 :-Significance

H. Current Usage farming site (FORBS) (Slope)

i. Rainy Season **(ii) Dry season**

Importance values (IVI)

i. Rainy Season	(ii) Dry season
32+105+01	68+10+06
+07+11+99	+33+10+15
+38+45+03	+24+160+01
+09+68	+70+54
Sum	
376	257
Mean (13)	
28.92	19.77

Formula

$$ts = \frac{\bar{Y}_1 - \bar{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Rainy Season
ii = Dry season

$\bar{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{38 - 41}{\sqrt{1/11(418^2 + 451^2)}}$$

$$:- ts = \frac{-3}{\sqrt{1/11(174724 + 203401)}}$$

$$:- ts = \frac{-3}{\sqrt{1/11(378125)}}$$

$$:- ts = \frac{-3}{\sqrt{34375}} = \frac{-3\sqrt{55}}{25\sqrt{55}}$$

$$:- ts = \frac{-3\sqrt{55}}{25}$$

= -4.45

= -4.45<0.05 :-Significance

RAW DATA FOR T-TEST
2. LAND USE

A. Short term fallow site (GRASS)
(Land use)

i. Managed	**(ii) Unmanaged**
130+48+25	19+30+06
+65+25+30	+07+17+16
+13+10+05	+01+105+50
+08+05+63	+32+12+01
+08+02+02	+01+13+04
+13+01+02	+01+02+03
+03+05	+01+04
Sum	
463	324
Mean (20)	
23.15	16.2

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Managed site
ii = Unmanaged site

$\overline{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{23.15 - 16.2}{\sqrt{1/20(463^2 + 324^2)}}$$

$$:- ts = \frac{6.95}{\sqrt{1/20(214369 + 104976)}}$$

$$:- ts = \frac{6.95}{\sqrt{1/20(319345)}}$$

$$:- ts = \frac{6.95}{\sqrt{15967.25}}$$

$$:- ts = \frac{6.95}{126.36}$$

= 0.06

= 0.06>0.05 :-Not significant

B. Short term fallow site (FORBS)
(Land use)

i. Managed	**(ii) Unmanaged**
01+35+82	19+43+78+14
+08+20+08	+03+12+03+01
+120+20+135	+75+34+07+10
+05+17+02	+34+19+01
+33+142+03	+51
+03	
Sum	
634	404
Mean (16)	
39.63	25.25

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Managed site
ii = Unmanaged site

$\overline{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{39.63-25.25}{\sqrt{1/16(634^2 + 404^2)}}$$

$$:- ts = \frac{14.38}{\sqrt{1/16(401956 + 163216)}}$$

$$:- ts = \frac{14.38}{\sqrt{1/16(565172)}}$$

$$:- ts = \frac{14.38}{\sqrt{35323.25}} = \frac{14.38}{87.945}$$

:- ts = 0.08

= 0.08>0.05 :- Not Significant

RAW DATA FOR T-TEST
2. LAND USE

C. Long term fallow site (Grass)
(Land use)

i. Managed	**(ii) Unmanaged**
25+18+15	190+37+33
+70+12+20	+10+12+03
+12+17+08	+02+02+03
+19+05+03	+15+13+02
+02+70	+01+08

Sum

296	331

Mean (14)

21.14	23.64

Formula

$$ts = \frac{\bar{Y}_1 - \bar{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Managed site
ii = Unmanaged site
$\bar{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{21.14 - 23.64}{\sqrt{1/14(296^2 + 331^2)}}$$

$$:- ts = \frac{-2.5}{\sqrt{1/14(87616 + 109561)}}$$

$$:- ts = \frac{-2.5}{\sqrt{1/14(197177)}}$$

$$:- ts = \frac{-2.5}{\sqrt{14084.07}}$$

$$:- ts = \frac{-2.5}{37.471}$$

= 0.07

= 0.07<0.05 :-Significant

D. Long term fallow site (Forbs in family)
(Land use)

i. Managed	**(ii) Unmanaged**
99+115+08	26+55+54
+39+22+114	+16+90+50
+62+205+03	+09+70+24
+04+09+03	+06+18+17
+67+15+02	+10+22+01
+90	+18

Sum

857	486

Mean (16)

57.07	30.38

Formula

$$ts = \frac{\bar{Y}_1 - \bar{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Managed site
ii = Unmanaged site
$\bar{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{57.07-30.38}{\sqrt{1/16(857^2 + 486^2)}}$$

$$:- ts = \frac{26.69}{\sqrt{1/16(734449 + 236196)}}$$

$$:- ts = \frac{26.69}{\sqrt{1/16(970645)}}$$

$$:- ts = \frac{26.69}{\sqrt{60665.31}} = \frac{26.69}{46.30}$$

:- ts = 0.108

= 0.11

= 0.11>0.05 :- Not Significant

RAW DATA FOR T-TEST
3. RELIEF (TOPOGRAPHY)

A. Short term fallow site (Grass)

i. Flat	**(ii) Slopy**
19+13+13	16+05+05
+16+12+45	+18+12+17
+93+40+15	+03+03+02
+03+10+04	+01+04+01
+01+06	+10+09
Sum	
290	106
Mean (14)	
20.71	7.57

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Managed site
ii = Unmanaged site

$\overline{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{20.71 - 7.75}{\sqrt{1/14(290^2 + 106^2)}}$$

$$:- ts = \frac{13.14}{\sqrt{1/14(84100 + 11236)}}$$

$$:- ts = \frac{13.14}{\sqrt{1/14(95336)}}$$

$$:- ts = \frac{13.14}{\sqrt{6809.71}}$$

$$:- ts = \frac{13.14}{82.521}$$

= 0.16

= 0.16>0.05 :-Not significant

B. Short term fallow site (Forbs in families)

i. Flat	**(ii) Slopy**
14+43+78	38+50+120
+03+13+03	+16+113+02
+12+01+75	+03+20+23
+34+07+01	+29+02+59
+11+34+20	+06+49+02
+51	+45
Sum	
400	576
Mean (16)	
25	36

Formula

$$ts = \frac{\overline{Y}_1 - \overline{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Managed site
ii = Unmanaged site

$\overline{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{25-36}{\sqrt{1/16(400^2 + 576^2)}}$$

$$:- ts = \frac{-11}{\sqrt{1/16(160000 + 331776)}}$$

$$:- ts = \frac{-11}{\sqrt{1/16(491776)}}$$

$$:- ts = \frac{-11}{\sqrt{30736}} = \frac{-11}{175.317}$$

:- ts = -0.063

= 0.06<0.05 :- Significant

RAW DATA FOR T-TEST RELIEF (TOPOGRAPHY)

C. Current Usage Farming site (Grass)

i. Flat	**(ii) Slopy**
130+48+25	25+18+15
+65+25+30	+70+12+20
+12+10+05	+12+17+08
+08+05+63	+19+05+03
+07+03+02	+02+03+02
+13+02+01	+01+03+70
+03+05+20	+18+10+10
+20+02	+03+02

Sum

504	348

Mean / (14)

21.91	15.13

Formula

$$ts = \frac{\bar{Y}_1 - \bar{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Managed site
ii = Unmanaged site
$\bar{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{21.91 - 15.13}{\sqrt{1/23(504^2 + 348^2)}}$$

$$:- ts = \frac{6.78}{\sqrt{1/23(254016 + 121104)}}$$

$$:- ts = \frac{6.78}{\sqrt{1/23(375120)}}$$

$$:- ts = \frac{6.78}{\sqrt{16309.565}}$$

$$:- ts = \frac{6.78}{127.71}$$

= 0.053
= 0.53>0.05 :-Not significant

D. Current Usage farming site (Forbs in families)

i. Flat	**(ii) Slopy**
02+35+82	99+115+08
+07+20+08	+39+21+114
+120+20+135	+62+205+03
+05+17+02	+04+09+03
+33+142+03	+67+15+02
+08	+90

Sum

639	876

Mean / (16)

39.94	53,5

Formula

$$ts = \frac{\bar{Y}_1 - \bar{Y}_2}{\sqrt{\frac{1}{n}(S_1^2 + S_2^2)}}$$ for equal sample size

Where i = Managed site
ii = Unmanaged site
$\bar{Y}$ = mean
n = number of values
S = sample size

$$:- ts = \frac{39.94 - 53.5}{\sqrt{1/16(639^2 + 856^2)}}$$

$$:- ts = \frac{-13.56}{\sqrt{1/16(408321 + 732736)}}$$

$$:- ts = \frac{-13.56}{\sqrt{1/16(1141057)}}$$

$$:- ts = \frac{-13.56}{\sqrt{71316.063}} = \frac{-13.56}{267.051}$$

:- ts = -0.05
= 0.05<0.05 :- Significant

T-TEST RAW DATA FOR SEASONS

A. Short term fallow site (GRASS)
i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
14+10+15	15+16+06
+17+63+35	+08+07+01
+02+25+07	+01+70+47
+04+01+03	+07+05+05
+12+02	+01+01

C. Long term fallow site (GRASS)
i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
75+35+33	115+02+03
+07+13+02	+15+12+03
+03+02+03	+01+07+18

E. Current Usage Farming site (GRASS) (FLAT)
i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
58+47+25	73+50+10
+15+15+13	+18+02+05
+10+05+05	+60+05+10
+08+05+03	+02+05+20
+03+02	+20+02

G. Current Usage Farming site (GRASS) (Slope)
i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
23+17+15	03+60+07
+10+05+10	+10+05+10
+16+08+05	+02+15+70
+04+05+02	+18+10+10
+03+03	+02+03

B. Short term fallow site (FORBS)
i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
12+60+143	45+33+55
+21+12+04	+03+08+115
+49+21+23	+02+47+35
+12+63+24	+14+01+01
+01+66+10	+30+01+34
+05+01	+02+01

D. Long term fallow site (FORBS)
i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
03+52+45	24+02+09
+05+47+37	+11+43+12
+10+40+10	+30+14+01
+05+17+13	+04+03+01
+07	+17

F. Current Usage farming site (FORBS) (FLAT)
i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
28+57+02	02+08+25
+08+05+88	+05+13+02
+17+80+05	+33+03+55
+14+05+65	+03+02+28
+02	+78

H. Current Usage farming site (FORBS) (Slope)
i. Rainy Season (ii) Dry season

Importance values (IVI)

i. Rainy Season	(ii) Dry season
32+105+01	68+10+06
+07+11+99	+33+10+15
+38+45+03	+24+160+01
+09+68	+70+54

T-TEST RAW DATA FOR LAND USE

A. Short term fallow site (GRASS)
(Land use)

i. Managed	(ii) Unmanaged
130+48+25	19+30+06
+65+25+30	+07+17+16
+13+10+05	+01+105+50
+08+05+63	+32+12+01
+08+02+02	+01+13+04
+13+01+02	+01+02+03
+03+05	+01+04

B. Short term fallow site (FORBS)
(Land use)

i. Managed	(ii) Unmanaged
01+35+82	19+43+78+14
+08+20+08	+03+12+03+01
+120+20+135	+75+34+07+10
+05+17+02	+34+19+01
+33+142+03	+51
+03	

C. Long term fallow site (Grass)
(Land use)

i. Managed	(ii) Unmanaged
25+18+15	190+37+33
+70+12+20	+10+12+03
+12+17+08	+02+02+03
+19+05+03	+15+13+02
+02+70	+01+08

D. Long term fallow site (Forbs in family)
(Land use)

i. Managed	(ii) Unmanaged
99+115+08	26+55+54
+39+22+114	+16+90+50
+62+205+03	+09+70+24
+04+09+03	+06+18+17
+67+15+02	+10+22+01
+90	+18

T-TEST RAW DATA FOR RELIEF

A. Short term fallow site (Grass)

i. Flat
19+13+13
+16+12+45
+93+40+15
+03+10+04
+01+06

(ii) Slopy
16+05+05
+18+12+17
+03+03+02
+01+04+01
+10+09

C. Current Usage Farming site (Grass)

i. Flat
130+48+25
+65+25+30
+12+10+05
+08+05+63
+07+03+02
+13+02+01
+03+05+20
+20+02

(ii) Slopy
25+18+15
+70+12+20
+12+17+08
+19+05+03
+02+03+02
+01+03+70
+18+10+10
+03+02

B. Short term fallow site (Forbs in families)

i. Flat
14+43+78
+03+13+03
+12+01+75
+34+07+01
+11+34+20
+51

(ii) Slopy
38+50+120
+16+113+02
+03+20+23
+29+02+59
+06+49+02
+45

D. Current Usage farming site (Forbs in families)

i. Flat
02+35+82
+07+20+08
+120+20+135
+05+17+02
+33+142+03
+08

(ii) Slopy
99+115+08
+39+21+114
+62+205+03
+04+09+03
+67+15+02
+90

APPENDIX 5
RANKING/DETERMINATION OF ECONOMIC RELEVANCE OF FLORAL SPP.

5a

S/NO	Millisia	Hevea	Tetrapleura	Erythrophle	Pentaclethra	Mangifera	Senna
1	-	-	12	-	12	12	-
2	11	11	-	-	-	11	-
3	-	-	-	-	-	-	-
4	9	9	9	9	9	9	9
5	8	8	8	-	8	8	8
6	-	-	7	-	-	7	7
7	6	6	-	-	-	6	-
8	-	5	-	-	5	-	-
9	4	-	-	-	-	4	-
10	-	-	-	-	-	-	3
11	-	-	-	2	-	-	-
12	-	-	-	-	-	-	-
	7.6	**7.8**	**9.0**	**5.5**	**8.5**	**8.1**	**6.8**

5b

S/NO	Albiza	Spondias	Dactyledeni	Voacanga	Diallum	Sterculia	Peltoforum
1	-	-	-	-	12	-	-
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-
4	9	9	9	9	9	9	9
5	8	8	8	8	8	8	8
6	-	7	-	7	7	-	-
7	6	-	6	-	6	-	-
8	-	-	-	-	-	-	-
9	-	-	-	-	4	-	-
10	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-
	7.7	**8.0**	**7.7**	**8.0**	**7.7**	**8.5**	**8.5**

5c

S/NO	Bridelia	Klausinia	Barteria	Sporospam	Dichrostach	Elaeis	Holarrhena
1	-	-	-	-	-	12	-
2	-	-	-	-	-	11	-
3	-	-	-	-	-	10	-
4	9	9	9	9	9	9	9
5	8	8	8	8	8	8	8
6	-	-	-	-	-	7	7
7	-	-	-	-	-	6	-
8	-	-	-	-	-	5	-
9	-	-	-	-	-	4	-
10	-	3	-	-	-	3	-
11	-	-	-	-	2	-	-
12	-	-	-	-	-	-	-
	8.5	**6.7**	**8.5**	**8.5**	**6.3**	**7.5**	**8.0**

5d.

S/NO	Afzelia	Zanthaxylo	Rothmania	Napoleana	Newbouldia	Cocos	Citrus
1	-	-	-	-	-	12	12
2	-	-	-	-	-	11	11
3	-	-	-	-	-	-	-
4	9	9	9	9	9	9	9
5	8	8	8	8	8	8	8
6	7	-	-	7	7	7	7
7	-	-	-	-	-	6	6
8	-	-	-	-	-	-	-
9	-	-	-	-	-	4	4
10	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-
	8.0	**8.5**	**8.5**	**8.0**	**8.0**	**8.1**	**8.1**

5e.

S/NO	Nauclea	Anthocleista	Psidium
1	12	-	12
2	-	-	-
3	-	-	-
4	9	9	9
5	8	8	8
6	7	7	7
7	-	-	6
8	-	-	-
9	-	-	4
10	-	-	-
11	-	-	-
12	-	-	-
	8.0	**8.0**	**7.7**

APPENDIX 6

6a

DIVERSITY INDEX (SHANNON WIENER)

4a. Forest Site- Trees (Rainy/Dry)

S/N	Species	Spp.Popn	Pi	In (Pi)	(Pi) x In(pi)
1.	*Zanthaxylon zanthaxyloides*	05	0.036	-3.324	-0.120
2.	*Spondias mombin*	02	0.014	-4.269	-0.060
3.	*Voacanga africana*	01	0.007	-4.962	-0.035
4.	*Holarrhena floribunda*	05	0.036	-3.324	-0.120
5.	*Elaeis guineensis*	10	0.072	-2.631	-0.190
6.	*Sporospamum febrifugum*	01	0.007	-4.962	-0.035
7.	*Newbouldia laevis*	03	0.022	-3.817	-0.084
8.	*Senna siamea*	10	0.072	-2.631	-0.190
9.	*Dialum guineense*	05	0.036	-3.324	-0.120
10.	*Afzelia africana*	03	0.022	-3.817	-0.084
11.	*Erythrophleum suaveolens*	01	0.007	-4.962	-0.035
12.	*Bridelia ferruginea*	01	0.007	-4.962	-0.035
13.	*Hevea brasiliensis*	15	0.109	-2.216	-0.242
14.	*Albizia chaevalieri*	03	0.022	-3.817	-0.084
15.	*Peltoforum pterocarpum*	01	0.007	-4.962	-0.035
16.	*Napoleana imperialis*	24	0.174	-1.749	-0.304
17.	*Anthocleista djalonensis*	01	0.007	-4.962	-0.035
18.	*Tetrapleura tetraptera*	04	0.029	-3.540	-0.103
19.	*Pentaclethra macrophyla*	10	0.072	-2.631	-0.190
20.	*Dichrostachys cinerea*	02	0.014	-4.269	-0.060

21. *Milisia excelsa*	01	0.007	-4.962	-0.035
22. *Barteria nigritiana*	01	0.007	-4.962	-0.035
23. *Rothmania hispida*	05	0.036	-3.324	-0.120
24. *Dactytedenia barteri*	23	0.167	-1.790	-0.299
25. *Sterculia tragacantha*	01	0.007	-4.962	-0.035
	138			**2.685**

H. 2.69 In(s) = In (25)

= 3.22. E = 2.69/3.22 = 0.84

Forest Climbers **6b**

		Rainy Season				Dry Season			
S/N	**Species**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In(i)**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In(pi)**
1	*Cissus araliodes*	20	0.069	-2.674	-0.185				
2	*Gongronema latifolium*	20	0.069	-2.674	-0.185	05	0.026	-3.65	-0.09
3	*Dioscorea dumentorun*	10	0.035	-3.352	-0.117				
4	*Peuraria phaseoloides*	30	0.104	-2.263	-0.235				-0.09
5	*Smilax anceps*	209	0.723	-0.324	-0.234	05	0.026	-3.65	-0.051
6	*Mucuna pruriens*	05	0.017	-4.075	-0.069	180	0.947	-0.054	
		294			**-1.025**	**190**			**0.23**

H = 1.025 Hmax = In(6) = 1.79 H = 0.23; In(3) = 1.099

E = 0.57 E = 0.23/1.099 = 0.21

Forest Shrubs

Rainy Season | **Dry Season**

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)
1	*Rauvolfia vomitoria*	05	0.017	-4.075	-0.069	05	0.019	-3.963	-0.075
2	*Ananas comosus*	10	0.034	-3.381	-0.115	10	0.037	-3.297	-0.122
3	*Byrsocarpus coccineus*	44	0.148	-1.910	-0.283	44	0.164	-1.808	-0.297
4	*Alchomea cordifolia*	05	0.017	-4.075	-0.069				
5	*Olax viridis*	204	0.685	-0.378	-0.259	180	0.669	-0.402	-0.269
6	*Bambusa vulgaris*	20	0.087	-2.703	-0.181	20	0.074	-2.604	-0.193
7	*Mimosa invisa*	10	0.034	-3.381	-0.115	10	0.037	-3.297	-0.122
		298		**-1.09**		**269**			**-1.078**

H = 1.09; In(7) = 1.946 | H = 1.078; In(6) = 1.79

E = 1.09/1.946 = 0.56 | E = 1.078/1.79 = 0.60

Forest Grass

Rainy Season | **Dry Season**

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)
1	*Imperata cylindrica*	50	0.33	-1.109	-0.366	50	0.33	-1.109	-0.366
2	*Cymbopogon cittratus*	100	0.67	-4.00	-0.268	100	0.67	-4.00	-0.268
		150			**-0.63**	**150**			**-0.63**

H = 0.63 Hmax = In(2) = 0.69 | H = 0.63; In(2) = 0.69

E = 0.63/0.69 = 0.91 | E = 0.63/0.69 = 0.91

6c

Short Term Fallow Site - Trees

		Rainy Season				Dry Season			
S/N	**Species**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In(pi)**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In(pi)**
1	*Mangifera indica*	05	0.043	-3.147	-0.135	05	0.043	-3.147	-0.135
2	*Klausinia anisata*	10	0.087	-2.442	-0.212	10	0.087	-2.442	-0.212
3	*Elaeis guineenses (seedling)*	30	0.261	-1.343	-0.291	30	0.261	-1.343	-0.291
4	*Cocos nucifera (seedling)*	25	0.217	-1.528	-0.332	25	0.217	-1.528	-0.332
5	*Citrus sinensis (seedling)*	30	0.261	-1.343	-0.291	30	0.261	-1.343	-0.291
6	*Psidium guajava (seedling)*	10	0.087	-2.442	-0.212	10	0.087	-2.442	-0.212
7	*Newbouldia laevis*	05	0.043	-3.147	-0.135	05	0.043	-3.147	-0.135
		115			**-1.608**	**115**			**-1.608**

H = 1.61; Hmax In(7) = 1.95　　　H = 1.61; Hmax- = 1.95

E = 1.61/1.95 = 0.83　　　E = 1.61/1.05 = 0.83

Short Term Fallow Site - Shrubs

		Rainy Season				Dry Season			
S/N	**Species**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In(pi)**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In(pi)**
1	*Ananas comosus*	30	0.222	-1.505	-0.334	10	0.087	-2.442	-0.212
2	*Manihot esculentun*	10	0.286	-1.252	-0.358	10	0.087	-3.442	-0.212
3	*Chromolaena odorata*	95	0.704	-0.351	-0.247	95	0.826	-0.191	-0.158
		135			**-0.94**	**115**			**0.528**

H = 0.94; In(3) = 1.099　　　H = 0.58; In(3) =1.099

E = 0.94/1.099 = 0.86　　　E = 0.53

Short Term Fallow Site - Grass **6d**

Rainy Season

S/N	Species	Flat Spp. Popn	Flat Pi	Flat In(Pi)	Flat (Pi) x In(pi)	Slope Spp. Popn	Slope Pi	Slope In(Pi)	Slope (Pi) x In(pi)
1	*Panicum maxima*	2	0.016	-4.135	-0.066				
2	*Imperata cylindrica*	5	0.039	-3.244	-0.127	6	0.118	-2.137	-0.252
3	*Paspalum scrobiculatum*	5	0.039	-3.244	-0.127				
4	*Hackelochloa granularis*	10	0.078	-2.551	-0.199	1	0.020	-3.912	-0.078
5	*Cymbopogon giganteus*	10	0.078	-2.551	-0.199	4	0.078	-2.551	-0.199
6	*Acroceras zizaniodes*	40	0.313	-1.162	-0.364	10	0.20	-1.609	-0.322
7	*Sporobolus pyramidalis*	30	0.234	-1.452	-0.340	1	0.020	-3.912	-0.078
8	*Cynodon dactylon*	1	0.008	-4.828	-0.039				
9	*Setaria barbata*	5	0.039	-3.244	-0.127	12	0.235	-1.448	-0.340
10	*Setaria longiseta*					10	0.20	-1.609	-0.322
11	*Panicum laxum*	10	0.078	-2.551	-0.199	1	0.020	-3.912	-0.078
12	*Digitaria gayana*	08	0.063	-2.765	-0.174				
13	*Brachiara lata*	02	0.016	-4.135	-0.066				
14	*Andropogon tectorum*					2	0.039	-3.244	-0.127
15	*Eragratis atrovirens*					1	0.020	-3.912	-0.078
16	*Cymbopogon cittratus*					1	0.020	-3.912	-0.078
17	*Zea mays*					2	0.039	-3.244	-0.129
		128			**-2.027**	**51**			**-2.079**

(Slope) H = 2.08; Hmax=E = 0.84

(Flat) H = -2.03; Hmax = In(12) = 2.48, E = 0.82

Short Term Fallow Site - Grass

6e

Dry Season

S/N	Species	Flat Spp. Popn	Flat Pi	Flat In(Pi)	Flat (Pi) x In(pi)	Slope Spp. Popn	Slope Pi	Slope In(Pi)	Slope (Pi) x In(pi)
1	*Panicum maxima*	15	0.115	-2.163	-0.249				
2	*Imperata cylindrica*	10	0.077	-2.564	-0.197	5	0.147	-1.917	-0.282
3	*Sorghum arundinaceum*	5	0.038	-3.270	-0.124				
4	*Andropogon gayanus*					5	0.147	-1.917	-0.282
5	*Paspalum scrobiculatum*	5	0.038	-3.270	-0.124	2	0.059	-2.830	-0.167
6	*Hackelochloa granularis*	1	0.008	-4.828	-0.039				
7	*Rottboelia cochinchinensis*					1	0.029	-3.540	-0.103
8	*Sporobolus pyramidalis*	50	0.385	-0.955	-0.367	10	0.294	-1.224	-0.360
9	*Cynodon dactylon*	30	0.231	-1.465	-0.338	10	0.294	-1.224	-0.360
10	*Setaria barbata*	5	0.038	-3.270	-0.124				
11	*Digitaria horizontalis*	5	0.038	-3.270	-0.124				
12	*Setaria longiseta*	2	0.015	-4.20	-0.063	1	0.029	-3.540	-0.103
13	*Paspalum conjugatum*	1	0.008	-4.828	-0.039				
14	*Rhynchelytrum repens*	1	0.008	-4.828	-0.039				
		130			**-1.827**	**34**			**1.657**

H = 1.83; Hmax=In(12) = 2.48 H = 1.66; Hmax In(7) = 1.95

E = 1.83/2.48 = 0.74 E = 1.66/1.95 = 0.85

Short Term Fallow Site – (Herbs in families)

Rainy Season

6f

S/N	Species	Flat Spp. Popn	Flat Pi	Flat In(Pi)	Flat (Pi) x In(pi)	Slope Spp. Popn	Slope Pi	Slope In(Pi)	Slope (Pi) x In(pi)
1	*Acanthaceae*	2	0.014	-4.269	-0.06				
2	*Amaranthaceae*	3	0.021	-3.863	-0.081	2	0.015	-4.20	-0.063
3	*Asteraceae*	95	0.066	-0.416	-0.275	95	0.731	-0.313	-0.229
4	*Commelinaceae*	2	0.014	-4.269	-0.06	2	0.015	-4.20	-0.063
5	*Convolvulaceae*	2	0.014	-4.269	-0.06				
6	*Cucurbitaceae*	1	0.007	-4.962	-0.035				
7	*Cyperaceae*	8	0.056	-2.882	-0.161	4	0.031	-3.474	-0.108
8	*Euphorbiaceae*	4	0.028	-3.576	-0.100	2	0.015	-4.20	-0.063
9	*Fabaceae*	1	0.007	-4.962	-0.035	1	0.008	-4.828	-0.039
10	*Lamiaceae*	11	0.076	-2.577	-0.196	6	0.046	-3.079	-0.142
11	*Loganiaceae*					1	0.008	-3.828	-0.039
12	*Melastomataceae*	1	0.007	-4.962	-0.035	1	0.008	-4.828	-0.039
13	*Muraceae*					1	0.008	-4.828	-0.039
14	*Nyctaginaceae*	1	0.007	-4.962	-0.035	2	0.015	-4.20	-0.063
15	*Onagraceae*	3	0.021	-3.863	-0.081	2	0.015	-4.20	-0.063
16	*Piperaceae*					1	0.008	-4.828	-0.039
17	*Polyganaceae*	1	0.007	-4.962	-0.035				
18	*Pontederaceae*								
19	*Rubiaceae*	4	0.028	-3.576	-0.100	5	0.038	-3.270	-0.124
20	Araceae	05	0.035	-3.352	0.117	05	0.038	-3.270	0.124
		144			**-1619**	**130**			**-2.353**

H = 1.62; Hmax=In(16) = 2.77
E = 0.58

H = 1.24;Hmax = 2.71
E = 0.46

6g

Short Term Fallow Site – (Herbs in families)
Dry Season

		Flat				Slope			
S/N	**Species**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In (pi)**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In (pi)**
1	Acanthaceae	2	0.025	-3.689	-0.092	2	0.04	-3.219	-0.129
2	Amaranthceae	4	0.05	-2.100	-0.105	2	0.04	-3.219	-0.129
3	Asteraceae	35	0.438	-0.826	-0.362	31	0.62	-0.478	-0.296
4	Capparidaceae	01	0.013	-4.343	-0.056	-	-	-	-
5	Commelinaceae	01	0.013	-4.343	-0.056	01	0.02	-3.912	-0.078
6	Compositae	01	0.013	-4.343	-0.056	01	0.02	-3.912	-0.078
7	Convolvulaceae	01	0.013	-4.343	-0.056	-	-	-	-
8	Cyperaceae	07	0.088	-2.43	-0.214	-	-	-	-
9	Euphorbiaceae	03	0.038	-3.27	-0.214	03	0.06	-2.813	-0.169
10	Fabaceae	01	0.013	-4.343	0.056	02	0.04	-3.219	-0.129
11	Lamiaceae	12	0.15	-1.90	-0.285	07	0.14	-1.966	-0.275
12	Malvaceae	01	0.013	-4.343	-0.056	-	-	-	-
13	Melastomataceae	01	0.013	-4.343	-0.056	-	-	-	-
14	Nyctaginaceae	02	0.025	-3.689	-0.092	01	0.02	-3.912	-0.078
15	Onagraceae	01	0.013	-4.343	0.056	-	-	-	-
16	Rubiaceae	05	0.063	-2.765	-0.174	-	-	-	-
17	Sphenocleaceae	01	0.013	-4.343	-0.056	-	-	-	-
18	Sterculiaceae	01	0.013	-4.343	-0.056	-	-	-	-
		80			**-2.01**	**50**			**1.36**

H = 2.01; Hmax = In(18) = 2.89
E = 0.70

H= 1.36; Hmax= In (09) = 2.20
E = 0.62

Long Term Fallow Site (Slope) – Trees

Rainy Season **Dry Season**

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)
1	*Nauclea latifolia*	05	1	0	0	05	1	0	0

Long Term Fallow Site - Climbers

Rainy Season **Dry Season**

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)
1	*Desmodium scorpiurus*	50	1	0	0				

Long Term Fallow Site - Shrubs

Rainy Season **Dry Season**

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)
1	*Annona senegalensis*	10	0.5	-0.693	-0.347	10	0.476	-0.742	-0.353
2	*Uvaria chamae*					1	0.048	-3.037	-0.146
3	*Mimosa invisa*	10	0.5	-0.693	-0.347	10	0.476	-0.742	-0.353
		20			**-0.694**	**21**			**0.852**

H =0.69; In(2) = 0.693, E = 1 H=0.85;=In(3)=1.099, E=0.77

Long Term Fallow Site - Grass

Rainy Season **Dry Season**

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)
1	*Panicum maxima*	30	0.163	-1.814	-0.296	02	0.013	-4.343	-0.056
2	*Hackelochloa granularis*	20	0.109	-2.216	-0.242				
3	*Andropogon tectorum*	05	0.027	-3.612	-0.098				
4	*Cymbopogon giganteus*	1	0.005	-5.298	-0.026				
5	*Imperata cylindrical*	100	0.543	-0.611	-0.332	150	0.974	-0.026	-0.026
6	*Andropogon gayanus*	05	0.027	-3.612	-0.098	2	0.013	-4.343	-0.056
7	*Rottboellia cochinchinensis*	05	0.027	-3.612	-0.098				
8	*Pennisetum pedicellatum*	15	0.082	-2.501	-0.205				
9	*Pennisetum polystachion*	02	0.011	-4.510	-0.050				
10	*Sorghum arundinaceum*	01	0.005	-5.298	-0.026				
		184			**1.471**	**154**			**0.138**

H = 1.47; In(10) =2.30; E = 0.64 H = 0.14; =In(3) =1.099, E=0.13

Long Term Fallow Site – (Herbs in families)

Rainy Season **Dry season**

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In (pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In (pi)
1	Acanthaceae	01	0.033	-3.411	-0.113	02	0.077	-2.564	-0.197
2	Amaranthceae	02	0.067	-2.703	-0.181	01	0.038	-3.270	-0.124
3	Asteraceae	03	0.1	-2.30	0.23	03	0.115	-2.163	-0.249
4	Commelinaceae	01	0.033	-3.411	-0.113	01	0.038	-3.270	-0.124
5	Compositae	01	0.033	-3.411	-0.113	01	0.038	-3.270	-0.124
6	Convolvulaceae	02	0.067	-2.703	-0.181	03	0.115	-2.163	-0.249
7	Cyperaceae	01	0.033	-3.411	-0.113	-	-	-	-
8	Euphorbiaceae	06	0.2	-1.609	0.322	03	0.115	-2.163	-0.249
9	Fabaceae	04	0.133	-2.017	-0.268	04	0.154	-1.871	-0.288
10	Malvaceae	02	0.067	-2.703	-0.181	01	0.038	-3.270	-0.124
11	Melastomataceae	02	0.067	-2.703	-0.181	-	-	-	-
12	Mimosoideae	01	0.033	-3.411	-0.113	01	0.038	-3.270	-0.124
13	Musaceae	01	0.033	-3.411	-0.133	02	0.077	-2.564	-0.197
14	Rubiaceae	02	0.067	-2.703	-0.181	01	0.038	-3.270	-0.124
15	Solanaceae	-	-	-	-	01	0.038	-3.270	-0.124
16	Sterculiaceae	01	0.033	-3.411	-0.113	-	-	-	-
17	Bromeliaceae	-	-	-	-	01	0.038	-3.270	-0.124
18	Verbenaceae	-	-	-	-	01	0.038	-3.270	-0.124
		30			**2.516**	**26**			**2.545**

H = 2.52; In(15) = 2.71; E = 0.93 H = 2.55; In(15) = 2.71; E= 0.94

Farm in Current Usage Site (Slope) – Shrubs

		Rainy Season				Dry Season			
S/N	**Species**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In (pi)**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In (pi)**
1	*Manihot esculentum*	2	0.069	-2674	-0.185	1	0.043	-3.147	-0.135
2	*Vernonia amygdalina*	15	0.517	-0660	-0.341	10	0.435	-0.832	-0.362
3	*Mimosa invisa*	10	0.345	-1.064	-0.367	10	0.435	-0.832	-0.362
4	*Piliostigma thonningii*	2	0.069	-2.674	-0.185	2	0.087	-2.442	-0.212
		29			**1.08**	**23**			**1.07**

h = 1.08; In (4) = 1.39; E = 0.78 H = 1.07; In(4) = 1.39; E= 0.77

Farm in Current Usage Site (Slope) –Climbers

		Rainy Season				Dry Season			
S/N	**Species**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In (pi)**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In (pi)**
1	*Telfeiria occidentalis*	150	0.60	-0.511	-0.307	50	0.556	-0.587	-0.326
2	*Desmodium scorpiurus*	50	0.2	-1.609	-0.322	20	0.222	-1.505	-0.334
3	*Phaseolus vulgaris*	50	0.2	-1.609	-0.322	20	0.222	-1.505	-0.334
		250			**0.95**	**90**			

H = 0.95; In(3) = 1.099; E= 0.86 H = 0.99 E = 0.90

Farm in Current Usage Site (Slope) –Grass

		Rainy Season				Dry Season			
S/N	**Species**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In (pi)**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In (pi)**
1	*Zea mays*	-	-	-	-	05	0.1	-2.303	-0.230
2	*Paspalum scrobiculatum*	-	-	-	-	25	0.5	-0693	-0.347
3	*Sorghum arudinaceum*	-	-	-	-	10	0.2	-1.609	-0.322
4	*Imperata cylindrical*	-	-	-	-	02	0.04	-3.219	-0.129
5	*Hackelochloa granularis*	25	0.595	-0.519	-0.309	-	-	-	-
6	*Panicum maxima*	10	0.238	-1.435	-0.342	08	0.16	-1.833	-0.293
7	*Oryza sativa*	02	0.048	-3.037	-0.146	-	-	-	-
8	*Cymbopogon cittratus*	05	0.119	-2.129	-0.253	-	-	-	-
		42			**-1.050**	**50**			**-1.321**

H = 1.05; In(4) = 1.39; E = 0.76 H = 1.32; =In(5) = 1.61, E= 0.82

6k

Farm in Current Usage Site (Slope)– (Herbs in families)

		Rainy Season				Dry Season			
S/N	**Species**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In(pi)**	**Spp. Popn**	**Pi**	**In(Pi)**	**(Pi) x In(pi)**
1	*Acanthaceae*	2	0.016	-4.135	-0.066				
2	*Amaranthceae*	6	0.048	-3.037	-0.146	3	0.035	-3.352	-0.117
3	*Araceae*	1	0.008	-4.828	-0.039				
4	*Asteraceae*	4	0.032	-3.442	-0.11	4	0.047	-3.058	-0.144
5	*Capparidaceae*	1	0.008	-4.828	-0.039	1	0.012	-4.423	-0.053
6	*Commelinaceae*	2	0.016	-4.135	-0.066	2	0.024	-3.73	-0.09
7	*Convolvulaceae*	3	0.024	-3.73	-0.09	2	0.024	-3.73	-0.09
8	*Cyperaceae*	8	0.063	-2.765	-0.174	4	0.047	-3.058	-0.144
9	*Dioscoreaceae*	1	0.008	-4.828	-0.039				
10	*Euphorbiaceae*	5	0.04	-3.219	-0.129	6	0.071	-2.645	-0.188
11	*Fabaceae*	2	0.018	-4.135	-0.066	2	0.024	-3.73	-0.09
12	*Lamiaceae*	73	0.579	-0.546	-0.316	52	0.612	-0.491	-0.300
13	*Loganiaceae*	1	0.008	-4.828	-0.039				
14	*Malvaceae*	1	0.008	-4.828	-0.039	1	0.012	-4.423	-0.053
15	*Mimosoideae*	3	0.024	-3.73	-0.09	1	0.012	-4.423	-0.053
16	*Musaceae*	1	0.008	-4.828	-0.039				
17	*Nyctaginaceae*	2	0.016	-4.135	-0.066				
18	*pedaliaceae*	1	0.008	-4.828	-0.039				
19	*Piperaceae*	1	0.008	-4.828	-0.039				
20	*Portulacaceae*	2	0.016	-4.135	-0.066	2	0.024	-3.73	-0.09
21	*Rubiaceae*	3	0.024	-3.73	-0.09	3	0.035	-3.352	-0.117
22	*Solanaceae*	1	0.008	-4.828	-0.039	1	0.012	-4.423	-0.053
23	*Urticaceae*	1	0.008	-4.828	-0.039				
24	*Verbenaceae*	1	0.008	-4.828	-0.039				
25	*Bromeliaceae*					1	0.012	-4.423	-0.053
		126			**-1.90**	**85**			**-1.635**

H = 1.90; In(2) = 3.18, E= 0.60   H = 1.635;=In(15) 2.71, E=0.60

Farm in Current Usage Site (Flat)- Shrubs

6l

Rainy Season / Dry Season

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In (pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In (pi)
1	*Manihot esculentum*	05	0.143	-1.945	-0.278	02	-0.167	-1.790	-0.299
2	*Vernonia amygdalina*	20	0.571	-0.560	-0.320	05	0.417	-0.875	-0.365
3	*Cajanus cajans*	10	0.286	-1.252	-0.358	05	0.417	-0.875	-0.365
		35			**0.96**	**12**			**1.029**

H = 0.96; In(3) = 1.099; E = 0.87 H = 1.029; In(3) = 1.089; E= 0.94

Farm in Current Usage Site (Flat) – Climbers

Rainy Season / Dry Season

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In (pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In (pi)
1	*Telfeiria occidentalis*	100	0.667	-0.405	-0.270	50	0.714	-0.337	-0.241
2	*Desmodium scorpiurus*	50	0.333	-1.10	-0.366	20	0.286	-252	-0.358
		150			**0.64**	**70**			**0.60**

H= 0.64; In(2) = 0.693; E= 0.92 H = 0.60; In(2) = 0.693; E= 0.87

Farm in Current Usage (Flat)- Grass

Rainy Season / Dry Season

S/N	Species	Spp. Popn	Pi	In(Pi)	(Pi) x In (pi)	Spp. Popn	Pi	In(Pi)	(Pi) x In (pi)
1	*Zea mays*	-	-	-	-	15	0.3	-1.204	-0.361
2	*Paspalum scrobiculatum*	-	-	-	-	15	0.3	-1.204	-0.361
3	*Sorghum arundinaceum*	-	-	-	-	10	0.2	-1.609	-0.322
4	*Imperata cylindrical*	03	0.053	-2937	-0.156	10	0.2	-1.609	-0.322
5	*Hackelochloa granularis*	40	0.702	-0.354	-0.248	-	-	-	-
6	*Panicum maxima*	07	0.123	-2.096	-0.258	-	-	-	-
7	*Oryza sativa*	04	0.070	2.660	-0.186	-	-	-	-
8	*Cymbopogon cittratus*	03	0.053	2.937	-0.156	-	-	-	-
		57			**-1.004**	**50**			**-1.366**

H = 1.00; In(5) = 1.61; E= 0.62 H= 1.37; =In(4) = 1.39, E= 0.99

Farm in Current Usage Site (Flat)–(Herbs in families)

S/N	Species	Rainy Season Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)	Dry Season Spp. Popn	Pi	In(Pi)	(Pi) x In(pi)
1	*Acanthaceae*					01	0.028	-3.576	-0.100
2	*Amaranthceae*	2	0.029	-3.54	-0.103	2	0.056	-2.88	-0.161
3	*Asteraceae*	4	0.059	-2.830	-0.167	4	0.11	-2.207	-0.243
4	*Capparidaceae*	1	0.015	-4.200	-0.063	1	0.028	-3.576	-0.100
5	*Commelinaceae*	1	0.015	-4.200	-0.063	1	0.028	-3.576	-0.100
6	*Convolvulaceae*	1	0.015	-4.200	-0.063	1	0.028	-3.576	-0.100
7	*Cyperaceae*	7	0.103	-2.273	-0.234	4	0.11	-2.207	-0.243
8	*Euphorbiaceae*	4	0.059	-2.830	-0.167	2	0.056	-2.88	-0.161
9	*Fabaceae*	1	0.015	-4.200	-0.063	1	0.028	-3.576	-0.100
10	*Lamiaceae*	31	0.456	-4.785	-0.072	11	0.306	-1.184	-0.362
11	*Malvaceae*	1	0.015	-4.200	-0.063				
12	*Mimosoideae*	2	0.029	-3.54	-0.103	1	0.028	-3.576	-0.100
13	*Nyctaginaceae*	1	0.015	-4.200	-0.063				
14	*Onagraceae*	3	0.044	-3.124	-0.137	1	0.028	-3.576	-0.100
15	*Portulacaceae*	1	0.015	-4.200	-0.063	2	0.056	-2.88	-0.161
16	*Rubiaceae*	5	0.074	-2.604	-0.193	2	0.056	-2.88	-0.161
17	*Urticaceae*	2	0.029	-3.34	-0.103	1	0.028	-3.576	-0.100
18	*Hydrophyllaceae*	01	0.015	-4.200	-0.063				
19	*Pontederiaceae*					1	0.028	-3.576	-0.100
		68			**-2.07**	**36**			-**2.39**

H = 2.07; In(17) = 2.833, E= 0.73 H = 2.39;=In(16) 2.77, E=0.86

APPENDIX 7
(Tree forest site)

Importance Values of encountered species from the forest site

S/N	Species Family	Spp	Measure	Position
1	*Zanthaxylon zanthaxyloides*	05	10.2	8th
2	*Spondias mombin*	02	4.5	12th
3	*Voacanga africana*	01	1.22	24th
4	*Holarrhena floribunda*	05	6.44	10th
5	*Elaeis guineensis*	10	12.56	5th
6	*Sporospamum febrifugum*	01	1.20	25th
7	*Newbouldia laevis*	03	17.7	3rd
8	*Senna siamea*	10	13.5	4th
9	*Dialum guineense*	05	3.45	15th
10	*Afzelia africana*	03	1.33	22nd
11	*Eythropleum suaveolens*	01	3.88	14th
12	*Bridelia ferruginea*	01	1.25	23rd
13	*Hevea braziliensis*	15	6.67	9th
14	*Albizia chaevalieri*	03	3.20	16th
15	*Peltoforum pterocarpum*	01	1.44	20th
16	*Napoleana imperialis*	24	25.64	1st
17	*Anthocleista djalonensis*	01	11.25	7th
18	*Tetrapleura tetraptera*	04	5.27	11th
19	*Pentaclethra macrophyla*	10	11.30	6th
20	*Dichrostachys cinerea*	02	2.32	17th
21	*Milicia excelsa*	01	4.23	13th
22	*Barteria nigritiana*	01	1.78	18th
23	*Rothmania hispida*	05	1.35	21st
24	*Dactyledenia barteria*	23	25.65	2nd
25	*Sterculia tragacantha*	01	1.60	9th

FOREST SITE

General formula for Determining Importance Values (IVI) using *Olax viridis* as an example

Techniques

C. 1 (closest Individual Technique)

Sum of distances 28.06
÷
88
0.319

(x2 : c.f)

Total Dimensions: Area = c x w = (20 x 20) m2 = 400m2

1. Frequency: + 88 = (88/100 x 100/1) = 88
C. I N. N

2. Density: $\frac{400}{0.319 \times 2} = \frac{400}{(0.638)2} = \frac{400}{0.407}$ $\frac{400}{0.361\text{x}1.67} = \frac{400}{(0.602)2} = \frac{400}{0.362}$
= 982.80 = 1104.97

3. Rel. Density: $\frac{982.80}{22519.55} \times \frac{100}{1}$ $\frac{1104.97}{25428.73} \times \frac{100}{1}$
47.07 57.93

4. Rel. Frequency : 100 = 30.09
678
34.45

5. Importance Value

Absolute values for Dry Season from the Forest site

Density

C. I Frequency

22,519.55 678

Absolute value for Rainy season from the Forest site

Density

C. I Frequency

22,789.55 690

APPENDIX

Forest site

S/N		Rainy		Dry
1	*Cissus araliodes*	20	32.83	0
2	*Rauvolfia vomitorium*	05	2.81	05
3	*Gongronema latifolia*	20	10.66	05
4	*Ananas comosus*	10	10.52	10
5	*Byrsocarpus coccineus*	44	22.06	44
6	*Dioscorea dumentorum*	10	5.07	0
7	*Alchornea cordifolia*	05	5.28	05
8	*Olax viridis*	204	68.89	180
9	*Peuraria phaseoloides*	30	9.34	05
10	*Bambusa vulgaris*	20	50.0	20
11	*Smilax anceps*	209	72.55	180
12	*Mimosa invisa*	05	29.18	05

GRASSES (Forest site)

1	*Imperata cylindrica*	50	12.0	50
2	*Cymbopogon cittratus*	10	10.0	10

APPENDIX III

DRY SEASON FLAT A

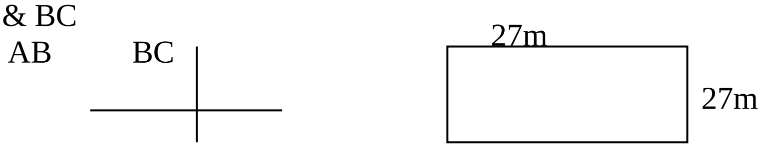
SHORT-TERM FALLOW SITE SITE B MANAGED (IMPORTANCE VALUES)

1. Total Dimensions (90 x 90) Ft -8100ft
   1m = 3.3 feet :. 90 ft =
   90 3.3 = 27. 3m
   0027m

a : . (27 x 27)m = 729m
5% Sampling intensity
= 5/100 x 7.29 = 7.29
= 36 quadrat

b. Sampling technique = Random sampling technique to avoid bias.

c. Using coordinates AB & BC



S/n	Species	Position	Total Quads	Quad.1	Quad.2	Quad.3	Quad.4
1.	*Vernonia cinerea*	42nd	02	-	01	01	-
2.	*Melochia corchorifolia*	50th	01	-	-	01	-
3.	*Leucas martinicensis*	50th	01	-	-	-	01
4.	*Acanthospermum hispidium*	38th	03	-	-	01	02
5.	*Ludwigia decurrens*	38th	03	-	-	01	02
6.	*Euphorbia hirta*	14th	18	05	10	-	03
7.	*Sporobolus pyramidalis*	1st	120	20	40	30	30
8	*Boerhavia diffusa*	6th	18	06	05	04	03
9.	*Hackelochloa granularis*	49th	02	02	-	-	-
10.	*Ipomoea aquatica*	37th	04	-	-	02	02
11.	*Sphenoclea zeylanica*	48th	03	-	-	03	-
12	*Rhynchelytrum repens*	50th	4.1	01	-	-	01
13.	*Ananas comosus*	21st	10	-	05	05	-
14.	*Sorghum arundinaceum*	20th	12	-	-	02	10
15.	*Malvastrum coromandelianum*	42nd	02	01	-	01	-
16.	*Hyptis lanceolata*	26th	07	-	02	05	-
17	*Cyathula prostrata*	42nd	02	-	01	-	01
18.	*Pupalia lappaceae*	33rd	05	-	-	03	02
19.	*Paspalum conjugatum*	42nd	02	01	-	-	01
20	*Eclipta alba*	38th	03	-	-	02	01
21.	*Fimbristylis littoralis*	42nd	02	01	-	01	-
22.	*Oldenlandia corymbosa*	7th	17	05	05	04	03
23.	*Heterotis grandifolia*	50th	01	01	-	-	-

24.	*Mariscus flabelliformis*	17th	15	-	05	-	10
25.	*Cyperus esculentus*	30th	06	04	-	02	-
26.	*Euphorbia heterophylla*	21st	10	05	-	-	05
27.	*Cynodon dactylon*	2nd	75	05	10	30	30
28.	*Mitracarpus villosus*	11th	14	-	02	05	04
29.	*Diodia sarmentosa*	10th	16	01	10	03	02
30.	*Chromolaena odorata*	26th	07	02	-	-	05
31.	*Gomphrena celosioides*	3rd	35	20	-	05	10
32.	*Paspalum scrobiculatum*	35th	10	-	10	-	-
33.	*Commelina erecta*	19th	09	-	03	03	03
34.	*Alternanthera sessilis*	11th	14	03	04	02	05
35.	*Spermacoce ocymoides*	7th	17	05	04	03	05
36.	*Mariscus alternifolia*	21st	10	05	05	-	-
37	*Setaria barbata*	15th	14	04	05	05	-
38.	*Panicum maxima*	20th	30	20	-	10	-
39.	*Imperata cylindrica*	16th	17	-	10	-	07
40	*Cleome rutidosperma*	30th	06	-	05	-	01
41.	*Setaria longiseta*	30th	06	-	03	03	-
42.	*Aspilia africana*	47th	05	-	05	-	-
43.	*Desmodium scorpiurus*	26th	07	-	04	03	-
44.	*Cyperus rotundus*	4th	35	-	-	30	05
45.	*Phyllanthus amarus*	7th	17	05	05	05	02
46.	*Elaeis guineensis (seedling)*	30th	06	-	05	-	01
47.	*Cocos nucifera (seedling)*	33rd	05	-	03	-	02
48	*Spermacoce verticillata*	38th	03	02	-	01	-
49.	*Hypoestes cancellata*	26th	07	-	-	05	02
50	*Kyllinga erecta*	17th	15	-	-	10	05
51.	*Asystasia gangentica*	26th	07	-	05	02	-
52.	*Kyllinga pumilla*	21st	10	-	-	05	05
53.	*Boerhavia coccinea*	13th	30	-	-	-	30
54.	*Digitaria horizontalis*	21st	10	-	-	05	05
55.	*Laggera aurita*	35th	10	-	-	-	10
707	Total per quadrat		707	126	172	203	216

(A)DENSITY =
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
73 73 73 73 73 73 73 73 73 73 73 73 73 73 73 73 73 73 73
02 01 01 03 03 18 120 18 02 04 03 01 10 12 02 07 02 05 02
20 21 22 23 24 25 26 27 28 29 39 31
73 73 73 73 73 73 73 73 73 73 73 73
03 02 17 01 15 06 10 75 14 16 07 35
73 73 0.247 0.027 0.041 0.137 0.027 0.027
0.027 0.014 0.014 0.041 0.041 1.645 0.247 0.055 0.014 0.163 0.096 0.068 0.027 0.041 0.027 0.233 0.014
0.205 0.082 0.137 1.027 0.192 0.219 0.096 0.479

(B) REL. DENSITY

0.275 0.143 0.143 0.143 0.418 0.418 2.516 16.753 2.516 0.275 0.560 0.418 1.395 1.670 0.275 0.978
0.275 0.693 0.275 0.418 0.275 2.373 0.143 2.088 0.835 1.395 10.459 1.955 2.230 0.978 4.878 0.027
9.819

(c) FREQUENCY

2/4 1/4 1/4 2/4 2/4 3/4 4/4 4/4 1/4 1/4 2/4 1/4 1/4 2/4 2/4 2/4 2/4 2/4
50 25 25 50 50 75 100 100 25 25 50 25 25 50 50 50 50 50
2/4 2/4 2/4 2/4 4/4 1/4 2/4 2/4 2/4 4/4 4/4 4/4 4/4 3/4
50 50 50 50 100 25 50 50 50 100 100 100 50 75
3050

(D) REL. FREQUENCY

1.639 0.820 0.820 1.639 1.639 2.459 3.279 3.279 0.820 1.639 0.820 0.820 1.639 1.639 1.639 1.639
1.639 1.639 1.639 1.639 1.639 3.279 0.820 1.639 1.639 1.639 3.279 3.279 3.279 1.639 2.459

(E) IMPORTANCE VALUE

1 2 3 4 5 6 7 8 9
1.914 0.963 0.963 2.057 2.057 4.975 20.03200 5.795 1.095
42nd 50th 50th 38th 38th 14th 1st 6th 49th
10 11 12 13 14 15 16 17 18 19
2.199 1.238 0.963 3.034 3.309 1.914 2.617 1.914 2.332 1.639
37th 48th 50th 21st 20th 42nd 26th 42nd 33rd 42nd
20 21 22 23 24 25 26 27 28 29
2.057 1.914 5.652 0.963 3.727 2.474 3.034 13.738 5.234 5.234 38th 42nd 7th 50th 17th
30th 21st 2nd 11th 10th
30 31
2.617 7.337
26th 3rd **DENSITY**
48 49 50 51 52 53 54 55 32 33
73 73 73 73 73 73 73 73 73 73
03 07 15 07 10 30 10 10 10 09
0.041 0.096 0.205 0.096 0.137 0.411 0.137 0.137 0.137 0.123
34 35 36 37 38 39 40 41 42 43
73 73 73 73 73 73 73 73 73 73
14 17 10 14 30 17 06 06 05 07
0.192 0.233 0.137 0.192 0.411 0.233 0.082 0.082 0.068 0.096
44 45 46 47
73 73 73 73
35 17 06 05
0.479 0.233 0.082 0.068

(B) REL. DENSITY

0.418 0.978 2.088 0.978 1.395 4.186 1.395 1.395 1.395 1.253
1.955 2.373 1.395 1.955 4.186 2.373 0.835 0.693 0.978 4.878
2.373 0.835 0.693

(C) FREQUENCY

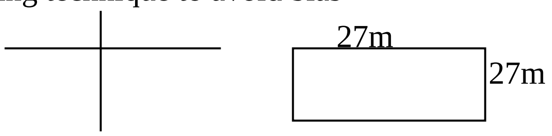
2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 1/4 3/4 4/4 4/4 2/4
50 50 50 50 50 50 50 50 25 75 100 100 50
3/4 2/4 2/4 2/4 2/4 1/4 2/4 2/4 4/4 2/4 2/4
75 50 50 50 50 25 50 50 100 50 50

(D) REL. FREQUENCY
1.639 1.639 1.639 1.639 1.639 0.820 1.639 0.820 0.820 2.459 3.279 3.279 1.639 2.459
1.639 1.639 1.639 1.639
0.820 1.639 1.639 3.279 1.639 1.639

(E) IMPORTANCE VALUE
48 49 50 51 52 53 54 55 32
2.057 2.617 3.727 2.617 3.034 5.006 3.034 2.215 2.215
38th 26th 17th 26th 21st 13th 21st 35th 35th
33 34 35 36 37 38 39 40 41
3.712 5.234 5.652 3.034 4.414 5.825 4.012 2.474 2.474
19th 11th 7th 21st 15th 5th 16th 30th 30th
42 43 44 45 46 47
1.513 2.617 6.517 5.652 2.474 2.332
47th 26th 4th 7th 30th 33rd

APPENDIX IV
DRY SEASON
SLOPE
Short Term Fallow Site Site B- Managed (Importance Values)

1. Total Dimensions (90 x 90)ft - 8100 ft
1m = 3.3 feet .: 90ft
90 ÷ 3.3 = 27.3m = 27m
a. .: (27 x 27) m = 729m
b 5% Sampling intensity
= 5/100 x 7.29 = 7.29
= 36 quadrat
c. Sampling technique = Random sampling technique to avoid bias
Using coordinates AB & BC AB BC



S/N	Species	Position	Total Quads	Quad.1	Quad. 2	Quad.3	Quad.4
1.	*Asytasia gangentica*	4th	70	20	30	10	10
2.	*Aspilia Africana*	1st	225	35	70	100	20
3.	*Ocimum basilicum*	10th	15	-	10	05	-
4.	*Chromolaena adorata*	3rd	95	05	20	20	50
5.	*Mucuna pruriens*	7th	12	05	-	05	-
6.	*Sporobolus pyramidalis*	9th	20	10	-	10	-
7.	*Desmodium scorpiurus*	2nd	100	20	30	30	20
8.	*Imperata cylindrica*	10th	15	10	-	-	05
9.	*Citrus cinenses (seedlings)*	5th	20	05	05	05	05
10.	*Paspalum scrobiculatum*	16th	05	05	-	-	-
11.	*Cynodon dactylon*	5th	20	05	05	05	05
12.	*Boerhavia erecta*	12th	13	-	10	03	-
13.	*Setaria longiseta*	22nd	03	-	03	-	-
14	*Manihot esculentum*	8th	10	03	-	02	05
15	*Gomphrena celosioides*	16th	05	-	-	-	05
16.	*Phyllanthus amarus*	13th	10	05	05	-	-

17.	*Commelina erecta*	14th	08	05	-	03	-
18.	*Hypoesthes cancellata*	16th	05	-	-	-	05
19.	*Cyathula prostrata*	16th	05	-	-	05	-
20.	*Solenostemon monostachyus*	21st	04	04	-	-	-
21.	*Andropogon gayanus (stand)*	15th	15	-	-	15	-
22.	*Newbouldia laevis*	23rd	02	-	02	-	-
23.	*Acalypha fimbriata*	16th	05	-	-	-	05
24.	*Rottboellia cochinchinensis*	24th	02	-	02	-	-

DENSITY

1 2 3 4 5 6 7 8 9 10

70 225 15 95 12 20 100 15 20 05

73 73 73 73 73 73 73 73 73 73

0.959 3.082 0.205 1.301 0.164 0.274 1.370 0.205 0.274 0.068

11 12 13 14 15 16 17 18 19 20

20 13 03 10 05 10 08 05 05 04

73 73 73 73 73 73 73 73 73 73

0.274 0.178 0.041 0.137 0.068 0.137 0.110 0.068 0.055 0.205

21 22 23 24

15 02 05 02

73 73 73 73

0.205 0.207 0.068 0.027

9. 365

(B) REL. DENSITY

10.240 32.910 2.189 13.892 1.751 2.926 14.629 2.189 2.926 0.726 1.901 0.438 1.463 0.726 1.463 1.175 0.726 0.726 0.587 2.189 0.288 0.726 0.288

(C) FREQUENCY

4/4 4/4 2/4 4/4 3/4 2/4 4/4 2/4 4/4 1/4 2/4

100 100 50 100 75 50 100 50 100 100 50

1/4 3/4 1/4 2/4 2/4 1/4 1/4 1/4 1/4 1/4 1/4

25 75 25 50 50 25 25 25 25 25 25

1300

(D) REL. FREQUENCY

7.692 7.692 3.846 7.692 5.769 3.846 7.692 3.846 7.692 1.923 7.692 3.846 1.923 5.769 1.923 3.846 3.846 1.923 1.923 1.923 1.923 1.923 1.923 1.923

(E) IMPORTANCE VALUE

1 2 3 4 5 6 7 8 9 10

17.932 40.602 6.035 21.584 7.52 6.772 22.321 6.035 10.618 2.649

4th 1st 10th 3rd 7th 9th 2nd 10th 5th 16th

11 12 13 14 15 16 17 18 19 20

10.618 5.747 2.361 7.232 2.649 5.309 5.021 2.649 2.649 2.51 5th

12th 22nd 8th 16th 13th 14th 16th 16th 21st

21 22 23 24

4.112 2.211 2.649 2.211

15th 23rd 16th 24th

APPENDIX
RAINY SEASON
SHORT TERM FALLOW SITE

S/n	Species	Position	Total Quads	Quad.1	Quad. 2	Quad.3	Quad. 4
1.	*Ageratum conyzoides*	2nd	80	20	20	20	20
2.	*Sporobolus pyramidalis*	3rd	65	10	30	05	20
3.	*Imperata cylindrica*	19th	10	-	05	-	05
4.	*Paspalum scrobiculatum*	13th	15	-	10	-	10
5.	*Cynodon dactylon*	35th	05	05	-	-	-
6.	*Brachiara lata*	46th	02	-	-	02	-
7.	*Commelina erecta*	6th	15	-	05	05	05
8.	*Ludwigia hyssopifolia*	9th	20	05	15	-	-
9.	*Bidens pilosa*	4th	40	10	20	05	05
10.	*Kyllinga pumilla*	19th	10	-	-	05	05
11.	*Digitaria gayana*	26th	08	03	05	-	-
12.	*Panicum maxima*	29th	07	-	-	02	05
13.	*Desmodium scorpiurus*	6th	20	05	05	05	05
14.	*Hyptis lanceolata*	35th	05	-	-	05	-
15.	*Asystasia gigantica*	43rd	03	-	-	-	03
16.	*Setaria barbata*	13th	15	-	05	10	-
17.	*Cymbopogon giganteus*	7th	25	10	10	-	05
18.	*Euphorbia heterophylla*	35th	05	05	-	-	-
19.	*Ipomoea triloba*	19th	10	05	05	-	-
20.	*Synedrella nodiflora*	28th	15	-	-	15	-
21.	*Amaranthus viridis*	46th	02	-	-	-	02
22.	*Polygonum salicifolium*	46th	02	02	-	-	-
23.	*Scleria verrucosa*	46th	02	-	-	02	-
24.	*Cyperus haspan*	46th	02	-	-	02	-
25.	*Colocasia esculentum*	9th	20	-	10	-	10
26.	*Spermacoce ocymoides*	35th	05	-	05	-	-
27	*Phyllantus amarus*	19th	10	05	-	05	-
28.	*Euphorbia hirta*	30th	06	-	03	-	03
29.	*Panicum laxum*	9th	20	10	-	-	10
30.	*Kyllinga squamulata*	19th	10	-	05	05	-
31.	*Luffa cylindrica*	46th	02	-	-	-	02
32.	*Mitracarpus villosus*	19th	10	05	05	-	-
33.	*Oldenlandia corymbosa*	6th	15	-	05	05	05
34.	*Cocos nucifera (seedling)*	32nd	04	02	-	-	02
35.	*Chromolaena odorata*	31st	06	-	03	03	-
36.	*Psidium guajava (seedling)*	46th	02	-	-	02	-
37.	*Acroceras zizanioides*	1st	90	-	40	30	20
38.	*Ludwigia decurrens*	12th	11	03	03	05	-
39	*Fuirena ciliaris*	43rd	03	03	-	-	-
40	*Mariscus alternifolia*	19th	10	05	05	-	-
41.	*Ipomoea involucrata*	34th	10	-	-	10	-

42.	*Hackelochloa granularis*	5th	30	10	01	10	-
43.	*Croton hirtus*	46th	02	-	-	-	02
44.	*Gomphrena celosioides*	26th	08	03	-	05	-
45.	*Mariscus flabelliformis*	6th	15	05	05	05	-
46.	*Fimbristylis littoralis*	35th	05	-	-	-	05
47.	*Ananas comosus*	35th	05	-	-	-	05
48.	*Amarathus hybridus*	15th	20	20	-	-	-
49.	*Boerhavia diffusa*	15th	20	-	20	-	-
50.	*Commelina diffusa*	43rd	03	03	-	-	-
51.	*Diodia samentosa*	35th	05	-	-	-	05
52.	*Sacciolepis africana*	46th	02	-	-	02	-
53.	*Heterotis rotundifolus*	15th	20	-	20	-	-
54.	*Hypoestes cancellata*	15th	20	20	-	-	-
55.	*Ludwigia octovalvis*	35th	05	-	05	-	-
56.	*Eichhornia crassipes*	33rd	10	-	-	10	-

FLAT B

(A) DENSITY

1	2	3	4	5	6	7	8	9	10	11
80	65	10	15	05	02	15	20	40	10	08
73	73	73	73	73	73	73	73	73	73	73
1.096	0.890	0.137	0.205	0.068	0.207	0.205	0.274	0.548	0.137	0.110

12	13	14	15	16	17	18	19	20	21
07	20	05	03	15	25	05	10	15	02
73	73	73	73	73	73	73	73	73	73
0.096	0.274	0.068	0.041	0.205	0.342	0.068	0.137	0.205	0.027

22	23	24	25	26	27	28	29	30	31
02	02	02	20	05	10	06	20	10	02
73	73	73	73	73	73	73	73	73	73
0.027	0.027	0.027	0.274	0.068	0.137	0.082	0.274	0.137	0.027

32	33	34	35	36	37	38	39	40	41
10	15	04	06	02	90	11	03	10	10
73	73	73	73	73	73	73	73	73	73
0.137	0.205	0.055	0.082	0.027	1.233	0.151	0.041	0.137	0.137

42	43	44	45	46	47	48	49	50	51
30	02	08	15	05	05	20	20	03	05
73	73	73	73	73	73	73	73	73	73
0.411	0.027	0.110	0.205	0.068	0.068	0.274	0.274	0.041	0.068

52	53	54	55	56	
02	20	20	05	10	
73	73	73	73	73	
0.027	0.274	0.274	0.068	0.137	**10.771**

(B) REL. DENSITY

1	2	3	4	5	6	7	8	9	10
10.175	8.263	1.272	1.903	0.631	0.251	1.903	2.544	5.088	1.272

11	12	13	14	15	16	17	18	19	20
1.201	0.891	2.544	0.631	0.381	1.903	3.175	0.631	1.272	1.903

21 22 23 24 25 26 27 28 29 30
0.251 0.251 0.251 0.251 2.544 0.631 1.272 0.761 2.544 1.272
31 32 33 34 35 36 37 38 39 40
0.251 1.272 1.903 0.511 0.761 0.251 11.447 1.402 0.381 1.272
41 42 43 44 45 46 47 48 49 50
1.272 3.816 0.251 1.021 1.903 0.631 0.631 2.544 2.544 0.381
51 52 53 54 55 56
0.631 0.251 2.544 2.544 0.631 1.272

(C) FREQUENCY

4/4 4/4 2/4 2/4 1/4 1/4 3/4 2/4 4/4 2/4 2/4 2/4 4/4
100 100 50 50 25 25 75 50 100 50 50 50 100
1/4 1/4 2/4 3/4 3/4 2/4 1/4 1/4 1/4 1/4 1/4 2/4 1/4
25 25 50 75 25 50 25 25 25 25 25 50 25
2/4 2/4 2/4 2/4 1/4 2/4 3/4 2/4 2/4 1/4 3/4 3/4 1/4
50 50 50 50 25 50 75 50 50 25 75 75 25
2/4 1/4 3/4 1/4 2/4 3/4 1/4 1/4 1/4 1/4 1/4 1/4 1/4
50 25 75 25 50 75 25 25 25 25 25 25 25
1/4 1/4 1/4 1/4
25 25 25 25

(D) REL. FREQUENCY

4 4 2 2 1 1 3 2 4 2 2 2 4 1 1 2 1 1 1 1 1 2 1 2 2 2 2 1 2 3
2 2 2 1 3 3 1 2 1 3 1 2 3 1 1 1 1 1 1 1 1 1 1 1

(E) IMPORTANCE VALUE

2nd 3rd 19th 13th 35th 46th 6th 9th 4th 19th
14.175 12.263 3.272 3.903 1.631 1.251 4.903 4.544 9.088 3.272 26th 29th 6th 35th 43rd
13th 7th 35th 19th 28th
3.021 2.891 6.544 1.631 1.381 3.903 6.175 1.631 3.272 2.903
46th 46th 46th 46th 9th 35th 19th 30th 9th 19th
1.251 1.251 1.251 1.251 4.544 1.631 3.272 2.761 4.544 3.272
46th 19th 6th 32nd 31st 46th 1st 12th 43rd 19th
1.251 3.272 4.903 2.511 2.761 1.251 14.447 4.402 1.381 3.272
34th 5th 46th 26th 6th 35th 35th 15th 15th 43rd
2.272 6.816 2.251 3.021 4.903 1.631 1.631 3.544 3.544 1.381
35th 46th 15th 15th 35th 33rd
1.631 1.251 3.544 3.544 1.631 2.272

APPENDIX **7k**

RAINY SEASON SLOPE B

SHORT-TERM FALLOW SITE

S/n	Species	Position	Total Quads	Quad.1	Quad.2	Quad.3	Quad.4
1.	*Citrus sinensis (seedling)*	9th	10	5	5	-	-
2.	*Ananas comosus*	10th	30	15	15	-	-
3.	*Phyllanthus amarus*	13th	15	-	5	5	5
4.	*Bidens pilosa*	6th	55	10	10	20	15
5.	*Ageratum conyzoides*	1st	80	20	20	20	20
6.	*Boerhavia diffusa*	2nd	90	30	30	30	-
7.	*Setaria longiseta*	16th	15	-	-	10	05
8.	*Mitracarpus villosus*	5th	65	20	15	20	10
9.	*Sporobolus pyramidalis*	21st	05	03	-	-	02
10.	*Setaria barbata*	7th	35	20	10	05	-
11.	*Peperomia pellucida*	2nd	90	-	40	20	30
12.	*Paspalum scrobiculatum*	25th	05	05	-	-	-
13.	*Eragrostis atrovirens*	25th	05	-	05	-	-
14.	*Oldenlandia corymbosa*	20th	06	-	-	03	03
15.	*Diodia sarmentosa*	15th	20	-	10	10	-
16.	*Kyllinga erecta*	14th	25	05	-	-	20
17.	*Ludwigia decurrens*	23rd	10	10	-	-	-
18.	*Amaranthus hybridus*	2nd	85	40	-	30	15
19.	*Imperata cylindrica*	12th	17	02	10	05	-
20.	*Commelina diffusa*	16th	15	-	10	-	05
21.	*Cymbopogun compressus*	43rd	02	-	02	-	-
22.	*Andropogon tectorum*	25th	05	-	-	05	-
23.	*Panicum laxum*	25th	05	-	-	-	05
24.	*Ludwigia abyssinica*	43rd	02	02	-	-	-
25.	*Zea mays*	19th	07	-	-	02	07
26.	*Musa paradisiacal*	43rd	02	-	02	-	-
27	*Colocasia esulentum*	25th	05	-	05	-	-
28.	*Commelina erecta*	18th	10	05	05	-	-
29.	*Acroceras zizaniodes*	8th	35	-	-	05	30
30	*Oldenlandia herbacea*	46th	01	01	-	-	-
31.	*Kyllinga pumila*	25th	05	-	-	05	-
32.	*Alternanthera sessilis*	25th	05	-	05	-	-
33.	*Boerhavia coccinea*	22nd	15	-	-	15	-
34.	*Cymbopogon giganteus*	23rd	10	10	-	-	-
35.	*Euphorbia hirta*	25th	05	-	-	-	05
36.	*Desmodium scorpiurus*	25th	05	-	-	-	05
37.	*Luffa cylindrica*	25th	05	-	-	-	05
38.	*Ipomoea involucrate*	25th	05	-	-	05	-
39.	*Tridax procumbens*	25th	05	05	-	-	-
40.	*Cyperus haspan*	25th	05	-	05	-	-
41.	*Cyperus difformis*	25th	05	05	-	-	-
42.	*Heterotis rotundifolia*	25th	05	-	05	-	-
43.	*Ocimum basilicum*	11th	40	-	40	-	-

44.	*Synedrella nodiflora*	5th	05	-	-	05	-
45.	*Spermacoce ocymoides*	25th	05	-	-	-	05
46.	*Spigelia anthelmia*	25th	05	-	-	05	-

DENSITY
10 30 15 55 80 90 15 65 05 35 90
73 73 73 73 73 73 73 73 73 73 73
0.137 0.411 0.205 0.753 1.096 1.233 0.205 0.890 0.068 0.479 1.233
05 05 06 20 25 10 85 17 15 02 05
73 73 73 73 73 73 73 73 73 73 73
0.068 0.068 0.082 0.274 0.342 0.137 1.164 0.233 0.205 0.207 0.068
02 07 02 05 10 35 01 05 05 15 10
73 73 73 73 73 73 73 73 73 73 73
0.027 0.096 0.027 0.068 0.137 0.479 0.014 0.068 0.068 0.205 0.137
05 05 05 05 05 05 05 05 40 05 05
73 73 73 73 73 73 73 73 73 73 73
0.068 0.068 0.068 0.068 0.068 0.068 0.068 0.068 0.548 0.068 0.068
05
73
0.068
12.068

(B) REL. DENSITY
1.135 3.406 1.699 6.24 9.082 10.217 1.699 7.375 0.563 3.969 10.217
0.563 0.563 0.679 2.270 2.834 2.834 1.135 9.6645 1.931 1.699 0.224
0.563 0.563 0.224 0.795 0.224 0.563 1.135 3.969 0.116 0.563 0.563
1.699 1.135 0.563 0.563 0.563 0.563 0.563 0.563 0.563 0.563 4.541
0.563 0.563 0.563

(c) FREQUENCY
4/4 2/4 3/4 4/4 4/4 3/4 2/4 4/4 2/4 3/4 3/4 3/4
100 50 75 100 100 75 50 100 50 75 75 25
1/4 2/4 2/4 2/4 1/4 3/4 3/4 2/4 1/4 1/4 1/4
25 50 50 50 25 75 75 50 25 25 25 25
2/4 1/4 1/4 2/4 2/4 1/4 1/4 1/4 1/4 1/4 1/4 1/4
50 25 25 50 50 25 25 25 25 25 25 25
1/4 1/4 1/4 1/4 1/4 1/4 1/4 1/4 1/4 1/4
25 25 25 25 25 25 25 25 25 25

(D) REL. FREQUENCY
5 2.5 3.75 5 5 3.75 2.5 5 2.5 3.75 3.75 1.25
1.25 2.5 2.5 2.5 1.25 3.75 3.75 2.5 1.25 1.25 1.25 1.25
2.5 1.25 1.25 2.5 2.5 1.25 1.25 1.25 1.25 1.25 1.25 1.25
1.25 2.5 1.25 1.25 1.25 1.25 1.25 1.25 1.25 1.25

(E) IMPORTANCE VALUE
9th 10th 13th 6th 1st 2nd 16th 5th 21st 7th
6.135 5.906 5.449 11.24 14.082 13.967 4.199 12.375 3.063 7.719
2nd 25th 25th 20th 15th 14th 23rd 2nd 12th 16th 43rd
13.967 1.813 1.813 3.179 4.77 5.334 2.385 13.395 5.681 4.199 1.474
25th 25th 43rd 19th 43rd 25th 18th 8th 46th 25th 25th
1.813 1.813 1.474 3.295 1.474 1.813 3.635 6.469 1.366 1.813 1.813
22nd 23rd 25th 25th 25th 25th 25th 25th 25th 25th 11th
2.949 2.385 1.813 1.813 1.813 1.813 1.813 1.813 1.813 1.813 5.791

7m

25th 25th 25th
1.813 1.813 1.813

APPENDIX 7

LONG TERM FALLOW SITE C (DETERMINING IMPORTANCE VALUES (SLOPE) DRY SEASON (UNMANAGED)

Total Dimensions (80 x 80)ft = 24m

1m = 3.3 feet :. 80 ft =

80 ÷3.3 = 24.4 = 24m

i.e (24 x 24) = 576

:. 5% Sampling intensity

= 5/100 x 576 = 29

= 29 quadrat

S/n	Species	Position	Total Quads	Quad. 1	Quad. 2	Quad. 3	Quad. 4	Quad. 5	Quad.6
1.	*Imperata cylindrica*	1st	230	40	30	50	20	50	40
2.	*Aspilia africana*	2nd	85	30	05	20	20	-	10
3.	*Brachiara lata*	34th	02	-	-	-	-	02	-
4.	*Phyllanthus malvaceorum*	28th	05	05	-	-	-	-	-
5.	*Schwenkia americana*	34th	02	-	02	-	-	-	-
6.	*Commelina erecta*	7th	22	02	10	-	05	-	05
7.	*Panicum maxima*	21st	04	02	-	-	-	-	02
8.	*Desmodium scorpiurus*	4th	50	-	10	15	20	05	-
9.	*Stachytarpheta jamaicensis*	3rd	35	-	05	05	10	10	05
10.	*Cynodon dactylon*	5th	35	10	10	-	-	10	05
11	*Hypoestes cancellata*	8th	40	05	-	05	-	30	-
12.	*Mucuna pruriens*	13th	10	-	-	-	05	-	05
13.	*Phyllanthus amarus*	13th	10	-	05	-	05	-	05
14.	*Crotolaria retusa*	12th	13	03	10	-	-	-	-
15.	*Paspalum conjugatum*	32nd	03	-	-	-	-	-	03
16.	*Paspalum scrobiculatum*	9th	15	05	-	05	05	-	-
17.	*Diodia sarmentosa*	28th	05	-	-	-	-	-	05
18.	*Mimosa invisa*	26th	10	-	-	--	-	10	-
19.	*Sarcocephalum laxiflora (Stands)*	25th	20	-	-	-	-	-	20
20.	*Musa sapientum*	21st	04	02	-	02	-	-	-
21.	*Digitaria gayana*	28th	05	-	-	-	-	05	-
22.	*Croton lobatus*	6th	25	10	05	10	-	-	05
23.	*Setaria longiseta*	24th	25	-	-	25	-	-	-
24.	*Asytasia gangentica*	18th	07	-	05	-	02	-	-
25.	*Musa paradisiaca*	19th	05	-	-	03	02	-	-
26.	*Manihot esculenta*	10th	10	05	-	-	03	-	02
27.	*Sida acuta*	34th	02	-	-	-	-	02	-
28.	*Ipomoea triloba*	11th	09	02	02	05	-	-	-
29.	*Ipomoea eriocarpa*	17th	07	-	-	-	-	02	05

30.	*Chromolaena odorata*	13th	10	05	-	05	-	-	-
31.	*Vernonia cinerei*	34th	02	-	-	-	-	-	02
32.	*Tridax procumbrens*	28th	05	-	-	-	05	-	-
33.	*Gomphrena celosioides*	19th	05	03	-	-	02	-	-
34.	*Setaria barbata*	28th	05	-	05	-	-	-	-
35.	*Ipomoea involucrate*	16th	08	-	-	-	-	-	08
36.	*Ananas comosus*	32nd	03	-	03	-	-	-	-
37	*Axonopus compressus*	23rd	30	-	-	-	-	30	-
38.	*Alchornea cordifolia (stand)*	26th	10	-	10	-	-	-	-

(A) Density
12.982
230 85 02 05 02 22 04 50 35 35
58 58 58 58 58 58 58 58 58 58
3.966 1.466 0.086 0.379 0.069 0.862 0.603 0.690 0.172 0.172
40 10 10 13 03 15 05 10 20 04
58 58 58 58 58 58 58 58 58 58
0.690 0.172 0.172 0.224 0.052 0.259 0.086 0.172 0.345 0.069
05 25 25 07 05 10 02 09 07 10
58 58 58 58 58 58 58 58 58 58
0.086 0.431 0.431 0.121 0.086 0.172 0.034 0.034 0.121 0.172
02 05 05 05 08 03 30 10
58 58 58 58 58 58 58 58
0.034 0.086 0.086 0.086 0.138 0.052 0.517 0.172

(B) REL. DENSITY
30.55 11.293 0.262 0.662 0.262 2.919 0.532 6.640 4.645 4.645 5.315 1.325 1.325 1.725 0.401 1.995 0.662 1.325 2.658 0.532 0.662 3.320 0.932 0.662 1.325 0.262 1.194 0.932 1.325 0.252 0.662 0.662 1.063 0.401 3.982 1.325
1366.9

(C) FREQUENCY
6/6 5/6 1/6 1/6 1/6 4/6 2/6 4/6 5/6 4/6 3/6 2/6 2/6
100 83.3 16.7 16.7 16.7 66.7 33.3 66.7 83.3 66.7 50 33.3 33.3
2/6 1/6 3/6 1/6 1/6 1/6 2/6 1/6 4/6 1/6 2/6 2/6 3/6
33.3 16.7 50 16.7 16.7 16.7 33.3 16.7 66.7 16.7 33.3 33.3 50
1/6 3/6 2/6 2/6 1/6 1/6 2/6 1/6 2/6 1/6 1/6 1/6
16.7 50 33.3 33.3 16.7 16.7 33.3 16.7 33.3 16.7 16.7 16.7

(D) REL. FREQUENCY
7.316 6.094 1.222 1.222 1.222 4.880 2.436 4.880 6.094 4.880 2.436
2.436 2.436/1.222 3.658 1.222 1.222 1.222 2.436 1.222 1.222 2.436
2.436 3.658 1.222 3.657/2.436 2.436 1.222 1.222 2.436 1.222 2.436
1.222 1.222 1.222

(E) IMPORTANCE VALUE
1st 2nd 34th 27th 34th 6th 22nd 3rd 4th 5th
37.866 17.387 1.484 1.884 1.484 7.799 2.968 11.520 10.739 9.252
9th 15th 15th 13th 32nd 7th 27th 24th 14th 22nd
4.983 3.761 3.761 4.161 1.623 5.653 1.884 2.547 3.880 2.968
26th 11th 11th 19th 9th 24th 34th 10th 19th 15th
1.884 4.542 4.542 3.368 3.098 4.983 1.484 4.852 3.368 3.761
26th 27th 21st 27th 18th 32nd 8th 24th

2.484 1.884 3.098 1.884 3.499 1.623 5.204 2.547

APPENDIX VIII
LONG TERM FALLOW SITE C (DETERMINING IMPORTANCE VALUES (SLOPE) RAINY SEASON (UNMANAGED)

S/n	Species	Position	Total Quads	Quad. 1	Quad. 2	Quad. 3	Quad. 4	Quad. 5	Quad.6
1.	*Mucuna pruriens*	7th	65	10	05	10	20	-	20
2.	*Desmodium scorpiurus*	3rd	90	10	10	20	20	20	10
3.	*Panicum maxima*	4th	70	05	05	10	10	20	20
4.	*Imperata cylindrica*	1st	150	30	20	30	10	30	30
5.	*Alternanthera braziliensis*	10th	65	-	30	15	20	-	-
6.	*Sarcocephalum Laxiflora (stand)*	14th	25	15	-	-	-	10	-
7.	*Pennisetum pedicellatum*	20th	25	-	10	-	10	05	-
8.	*Hachelochloa granularis*	10th	65	30	-	15	-	-	20
9.	*Musa paradisiaca*	14th	25	-	10	-	10	05	-
10.	*Aspilia africana*	2nd	95	05	10	20	20	20	20
11.	*Heterotis rotundifolia*	26th	20	20	-	-	-	-	-
12.	*Ageratum conyzoides*	6th	70	10	20	20	10	10	10
13.	*Ipomoea triloba*	12th	45	-	-	-	10	15	20
14.	*Mimosa invisa*	9th	90	40	-	20	30	-	-
15.	*Waltheria indica*	12th	45	-	15	-	10	20	-
16.	*Manihot esculentum*	5th	40	10	5	5	5	5	10
17.	*Ipomoea involucrata*	13th	35	-	5	-	10	-	20
18.	*Ipomoea triloba*	8th	40	20	-	10	-	5	5
19.	*Phyllanthus amarus*	16th	15	5	-	5	-	5	-
20.	*Sida acuta*	27th	05	-	-	-	-	-	05
21.	*Melastromastrum capitatum*	16th	15	-	5	-	5	-	5
22.	*Digitaria gayana*	16th	15	5	5	5	-	-	-
23.	*Mitracarpus villosus*	22nd	10	-	-	-	5	5	-
24.	*Sporobolus pyramidalis*	27th	05	-	-	-	--	-	5
25.	*Pennisetum polystachion*	27th	05	-	-	5	-	-	-
26.	*Synedrela nodiflora*	27th	05	-	-	5	-	-	-
27.	*Hibiscus asper*	27th	05	-	-	-	-	-	5
28.	*Saccharum officinarum*	27th	05	05	-	-	-	-	-
29.	*Bidens pilosa*	27th	05	-	-	-	-	5	-
30	*Alternanthera sessilis*	19th	40	-	30	10	-	-	-
31.	*Justicia flava*	27th	05	-	-	-	5	-	-
32.	*Digitaria nuda*	27th	05	-	-	-	5	-	-
33.	*Mariscus alternifolia*	21st	15	10	5	-	-	-	-
34.	*Zornia latifolia*	22nd	10	-	-	-	-	5	5

35.	*Oldenlandlia corymbosa*	27th	05	5	-	-	-	-	-
36	*Crotolaria retusa*	22nd	10	-	-	-	-	5	5
37	*Commelina erecta*	22nd	10	-	-	5	5	-	-

DENSITY

21.552

65 90 70 1 50 65 25 25 65 25 95 20 70 45

58 58 58 58 58 58 58 58 58 58 58 58 58

1.121 1.552 1.207 2.586 1.121 0.431 0.143 1.121 0.431 1.638 0.345 1.207 0.776

90 45 40 35 40 15 05 15 15 10 05 05 05

58 58 58 58 58 58 58 58 58 58 58 58 58 1.552 0.776 0.690 0.603 0.690

0.259 0.086 0.259 0.259 0.172 0.086 0.086 0.086

05 05 05 40 05 05 15 10 05 10 10

58 58 58 58 58 58 58 58 58 58 58

0.086 0.086 0.086 0.690 0.086 0.086 0.259 0.172 0.086 0.172 0.172

(B) REL. DENSITY

5.201 7.201 5.600 11.999 5.201 2.0 2.0 5.201 2.0 7.600 1.600 5.600 3.600 7.201 3.600 3.02 2.798 3.202 1.202 0.399 1.202 1.202 0.789 0.399 0.399 0.399 0.399 0.399 0.399 3.202 0.399 0.399 1.202 0.798 0.399 0.798 0.798

(C FREQUENCY

1700.1

5 /6 6/6 6/6 6/6 3/6 2/6 3/6 3/6 6/6 1/6 5/6 3/6 83.3 100 100 100 50 50 33.3 50 100 16.7 83.3 50

3/6 3/6 6/6 3/6 4/6 3/6 1/6 3/6 3/6 2/6 1/6 1/6

50 50 100 50 66.7 50 16.7 50 50 33.3 16.7 16.7

1/6 1/6 1/6 1/6 2/6 1/6 1/6 2/6 2/6 1/6 2/6 2/6

16.7 16.7 16.716.7 33.3 16.7 16.7 33.3 33.3 16.7 33.3 33.3

(D) REL. FREQUENCY

4.900 5.882 5.882 5.882 2.941 2.941 1.959 2.941 5.882 0.982 4.900 2.941/2.941 2.941 5.882 2.941 5.882 2.941 3.923 2.941 0.982/2.941 2.941 1.959 0.982 0.982 0.982 0.982 0.982 0.982 1.959 0.982 1.959 1.959 0.982 1.959 1.959

(E) IMPORTANCE VALUE

7th 3rd 4th 1st 10th 14th 20th 10th 14th 2nd 26th 6th

10.10 13.083 11.482 17.881 8.142 4.941 3.941 8.142 4.941 13.482 2.582 10.500

12th 12th 12th 5th 13th 8th 16th 22nd 27th 16th 22nd 27th

6.541 10.142 6.541 9.084 5.739 7.125 4.143 4.143 1.381 4.143 2.757 1.381

27th 27th 27th 27th 19th 27th 27th 21st 22nd 27th 22nd 22nd

1.381 1.381 1.381 1.381 5.161 1.381 1.381 3.161 2.757 1.381 2.757 2.757

APPENDIX IX
ENTIRE FARM UNDER CURRENT USAGE SITE D (DETERMINING ABUNDANCE IMPORTANCE VALUES (SLOPEY)
DRY SEASON -MANAGED

Total Dimensions (80 x 80)ft =
1m = 3.3ft . . .
. . . (24 x 24) = 576
5% sampling intensity = 5/100 x 576/1 = 576
= 29 quadrats

S/n	Species	Position	Total Quads	Quad. 1	Quad. 2	Quad. 3	Quad. 4	Quad. 5	Quad.6
1.	*Amaranthus spinosus*	31st	05	05	-	-	-	-	-
2.	*Zea mays*	18th	15	10	-	-	05	-	-
3.	*Vernonia amygdalina*	7th	30	05	05	05	05	05	05
4.	*Talinum triangulare*	3rd	110	20	20	20	10	10	30
5.	*Phyllanthus amarus*	22nd	08	-	-	-	-	03	08
6.	*Cynodon dactylon*	2nd	140	-	10	30	50	50	-
7.	*Ocimum basilicum*	1st	300	50	50	50	50	50	50
8.	*Gomphrena celosioides*	4th	120	40	-	30	20	10	20
9.	*Sporobolus pyramidalis*	4th	120	-	10	30	20	30	30
10.	*Panicum repens*	31st	05	-	-	05	-	-	-
11.	*Mariscus altermifolia*	31st	05	-	05	-	-	-	-
12.	*Commelina erecta*	12th	20	05	-	-	05	05	05
13.	*Portulaca oleracea*	15th	40	-	20	-	-	20	-
14.	*Desmodium scorpiurus*	12th	20	-	05	05	05	05	05
15.	*Euphorbia hirta*	20th	10	05	-	-	05	-	-
16.	*Euphorbia heterophyla*	16th	15	05	-	05	05	-	-
17.	*Mimosa invisa*	12th	20	05	05	-	-	05	05
18.	*Setaria longiseta*	11th	35	05	10	-	-	-	20
19.	*Setaria barbata*	29th	10	-	10	-	-	-	-
20	*Brachiaria deflexa*	23rd	20	-	-	-	20	-	-
21.	*Cypenus rotundus*	18th	15	-	-	-	-	05	10
22.	*Ageratum conyzoides*	20th	10	-	-	05	-	05	-
23.	*Rottboellia cochinchinensis*	23rd	20	-	-	-	-	-	20
24.	*Piliostigma thonningii (stand)*	28th	15	-	-	-	--	-	15
25.	*Paspalum scrobiculatum*	10th	30	05	10	05	10	-	-
26.	*Ananas melanguena*	9th	60	-	-	-	-	50	10
27.	*Commelina diffusa*	8th	45	-	20	05	10	-	10
28.	*Sorghum arundinaceum*	23rd	20	-	-	-	20	-	-
29.	*Hyptis lanceolata*	23rd	20	-	-	-	-	-	20
30.	*Ipomoea triloba*	31st	05	05	-	-	-	-	-
31	*Cleome rutidospema*	17th	13	05	05	03	-	-	-
32.	*Synedrella nodiflora*	31st	05	-	-	-	-	-	05
33.	*Ipomoea eriocarpa*	17th	15	-	-	-	10	05	-

34.	*Sarcocephalum laxiflora (stand)*	31st	05	-	05	-	-	-	-
35.	*Digitaria gayana*	31st	05	-	-	-	-	-	05
36.	*Oldenlandlia herbacea*	44th	03	-	-	-	03	-	-
37.	*Sida garckeana*	44th	03	-	-	03	-	-	-
38.	*Bidens pilosa*	31st	05	-	-	-	05	-	-
39.	*Manihot esculenta*	31st	05	-	-	05	-	-	-
40	*Panicum laxum*	31st	05	-	-	-	-	-	05
41.	*Croton lobatus*	20th	12	02	10	-	-	--	-
42.	*Imperata cylindrica*	31st	05	-	-	-	05	-	-
43.	*Panicum maxima*	23rd	20	-	-	20	-	-	-
44.	*Cypenus esculentus*	31st	05	-	-	05	-	-	-
45.	*Spermacoce ocymoides*	6th	100	50	-	-	-	-	50
46.	*Mitracarpus villosus*	31st	05	-	-	-	-	05	-
47.	*Mariscus flabelliformis*	31st	05	-	-	-	05	-	-
48.	*Pupalia lappacea*	29th	10	10	-	-	-	-	-

DENSITY

05 15 30 110 08 140 300 120 120 05 05
58 58 58 58 58 58 58 58 58 58 58
0.086 0.259 0.517 1.897 0.138 2.414 5.172 2.069 2.069 0.086 0.086
20 40 20 10 15 20 35 10 20 15 10
58 58 58 58 58 58 58 58 58 58 58
0.345 0.690 0.345 0.172 0.259 0.345 0.603 0.172 0.345 0.259 0.172
20 15 30 60 45 20 20 05 13 05 15
58 58 58 58 58 58 58 58 58 58 58
0.345 0.259 0.517 1.034 0.776 0.345 0.345 0.086 0.224 0.086 0.259
05 05 03 03 05 05 05 12 05 20 05
58 58 58 58 58 58 58 58 58 58 58
0.086 0.0086 0.052 0.052 0.086 0.0086 0.086 0.2070.086 0.345 0.086
100 05 05 10
58 58 58 58
1.724 0.086 0.086 0.172 24.034

(B) FREQUENCY

1/6 2/6 6/6 6/6 2/6 4/6 6/6 5/6 5/6 1/6 1/6 4/6
16.7 33.3 100 100 33.6 16.7 100 83.3 83.3 16.7 16.7 66.7
2/6 4/6 2/6 3/6 4/6 3/6 1/6 1/6 2/6 2/6 1/6 1/6
33.6 66.7 33.6 50 66.7 50 16.7 16.7 33.6 33.6 16.7 16.7
4/6 2/6 4/6 1/6 1/6 1/6 3/6 1/6 2/6 1/6 1/6 1/6
66.7 33.6 66.7 16.7 16.7 16.7 50 16.7 33.6 16.7 16.7 16.7
1/6 1/6 1/6 1/6 2/6 1/6 1/6 1/6 2/6 1/6 1/6 1/6
16.7 16.7 16.7 16.7 33.6 16.7 16.7 16.7 33.6 16.7 16.7 16.7

(C) REL. DENSITY

0.358 1.078 2.151 7.893 0.574 10.044 21.520 8.609 8.609 0.358 0.358 1.435 2.871 1.435 0.716 1.078
1.435 2.509 0.716 1.435 1.435 1.078 0.716 1.435 1.078 2.151 4.302 3.229 1.435 1.435 0.358 0.932 0.358
1.078 0.358 0.358 0.216 0.216 0.358 0.358 0.358 0.861 0.358 1.435 0.358 7.173 0.358 0.716

(D) REL. FREQUENCY

0.952 1.916 5.703 5.703 1.916 3.084 5.703 4.750 4.750 0.952 0.952

3.804 1.916 3.804 1.916 2.851 3.804 2.851 0.952 0.952 1.916 1.916 0.952 0.952 3.804 1.916 3.804 0.952 0.952 0.952 2.851 0.952 1.916 0.952 0.952 0.952 0.952 0.952 0.952 0.952 1.916 0.952 0.952 1.916 0.952 0.952 0.952

(E) IMPORTANCE VALUE

31st 18th 7th 3rd 22nd 2nd 1st 4th 4th 31st 31st
1.31 2.994 7.854 13.596 2.49 13.848 27.223 13.359 13.359 1.31 1.31
12th 15th 12th 20th 16th 12th 11th 29th 23rd 18th 20th
5.239 4.787 5.239 2.632 3.929 5.239 5.36 1.668 2.387 2.994 2.632
23rd 28th 10th 9th 8th 23rd 23rd 31st 17th 31st 17th 31st
2.387 2.03 5.955 6.216 7.033 2.387 2.387 1.31 3.783 1.31 2.994 1.31
31st 44th 44th 31st 31st 31st 20th 31st 23rd 31st 6th 31st
1.31 1.168 1.168 1.31 1.31 1.31 2.777 1.31 2.387 1.31 9.089 1.31
31st 29th
1.31 1.668

APPENDIX X

ENTIRE FARM UNDER CURRENT USAGE SITE D (DETERMINING IMPORTANCE VALUE (SLOPEY)

RAINY SEASON - MANAGED

(80 X80)ft

6 quadrats

S/n	Species	Position	Total Quads	Quad. 1	Quad. 2	Quad. 3	Quad. 4	Quad. 5	Quad .6
1.	*Musa paradisiaca*	40th	06	-	03	-	03	-	-
2.	*Ageratum conyzoides*	1st	125	15	30	20	30	20	30
3.	*Vernonia amygdalina*	8th	40	10	5	05	05	10	5
4.	*Mimosa invisa*	22nd	15	-	05	05	05	-	-
5.	*Bidens pilosa*	4th	75	10	20	10	20	10	05
6.	*Hackelochloa granularis*	9th	35	10	-	05	10	-	10
7.	*Ipomoea involucrata*	30th	10	-	05	-	-	05	-
8.	*Euphorbia hirta*	17th	25	-	-	-	05	10	10
9.	*Euphorbia heterophylla*	23rd	20	-	10	10	-	-	-
10.	*Manihot esculentum*	25th	09	-	-	-	03	03	03
11.	*Digitaria gayana*	30th	10	05	05	-	-	-	-
12.	*Mariscus flabelliformis*	12th	35	-	05	20	10	-	-
13.	*Mariscus alternifolia*	6th	55	-	20	05	20	05	05
14.	*Cyperus rotundus*	30th	10	-	-	-	-	05	05
15.	*Commelina erecta*	38th	08	-	-	-	-	03	05
16.	*Spermacoce ocymoides*	3rd	90	-	30	20	20	20	20
17.	*Oldenlandlia corymbosa*	5th	65	20	05	15	05	10	10
18.	*Boerhavia diffusa*	2nd	120	30	20	10	20	10	20
19.	*Mucuna pruriens*	54th	03	-	03	-	-	-	-
20.	*Cyathula prostrata*	54th	03	-	-	-	-	03	-
21.	*Kyllinga pumila*	17th	25	10	05	10	-	-	-
22.	*Kyllinga erecta*	20th	20	-	05	10	-	-	-
23.	*Cyperus haspan*	12th	35	20	-	-	05	-	10
24.	*Echinochloa obtusiflora*	47th	05	-	-	-	-	05	-
25.	*Cyperus iria*	38th	20	10	-	-	-	-	10
26.	*Lessia hexandra*	54th	05	-	-	05	-	-	-

27.	*Paspalum scrobiculatum*	42nd	08	-	-	-	03	05	-
28.	*Mimosa pigra*	15th	03	-	-	-	03	-	-
29.	*Ananas melanguena*	27th	05	-	05	-	-	-	-
30.	*Talinum triangulare*	10th	40	05	05	05	05	10	10
31.	*Phyllanthus amarus*	21st	20	05	05	05	05	05	05
32.	*Sporobolus pyramidalis*	23rd	20	-	10	10	-	-	-
33.	*Zea mays*	29th	09	03	-	03	-	03	-
34.	*Ocimum maxima*	26th	20	-	-	-	10	-	10
35.	*Brachiara lata*	47th	05	-	-	-	-	-	05
36.	*Brachiara deflexa*	40th	15	10	05	-	-	-	-
37.	*Mitracarpus villosus*	10th	06	-	-	03	-	03	-
38.	*Spigelia anthelmia*	19th	06	-	-	03	-	03	-
39.	*Panicum laxum*	15th	45	20	10	-	05	05	05
40.	*Acroceras zizaniodes*	26th	30	-	-	-	10	-	20
41.	*Mimosa pudica*	30th	15	-	-	-	05	10	-
42.	*Gomphrena celosioides*	42nd	15	-	10	05	-	-	-
43.	*Ipomoea triloba*	6th	10	10	-	-	-	-	-
44.	*Commelina diffusa*	35th	05	05	-	-	-	-	-
45.	*Ocimum basilicum*	29th	80	-	20	30	-	30	-
46.	*Spermacoce verticillata*	54th	15	-	-	-	15	-	-
47.	*Celosia leptostachyus*	35th	05	-	-	-	05	-	-
48.	*Ipomoea eriocarpa*	34th	03	-	-	03	-	-	-
49.	*Peperomia pellucida*	36th	30	20	-	10	-	-	-
50.	*Digitaria nuda*	54th	03	-	-	-	-	-	03
51.	*Portulacastrum*	54th	03	-	03	-	-	-	-
52.	*Alternanthera sessilis*	12th	35	20	-	-	-	10	05
53.	*Celosia isertii*	54th	03	-	-	-	03	-	-
54.	*Amaranthus hybridus*	64th	02	-	-	-	-	-	02
55.	*Axonopus compressus*	48th	05	-	05	-	-	-	-
56.	*Plastostoma africanum*	48th	05	-	-	05	-	-	-
57.	*Sida linifolia*	48th	05	-	-	05	-	-	-
58.	*Sesamum indicum*	48th	05	-	-	-	-	-	05
59.	*Zea mays*	24th	11	-	05	-	03	-	03
60.	*Fimbristylis littoralis*	54th	03	03	-	-	-	-	-
61.	*Acanthospermum hispidum*	44th	10	-	-	10	-	-	-
62.	*Solenostemum monostachyus*	48th	05	-	-	05	-	-	-
63.	*Boerhavia coccinea*	35th	15	-	-	-	-	-	15
64.	*Stachytarpheta cayennensis*	54th	03	-	-	--	-	03	-
65.	*Pouzolzia*	64th	02	02	-	-	-	-	-
66.	*Setaria barbata*	28th	13	10	03	-	-	-	-
67.	*Cleome viscosa*	64th	02	-	-	-	02	-	-
68.	*Cymbopogon cittratus*	44th	10	-	-	-	-	10	-
69.	*Alchomea cordifolia (stand)*	44th	10	-	10	-	-	-	-
70.	*Colocasia esculentum*	64th	02	02	-	-	--	-	-
71.	*Dioscorea dumentosum*	64th	02	-	-	-	-	-	02
72.	*Cajanus cajan*	64th	02	-	-	02	-	-	-

A DENSITY
66 125 40 15 75 35 10 25 20 09 10
58 58 58 58 58 58 58 58 58 58 58
0.103 2.155 0.690 0.259 1.293 0.603 1.172 0.431 0.345 0.155 0.172
35 55 10 08 90 65 120 03 03 25 20
58 58 58 58 58 58 58 58 58 58 58
0.603 0.948 0.172 0.138 1.552 1.121 2.069 0.052 0.052 0.431 0.345
35 05 20 05 08 03 05 40 20 20 09 20
58 58 58 58 58 58 58 58 58 58 58 58
0.603 0.086 0.345 0.086 0.138 0.052 0.086 0.690 0.345 0.345 0.155 0.345
05 15 06 06 45 30 15 15 10 05 80
58 58 58 58 58 58 58 58 58 58 58
0.086 0.259 0.103 0.103 0.776 0.517 0.259 0.259 0.172 0.086 1.379
15 05 03 30 03 03 35 03 02 05 05
58 58 58 58 58 58 58 58 58 58 58
o.259 0.086 0.052 0.517 0.052 0.052 0.603 0.052 0.034 0.086 0.086
05 05 11 03 10 05 15 03 02 13 02
58 58 58 58 58 58 58 58 58 58 58
0.086 0.086 0.190 0.052 0.172 0.086 0.259 0.052 0.034 0.224 0.034
13 02 10 10 02 02 02
58 58 58 58 58 58 58
0.172 0.034 0.172 0.172 0.034 0.034 0.034
2672.6 **B FREQUENCY**
2/6 6/6 6/6 3/6 6/6 4/6 2/6 3/6 2/6 3/6 2/6 2/6
33.6 100 100 50 100 66.7 33.6 50 33.6 50 33.6 50
5/6 2/6 2/6 4/6 6/6 6/6 1/6 1/6 3/6 3/6 3/6 1/6
83.3 33.6 33.6 66.7 100 100 16.7 33.6 50 33.6 16.7 33.6
2/6 1/6 2/6 1/6 1/6 6/6 4/6 2/6 3/6 2/6 1/6 2/6
33.6 16.7 33.6 16.7 16.7 100 66.7 33.6 50 33.6 16.7 16.7
2/6 2/6 5/6 2/6 2/6 2/6 1/6 1/6 3/6 /6 1/6 1/6
33.6 16.7 83.3 33.6 33.6 33.6 16.7 16.7 50 16.7 16.7 16.7
2/6 1/6 1/6 3/6 1/6 1/6 1/6 1/6 1/6 1/6 3/6 1/6
33.6 16.7 16.7 50 16.7 16.7 16.7 16.7 16.7 16.7 50 16.7
1/6 1/6 1/6 1/6 1/6 2/6 1/6 1/6 1/6 1/6 1/6 1/6
16.7 16.7 16.7 16.7 16.7 33.6 16.7 16.7 16.7 16.7 16.7 16.7
C. REL. DENSITY
0.595 12.447 3.985 1.496 7.468 3.483 0.993 2.489 1.993 0.895
0.993 3.483 5.475 0.993 0.797 8.964 6.475 11.950 0.300 0.300
2.489 1.993 3.483 0.497 0.797 0.300 0.497 3.985 1.993 1.993
0.895 1.993 0.497 1.496 0.595 0.595 4.482 2.9986 1.496 1.496
0.993 0.497 7.965 1.496 0.497 0.300 1.496 0.300 0.993 0.300
0.300 3.483 0.300 0.196 0.497 0.497 0.497 0.497 1.097 0.300
0.993 0.497 1.496 0.300 0.196 1.294 0.196 0.993 0.993 0.196
0.196 0.196 0.196
D. REL. DENSITY
1.257 3.742 3.742 1.871 3.742 2.496 1.257 1.871 1.2571.871 1.257 1.871 3.117 1.257 1.257 2.496
3.742 3.742 0.625 0.625 1.871 1.871 1.871 0.625 1.257 0.625 1.257 0.625 0.625 3.742 2.496 1.257 1.871
1.257 0.625 1.257 1.257 1.257 3.117 1.257 1.257 0.625 0.625 1.871 0.625 0.625 0.625 1.257 0.625 0.625
1.871 0.625 0.625 0.625 0.625 0.6251.871 0.625 0.625 0.625 0.625 0.625 1.257 0.625 0.625 0.625 0.625
0.625 0.625 0.625

IMPORTANCE VALUE

40th 1st 8th 22nd 4th 9th 30th 17th 23rd 25th 30th 12th
1.852 16.189 7.727 3.367 11.21 5.979 2.25 4.36 3.25 2.766 2.25 5.354
6th 30th 38th 3rd 5th 2nd 54th 54th 17th 20th 12th
8.592 2.25 2.054 11.46 10.217 15.692 0.925 0.925 4.36 3.864 5.354
48th 38th 54th 42nd 15th 27th 10th 21st 23rd 29th 26th 47th
1.122 2.054 0.925 1.754 4.613 2.618 5.753 3.391 3.25 2.368 2.753 1.22
40th 10th 19th 15th 26th 30th 41st 6th 35th 29th 54th
1.852 5.735 4.243 4.613 2.753 2.25 1.754 8.592 2.121 2.368 0.925
35th 54th 30th 54th 54th 12th 54th 64th 48th 48th 48th
2.121 0.925 2.25 0.925 0.925 5.354 0.925 0.821 1.122 1.122 1.122
48th 24th 54th 44th 48th 35th 54th 64th 28th 64th 44th
1.122 2.968 0.925 1.618 1.122 2.121 0.925 0.821 2.551 0.821 1.618
44th 64th 64th 64th 64th
1.618 0.821 0.821 0.821 0.821

APPENDIX XI
ENTIRE FARM UNDER CURRENT USAGE SITE E
(DETERMINING IMPORTANCE VALUES (FLAT)
DRY SEASON - MANAGED

Site D Total Dimension (80 x 80)ft (3x3) quadrt
5% of 576 57.6
= 5/100 x 576/1 = 7.29
= 29 quadrats

S/n	Species	Position	Total Quads	Quad. 1	Quad. 2	Quad. 3	Quad. 4	Quad. 5	Quad. 6
1.	*Telfeira occidentalis*	1st	180	50	-	20	30	30	50
2.	*Sporobolus pyramidalis*	2nd	145	05	30	10	30	50	20
3.	*Zea mays*	7th	40	05	05	10	10	05	05
4.	*Paspalum scrobiculatum*	11th	20	05	-	05	-	05	05
5.	*Imperata cylindrica*	20th	10	05	-	05	-	-	-
6.	*Cynodon dactylon*	5th	100	-	30	10	20	10	30
7.	*Ocimum basilicum*	6th	110	30	50	30	-	-	-
8.	*Vernonia amygdalina*	19th	15	-	-	-	10	05	-
9.	*Setaria longiseta*	28th	05	-	-	-	-	-	05
10.	*Talinum triangulare*	17th	30	-	-	-	10	-	20
11.	*Axonopus compressus*	28th	05	05	-	-	-	-	-
12.	*Spermacoce ocymoides*	3rd	150	20	20	-	30	50	30
13.	*Diodia sarmentosa*	28th	05	-	05	-	-	-	-
14.	*Portuluca oleracea*	12th	25	10	-	05	-	10	-
15.	*Mimosa invisa*	12th	25	-	05	-	10	-	10
16.	*Setaria barbata*	25th	20	-	-	20	-	-	-
17.	*Digitaria nuda*	4th	120	-	50	30	20	20	-
18.	*Brachiaria deflexa*	26th	10	-	-	-	-	-	10
19.	*Digitaria gayana*	28th	05	05	-	-	-	-	-
20	*Mariscus alternifolia*	20th	10	-	-	-	05	05	-
21.	*Manihot esculentum*	28th	05	-	-	-	-	-	05
22.	*Ananas melanguena*	22nd	35	20	-	-	10	05	-

23.	*Desmodium scopiurus*	20th	10	-	-	-	-	05	05
24.	*Echinochloa colona*	9th	35	20	15	-	-	-	-
25.	*Cyperus esculentus*	8th	45	20	15	10	-	-	-
26.	*Cleome rutidosperma*	20th	10	-	05	-	-	05	-
27.	*Synedrela nodiflora*	16th	20	-	-	-	05	10	05
28.	*Amaranthus viridis*	28th	05	-	-	05	-	-	-
29.	*Bidens pilosa*	12th	25	10	-	-	05	-	10
30.	*Ageratumconyzoides*	28th	05	-	-	-	-	-	05
31.	*Commelina erecta*	12th	25	-	10	10	05	-	-
32.	*Eleusine indica*	20th	10	05	-	05	-	-	-
33.	*Ludwigia decurrens*	28th	05	-	-	-	05	-	-
34.	*Heteranthera califolia*	28th	05	-	-	-	05	-	-
35.	*Fimbristylis littoralis*	28th	05	05	-	-	-	-	-
36.	*Justicia flava*	41st	03	-	-	-	03	-	-
37.	*Gomphrena celosioides*	26th	10	-	-	-	-	-	10
38.	*Ipomoea aquatica*	28th	05	-	05	-	-	-	-
39.	*Cyperus iria*	28th	05	05	-	-	-	-	-
40	*Sorghum arundinaceum*	18th	40	-	-	-	-	40	-
41.	*Phyllanthus amarus*	28th	05	-	-	-	-	-	05

A. DENSITY

180 145 40 20 10 100 110 15 05 30 05 150
58 58 58 58 58 58 58 58 58 58 58 58
3.103 2.5 0.67 0.345 0.724 1.724 1.897 0.259 0.086 2.586 0.086 2.586
05 25 25 20 120 10 05 10 05 35 10 35
58 58 58 58 58 58 58 58 58 58 58 58
0.431 0.431 0.345 0.345 2.069 0.172 0.086 0.172 0.086 0.603 0.172 0.603
45 10 20 05 25 05 25 10 05 05 05 03
58 58 58 58 58 58 58 58 58 58 58 58
0.776 0.172 05 0.086 0.431 0.086 0.431 0.172 0.086 0.086 0.086 0.052
10 05 05 40 05
58 58 58 58 58
0.172 0.086 0.086 0.67 0.086 **20.524**

B. FREQUENCY

5 6 6 4 2 5 3 2 1 2 1 5 1 3 3

S/n	Species	Position	Total Quads	Quad. 1	Quad. 2	Quad. 3	Quad. 4	Quad. 5	Quad.6
1.	*Sporobolus pyramidalis*	2nd	115	-	40	-	50	05	20
2.	*Ageratum conyzoides*	5th	70	15	-	20	10	10	15
3.	*Vernonia amydalina*	6th	55	05	05	05	10	20	10
4.	*Kyllinga pumila*	13th	25	-	10	-	10	05	-
5.	*Bidens pilosa*	10th	40	-	-	15	-	10	15
6.	*Cymbopogon cittratus (stand)*	41st	05	05	-	-	-	-	-
7.	*Oldenlandlia corymbosa*	3rd	85	30	-	30	05	10	10
8.	*Cyperus haspan*	7th	40	-	05	10	05	10	10

9.	*Ocimum basilicum*	1st	160	-	20	30	30	50	30
10.	*Cynodon dactylon*	12th	30	10	10	10	-	-	-
11.	*Mimosa pudica*	27th	10	-	-	-	-	05	05
12.	*Kyllinga erecta*	16th	30	05	-	05	20	-	-
13.	*Evolvulus alsinoides*	38th	10	10	-	-	-	-	-
14.	*Panicum laxum*	4th	95	30	-	30	15	-	20
15.	*Leesier hexandra*	38th	10	-	10	-	-	-	-
16.	*Ludwigia decurrens*	54th	03	-	-	-	03	-	-
17.	*Heterotis rotundifolia*	41st	05	-	-	-	-	05	-
18.	*Panicum repens*	54th	03	-	-	-	-	-	03
19.	*Ludwigia hysopifolia*	16th	20	05	-	-	-	10	05
20.	*Desmodium scorpiurus*	25th	15	05	10	-	-	-	-
21.	*Manihot esculentum*	27th	10	-	-	05	05	-	-
22.	*Alternanthera sessilis*	16th	20	10	-	-	-	05	05
23.	*Phyllanthus amarus*	11th	20	-	05	05	-	05	05
24.	*Ludwigia abyssinica*	41st	05	-	-	-	05	-	-
25.	*Commelina diffusa*	21st	15	05	05	05	-	-	-
26.	*Sida linifolia*	36th	08	-	-	05	03	-	-
27.	*Eichinochloa colona*	22nd	25	10	-	-	-	-	15
28.	*Setaria barbata*	20th	30	-	-	10	-	20	-
29.	*Eichinochloa obtusiflora*	37th	15	-	15	-	-	-	-
30.	*Eleusine indica*	27th	10	-	-	05	-	05	-
31.	*Fimbristylis littoralis*	9th	40	-	20	-	10	05	05
32.	*Euphorbia hirta*	41st	05	05	-	-	-	-	-
33.	*Boerhavia diffusa*	13th	25	10	10	05	-	-	-
34.	*Mitracarpus villosus*	16th	20	-	10	05	-	-	-
35.	*Digitaria nuda*	41st	05	-	-	-	-	-	-
36.	*Cyperus esculentus*	41st	05	-	-	-	05	-	-
37.	*Mariscus flabelliformis*	22nd	25	05	-	-	-	-	20
38.	*Imperata cylindrica*	41st	05	-	-	-	05	-	-
39.	*Oryza sativa*	41st	05	-	-	-	-	05	-
40.	*Talinum triangulare*	27th	10	-	05	05	-	-	-
41.	*Cleome rutidosperma*	41st	05	05	-	-	-	-	-
42.	*Mariscus alternifolia*	27th	10	-	-	05	-	05	-
43.	*Gomphrena celosioides*	15th	35	-	30	-	05	-	-
44.	*Digitaria gayana*	24th	20	-	-	-	-	05	15
45.	*Mimosa invisa*	27th	10	-	05	-	05	-	-
46.	*Euphorbia heterophylla*	27th	10	-	-	05	-	05	-
47.	*Chlorus piloris*	54th	03	03	-	-	-	-	-
48.	*Panicum maxima*	27th	10	-	-	-	-	05	05
49.	*Hackelochloa granularis*	8th	50	20	-	10	-	-	20
50.	*Spermacoce ocymoides*	38th	10	-	-	-	10	-	-
51.	*Diodia sarmentosa*	25th	15	-	10	-	-	-	05
52.	*Pouzolzia guinnensis*	27th	10	05	-	-	05	-	-
53.	*Hydrolea palustris*	41st	05	-	-	-	-	-	05
54.	*Pentodon pentandra*	41st	05	-	-	-	-	05	-
55.	*Laportea aestuans*	41st	05	-	05	-	-	-	-

56.	*Eclipta alba*	54th	03	-	-	03	-	-	-
57.	*Paspalum scrobiculatum*	41st	05	-	-	-	05	-	-

6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
83.3 100 100 66.7 33.3 83.3 50 33.7 16.7 33.3 16.7 83.3 16.7 50 50
1 4 1 1 2 1 3 2 2 3 2 3 1 3 1
6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
16.7 66.7 16.7 16.7 33.3 16.7 50 33.3 33.3 50 33.3 50 16.7 50 16.7
3 2 1 1 1 1 1 1 1 1 1
6 6 6 6 6 6 6 6 6 6 6
50 33.3 16.7 16.7 16.7 16.7 16.7 16.7 16.7 16.7 16.7 **1550.3**

C. REL. DENSITY

15.119 12.181 3.264 1.681 0.838 8.40 9.243 1.262 0.419
2.519 0.419 12.60 0.419 2.010 2.010 1.681 10.081 0.838
0.419 0.838 0.419 2.938 0.838 2.938 3.781 0.838 1.681
0.419 2.010 0.419 2.010 0.838 0.419 0.419 0.419 0.253
0.838 0.419 0.419 3.264 0.419

D. REL.FREQUENCY

5.373 6.45 4.302 4.302 2.148 5.373 3.225 2.148 1.077 2.148
1.077 5.373 1.077 3.225 3.225 1.077 4.302 1.077 11.077 2.148
1.077 3.225 2.148 2.148 3.225 2.148 3.225 1.077 3.225 1.077
3.225 2.148 1.077 1.077 1.077 1.077 1.077 1.077 1.077 1.077 1.077

E. IMPORTANCE VALUE

1st 2nd 7th 11th 20th 5th 6th 19th 28th 17th
20.492 18.631 9.714 5.983 2.986 13.773 12.468 3.41 1.496 4.667
28th 3rd 28th 12th 12th 25th 4th 26th 28th 20th
1.496 17.973 1.496 5.235 5.235 2.758 14.383 1.915 1.496 2.986
28th 9th 20th 9th 8th 20th 16th 28th 12th 28th
1.496 6.163 2.986 6.163 7.006 2.986 4.906 1.496 5.235 1.496
12th 20th 28th 28th 28th 41st 26th 28th 28th 18th 28th
5.235 2.986 1.496 1.496 1.496 1.33 1.915 1.496 1.496 4.341 1.496
192.81

APPENDIX XII
ENTIRE FARM UNDER CURRENT USAGE SITE E
(DETERMINING IMPORTANCE VALUES (FLAT)
RAINY SEASON - MANAGED

DENSITY

115 70 55 25 40 05 85 40 160 30 10 30
58 58 58 58 58 58 58 58 58 58 58 58
1.983 1.207 0.948 0.431 0.67 0.086 1.466 0.67 2.759 0.172 0.517
10 95 10 03 05 03 20 15 10 20 20 05
58 58 58 58 58 58 58 58 58 58 58 58
0.172 1.638 0.172 0.052 0.086 0.052 0.345 0.259 0.172 0.345 0.345 0.086
15 08 25 30 15 10 40 05 25 20 05 05
58 58 58 58 58 58 58 58 58 58 58 58
0.259 0.138 0.431 0.517 0.259 0.171 0.67 0.086 0.431 0.345 0.086 0.086
25 05 05 10 05 10 35 20 10 10 03 10
58 58 58 58 58 58 58 58 58 58 58 58
0.431 0.086 0.086 0.172 0.086 0.172 0.603 0.345 0.172 0.172 0.052 0.172

50 10 15 10 05 05 03 05
58 58 58 58 58 58 58 58
0.862 0.172 0.259 0.172 0.086 0.086 0.052 0.086 **23.06**

C. FREQUENCY

4/6 5/6 6/6 3/6 3/6 1/6 5/6 5/6 3/6 2/6 3/6 1/6
66.7 83.3 100 50 50 16.7 83.3 83.3 50 33.3 50 16.7
4/6 1/6 1/6 1/6 1/6 3/6 2/6 2/6 3/6 4/6 1/6 3/6 2/6
66.7 16.7 16.7 16.7 16.7 50 33.3 33.3 50 66.7 16.7 50 33.3
2/6 1/6 2/6 2/6 2/6 2/6 2/6 1/6 2/6 3/6 1/6 2/6 2/6
33.3 16.7 33.3 33.3 33.3 33.3 33.3 16.7 33.3 50 16.7 33.3 33.3
1/6 1/6 1/6 1/6 1/6
16.7 16.7 16.7 16.7 16.7 **2116.8**

C. REL. DENSITY

2.242 8.599 5.234 4.111 1.869 2.905 0.373 6.357 2.905 11.964
0.746 2.242 0.746 7.103 0.746 0.225 0.373 0.225 1.496 1.123
0.746 1.496 1.496 0.373 1.123 0.598 1.869 2.242 1.123 0.746
2.905 0.373 1.869 1.496 0.373 0.373 1.869 0.373 0.373 0.746
0.373 0.746 2.615 1.496 0.746 0.746 0.225 0.746 3.738 0.746
1.123 0.746 0.373 0.373 0.373 0.225 0.373

D. REL. FREQUENCY

3.151 3.935 4.724 2.362 2.362 0.789 3.935 3.935 3.935 2.362
1.573 2.362 0.789 3.151 0.789 0.789 0.789 0.789 2.362 1.573
1.573 2.362 3.151 0.789 2.362 1.573 1.573 1.573 0.789 1.573
3.151 0.789 2.362 2.363 0.789 0.789 1.573 0.789 0.789 1.573
0.789 1.573 1.573 1.573 1.573 1.574 0.789 1.573 2.362 0.789
1.573 1.573 0.789 0.789 0.789 0.789 0.789

E. IMPORTANCE VALUE

2nd 5th 13th 10th 41st 3rd 7th 1st 12th 27th
11.75 9.169 4.231 5.267 1.162 10.292 6.84 15.899 4.604 2.319
16th 38th 4th 38th 54th 41st 54th 16th 25th 27th
3.858 1.535 10.254 1.535 1.014 1.162 1.014 3.858 2.696 2.319
16th 11th 41st 21st 36th 22nd 20th 37th 27th 9th 41st
3.858 4.647 1.162 3.485 2.171 3.442 3.815 1.912 2.319 6.056 1.162 13th 16th 41st 41st
22nd 41st 41st 27th 41st 27th 15th
4.231 3.858 1.162 1.162 3.442 1.162 1.162 2.319 1.162 1.319 4.188
24th 27th 27th 54th 27th 8th 38th 25th 27th 41st
3.069 2.319 2.319 1.014 2.319 6.1 1.535 2.696 2.319 1.162
41st 41st 54th 41st
1.162 1.162 1.014 1.162

APPENDIX 8

Tree forest

Group Statistics

	Season	N	Mean	Std. Deviation	Std. Error Mean
IVI	Rainy	25	11.1240	3.91098	1.58220
	Dry	25	7.9072	2.28833	85767

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
IVI	Equal variances assumed	7.334	0.009	1.787	48	.080	3.21680	1.79970
	Equal variances not assumed			1.787	36.983	.082	3.21680	1.79970

Descriptive Statistics

Dependent Variable: IVI

Season	Slope	Mean	Std. Deviation	N
Rainy	Flat	15.1867	14.85132	6
	Sloppy	11.5533	12.31128	6
	Total	13.3700	13.14344	12
Dry	Flat	11.1617	10.00809	6
	Sloppy	9.2217	8.22293	6
	Total	10.1917	8.79144	12
Total	Flat	13.1742	12.25568	12
	Sloppy	10.3875	10.05544	12
	Total	11.7808	11.05528	24

Tests of Between-Subjects Effects

Dependent Variable: IVI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	111.505[a]	3	37.168	275	842
Intercept	3330.913	1	3330.913	24.678	000
Season	60.611	1	60.611	449	510
Slope	46.593	1	46.593	345	563
Season * Slope	4.301	1	4.301	032	860
Error	2699.538	20	134.977		
Total	6141.956	24			

Descriptive Statistics

Dependent Variable: IVI

Season	Slope	Mean	Std. Deviation	N
Rainy	Flat	14.3591	12.92185	23
	Sloppy	12.6483	10.57220	23
	Total	13.5037	11.70571	46
Dry	Flat	6.3126	5.38907	19
	Sloppy	6.1389	5.54626	18
	Total	6.2281	5.39025	37
Total	Flat	10.7190	10.89849	42
	Sloppy	9.7905	9.23277	41
	Total	10.2604	10.05928	83

Tests of Between-Subjects Effects

Dependent Variable: IVI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1119.410[a]	3	373.137	4.107	.009
Intercept	7978.767	1	7978.767	87.812	.000
Season	1085.730	1	1085.730	11.949	.001
Slope	18.201	1	18.201	.200	.656
Season * Slope	12.108	1	12.108	.133	.716
Error	7178.099	79	90.862		
Total	17035.335	83			
Corrected Total	8297.508	82			

a. R Squared = .135 (Adjusted R Squared = .102)

Group Statistics

	Season	N	Mean	Std. Deviation	Std. Error Mean
IVI	Rainy	10	10.1050	3.33938	1.05600
	Dry	10	4.3060	2.18336	.69044

Grass in long term site

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
IVI	Equal variances assumed	1.200	.288	4.596	18	.000	5.79900	1.26169
	Equal variances not assumed			4.596	15.506	.000	5.79900	1.26169

Descriptive Statistics

Dependent Variable: IVI

Season	Slope	Mean	Std. Deviation	N
	Flat	8.8750	3.72190	8
Rainy	Sloppy	5.2188	2.50497	8
	Total	7.0469	3.59967	16
	Flat	2.7033	1.62997	6
Dry	Sloppy	2.7333	.72701	6
	Total	2.7183	1.20338	12
	Flat	6.2300	4.30424	14
Total	Sloppy	4.1536	2.28281	14
	Total	5.1918	3.54218	28

Tests of Between-Subjects Effects

Dependent Variable: IVI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	181.953[a]	3	60.651	9.282	.000
Intercept	653.892	1	653.892	100.074	.000
Season6	128.477	1	128.477	19.663	.000
Slope	22.542	1	22.542	3.450	.076
Season6 * Slope	23.294	1	23.294	3.565	.071
Error	156.818	24	6.534		
Total	1093.501	28			
Corrected Total	338.771	27			

a. R Squared = .537 (Adjusted R Squared = .479)

Descriptive Statistics

Dependent Variable: IVI

Season	Slope	Mean	Std. Deviation	N
Rainy	Flat	15.1867	14.85132	6
	Sloppy	11.5533	12.31128	6
	Total	13.3700	13.14344	12
Dry	Flat	11.1617	10.00809	6
	Sloppy	9.2217	8.22293	6
	Total	10.1917	8.79144	12
Total	Flat	13.1742	12.25568	12
	Sloppy	10.3875	10.05544	12
	Total	11.7808	11.05528	24

Tests of Between-Subjects Effects

Dependent Variable: IVI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	111.505[a]	3	37.168	.275	.842
Intercept	3330.913	1	3330.913	24.678	.000
Season	60.611	1	60.611	.449	.510
Slope	46.593	1	46.593	.345	.563
Season * Slope	4.301	1	4.301	.032	.860
Error	2699.538	20	134.977		
Total	6141.956	24			

Descriptive Statistics

Dependent Variable: IVI

Season	Slope	Mean	Std. Deviation	N
Rainy	Flat	14.3591	12.92185	23
	Sloppy	12.6483	10.57220	23
	Total	13.5037	11.70571	46
Dry	Flat	6.3126	5.38907	19
	Sloppy	6.1389	5.54626	18
	Total	6.2281	5.39025	37
Total	Flat	10.7190	10.89849	42
	Sloppy	9.7905	9.23277	41
	Total	10.2604	10.05928	83

Tests of Between-Subjects Effects

Dependent Variable: IVI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1119.410[a]	3	373.137	4.107	.009
Intercept	7978.767	1	7978.767	87.812	.000
Season	1085.730	1	1085.730	11.949	.001
Slope	18.201	1	18.201	.200	.656
Season * Slope	12.108	1	12.108	.133	.716
Error	7178.099	79	90.862		
Total	17035.335	83			
Corrected Total	8297.508	82			

a. R Squared = .135 (Adjusted R Squared = .102)

Group Statistics

	Season	N	Mean	Std. Deviation	Std. Error Mean
IVI	Rainy	10	10.1050	3.33938	1.05600
	Dry	10	4.3060	2.18336	.69044

Grass in long term site

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
IVI	Equal variances assumed	1.200	.288	4.596	18	.000	5.79900	1.26169
	Equal variances not assumed			4.596	15.506	.000	5.79900	1.26169

Descriptive Statistics

Dependent Variable: IVI

Season	Slope	Mean	Std. Deviation	N
Rainy	Flat	8.8750	3.72190	8
	Sloppy	5.2188	2.50497	8
	Total	7.0469	3.59967	16
Dry	Flat	2.7033	1.62997	6
	Sloppy	2.7333	.72701	6
	Total	2.7183	1.20338	12
Total	Flat	6.2300	4.30424	14
	Sloppy	4.1536	2.28281	14
	Total	5.1918	3.54218	28

Tests of Between-Subjects Effects

Dependent Variable: IVI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	181.953[a]	3	60.651	9.282	.000
Intercept	653.892	1	653.892	100.074	.000
Season6	128.477	1	128.477	19.663	.000
Slope	22.542	1	22.542	3.450	.076
Season6 * Slope	23.294	1	23.294	3.565	.071
Error	156.818	24	6.534		
Total	1093.501	28			
Corrected Total	338.771	27			

a. R Squared = .537 (Adjusted R Squared = .479)

APPENDIX 8

Tree forest

	Season	N	Mean	Std deviation	Std Error Mean
IVI	Rainy	25	11.1240	3.91098	1.58220
	Dry	25	7.9072	2.28833	.85767

		Levene's Test for Equality of variance		t-test for equality of Means				
		F	Sig	i	df	Sig (2-tailed)	Mean Difference	Std. Error Difference
IVI	Equal variances assumed	7.334	0.009	1.787	48	080	3.21680	1.79970
	Equal variances not assumed			1.787	36.982	082	3.21680	1.79970

Shrub forest

	Season	N	Mean	Std deviation	Std Error Mean
IVI	Rainy	11	16.8364	8.62337	2.60004
	Dry	11	6.5727	3.18122	.95917

		Levene's Test for Equality of variance		t-test for equality of Means				
		F	Sig	i	df	Sig (2-tailed)	Mean Difference	Std. Error Difference
IVI	Equal variances assumed	19.260	.000	3.704	20	001	10.26364	2.77133
	Equal variances not assumed			3.704	12.672	003	10.26364	2.77133

Short Term Fallow Site Season and Slope (tree)

Descriptive Statistics

Dependent Variable IVI

Season	Slope	Mean	Std Deviation	N
Rainy season	Flat	9.6286	6.36598	7
	Sloppy	9.4829	6.91107	7
	Total	9.5557	6.38391	14
Dry season	Flat	14.0500	10.62992	7
	Sloppy	6.0743	4.73715	7
	Total	10.0621	8.92385	14
Total	Flat	11.8383	88.72462	14
	Sloppy	7.7786	5.96067	14
	Total	8.8089	7.61786	28

Descriptive Statistics

Dependent Variable IVI

Season	Slope	Mean	Std Deviation	N
Rainy season	Flat	15.1867	14.85132	6
	Sloppy	11.5533	12.31128	6
	Total	13.3700	13.14344	12
Dry season	Flat	11.1617	10.00809	6
	Sloppy	9.2217	8.22293	6
	Total	10.1917	8.79144	12
Total	Flat	13.1742	12.25568	12
	Sloppy	10.3875	10.05544	12
	Total	11.7808	11.05528	24

Tests of Between Subjects Effects

Dependent Variable IVI

Source	Type III sum of squares	df	Mean Square	F	Sig.
Corrected Model	111.505	3	37.168	275	842
Intercept	3330.913	1	3330.913	24.678	000
Season	60.611	1	60.611	.449	510
Slope	46.593	1	46.593	.346	563
Season *Slope	4.301	1	4.301	.032	860
Error	2699.538	20	134.977		
Total	6141.956	24			

Descriptive Statistics

Dependent Variable IVI

Season	Slope	Mean	Std Deviation	N
Rainy season	Flat	14.3691	12.9218	23
	Sloppy	12.6483	10.57220	23
	Total	13.5037	11.70571	46
Dry season	Flat	6.3126	5.38907	19
	Sloppy	6.1389	5.54626	18
	Total	6.2281	5.39025	37
Total	Flat	10.7190	10.89849	42
	Sloppy	9.7905	9.23277	41
	Total	10.2604	10.05928	83

Tests of Between Subjects Effects

Dependent Variable IVI

Source	Type III sum of squares	df	Mean Square	F	Sig.
Corrected Model	1119.410[a]	3	373.137	4.107	.000
Intercept	7978.767	1	7878.767	87.812	.000
Season	1085.730	1	1085.730	11.949	.001
Slope	18.201	1	18.201	.200	.655
Season *Slope	12.106	1	12.108	.133	.716
Error	7178.099	79	90.862		
Total	17035.335	83			
Corrected Total	8297.508	82			

a. R Squared = 135 (Adjusted R Squared = 102)

Group Statistics

	Season	N	Mean	Std deviation	Std Error Mean
IVI	Rainy	10	10.1050	3.33938	1.05600
	Dry	10	4.3060	2.18336	.69044

Grass in long term site

		Levene's Test for Equality of variance		t-test for equality of Means				
		F	Sig	i	df	Sig (2-tailed)	Mean Difference	Std. Error Difference
IVI	Equal variances assumed	1.200	.288	4.596	18	.000	5.79900	1.26169
	Equal variances not assumed			4.596	15.506	.000	5.79900	1.26169

Descriptive Statistics

Dependent Variable IVI

Season	Slope	Mean	Std Deviation	N
Rainy season	Flat	8.8750	3.72190	8
	Sloppy	5.2188	2.50497	8
	Total	7.0469	3.59967	16
Dry season	Flat	2.7033	1.62997	6
	Sloppy	2.7333	.72701	6
	Total	2.7183	1.20338	12
Total	Flat	6.2300	4.30424	14
	Sloppy	4.1536	2.28281	14
	Total	5.1918	3.54218	28

Tests of Between Subjects Effects

Dependent Variable IVI

Source	Type III sum of squares	df	Mean Square	F	Sig.
Corrected Model	181.953[a]	3	60.651	9.282	.000
Intercept	653.892	1	653.892	100.074	.000
Season	128.477	1	128.477	19.663	.000
Slope	22.642	1	22.542	3.450	.076
Season *Slope	23.294	1	23.294	3.565	.071
Error	156.818	24	6.534		
Total	1093.501	28			
Corrected Total	338.771	27			

a. R Squared = .537 (Adjusted R Squared = 479)

Regression

(DataSet0)C/Users/Dr. F. C. Eze/Desktop/Forest-Trees Rainy season (Unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. **All requested variable entered**

b. **Dependent Variable Spp. Popn**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.816[a]	.666	.652	3.86358

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	Df	Mean Square	F	Sig.
1	Regression	684.912	1	684.912	45.883	.000
	Residual	343.328	23	14.927		
	Total	1028.240	24			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	.236	1.098		.215	.832
	Abundance measure	.738	.109	.816	6.774	.000

a. Dependent Variable Spp. Popn.

Regression

(DataSet0)C/Users/Dr. F. C. Eze/Desktop/Forest-Trees Dry season (Unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. All requested variable entered

b. Dependent Variable Spp. Popn

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.816[a]	.666	.652	3.86358

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	Df	Mean Square	F	Sig.
1	Regression	684.912	1	684.912	45.883	.000
	Residual	343.328	23	14.927		
	Total	1028.240	24			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	.236	1.098		.215	.832
	Abundance measure	.738	.109	.816	6.774	.000

a. Dependent Variable Spp. Popn.

Regression

(DataSet1)C/Users/Dr. F. C. Eze/Desktop/Forest-Climbers Rainy season (Unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. **All requested variable entered**

b. **Dependent Variable Spp. Popn**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.928[a]	.861	.828	32.88338

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	26774.734	1	26774.734	24.761	.008[a]
	Residual	4325.266	4	1081.316		
	Total	31100.000	5			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients		
		B	Std Error	Beta	t	Sig.
1	(Constant)	.-10.753	18.012		-.597	.583
	Abundance measure	2.708	.544	.928	4.976	.008

a. Dependent Variable Spp. Popn.

Regression

(DataSet1)C/Users/Dr. F. C. Eze/Desktop/Forest-Climbers Dry season (Unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. **All requested variable entered**

b. **Dependent Variable Spp. Popn**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000[a]	1.000	.999	2.27513

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	Df	Mean Square	F	Sig.
1	Regression	20411.490	1	20411.490	3.943E3	.010[a]
	Residual	5.176	1	5.176		
	Total	20416.667	2			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients		
		B	Std Error	Beta	t	Sig.
1	(Constant)	-1.115	1.667		-.669	.625
	Abundance measure	2.898	.046	1.000	62.796	.010

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Forest-Site Shrubs (Rainy).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.841[a]	.708	.679	42.34793

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	43447.525	1	43447.525	24.227	.001[a]
	Residual	17933.475	10	1793.348		
	Total	61381.000	11			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	-18.695	18.325		-1.020	.332
	Abundance measure	2.526	.513	.841	4.922	.001

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Forest-Site Shrubs (Dry).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.848[a]	.719	.691	37.41902

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	35802.418	1	35802.418	25.570	.000[a]
	Residual	14001.832	10	1400.183		
	Total	49804.250	11			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	-22.747	16.192		-1.405	.190
	Abundance measure	2.293	.454	.848	5.057	.000

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Forest-Site Grass Rainy season (unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. All requested variable entered

b. Dependent Variable Spp. Popn

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000[a]	1.000		

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	1250.000	1	1250.000		
	Residual	.000	0			
	Total	1250.000	1			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	43.182	.000			
	Abundance measure	.568	.000	1.000		

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Forest-Site Grass Dry season (unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. **All requested variable entered**

b. **Dependent Variable Spp. Popn**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000[a]	1.000		

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	1250.000	1	1250.000		
	Residual	.000	0			
	Total	1250.000	1			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	43.182	.000			
	Abundance measure	.568	.000	1.000		

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Forest-Site –Tree Rainy season (unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. All requested variable entered

b. Dependent Variable Spp. Popn

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.283[a]	.080	-.104	12.02196

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	63.077	1	63.077	.436	.538[a]
	Residual	7.22.637	5	144.527		
	Total	785.714	6			

a. Predictor (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	11.703	8.475		1.381	.226
	Abundance measure	.494	.748	.283	.661	.536

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Trees (managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	642[a]	.412	.295	9.60890

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	324.059	1	324.059	3.510	120[a]
	Residual	461.655	5	92.331		
	Total	785.714	6			

a. Predictors (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	31.546	8.840		3.565	0.16
	Abundance measure	-2.254	1.203	-.642	-1.873	.120

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Shrubs (managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.349[a]	.122	.098	35.79917

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	711.091	1	711.091	.555	.498[a]
	Residual	5126.409	4	1281.602		
	Total	5837.500	5			

a. Predictors (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	51.746	35.681		1.450	.221
	Abundance measure	-2.171	2.915	-.349	-.745	.498

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Grass (Rainy season).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.993[a]	.986	.985	1.49178

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	1602.413	1	1602.413	720.054	.000[a]
	Residual	22.254	10	2.225		
	Total	1624.667	11			

a. Predictors (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	-670	.595		-1.127	.286
	Abundance measure (Flat)	.452	.017	.993	26.834	.000

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Grass (Dry season).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.997[a]	.993	.993	1.26774

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	2407.595	1	2407.595	1.498E3	.000[a]
	Residual	16.072	10	1.607		
	Total	2423.667	11			

a. Predictors (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	.576	.452		1.275	.231
	Abundance measure (Flat)	.410	.011	.997	38.705	.000

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Grass (Rainy season).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.918[a]	.843	.828	1.73497

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	162.149	1	162.149	53.668	.000[a]
	Residual	30.101	10	3.010		
	Total	192.250	11			

a. Predictors (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	.203	.745		.273	.791
	Abundance measure (Flat)	.333	.045	.918	7.339	.000

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Grass (Dry season).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.957[a]	.917	.900	1.23013

a. Predictor (Constant), Abundance measures (Slope)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	83.291	1	83.291	55.042	.001[a]
	Residual	7.566	5	1.513		
	Total	90.857	6			

a. Predictors (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	.538	.863		-.624	.560
Abundance measure (Flat)	.472	.064	.957	7.419	.001

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Herbs in family Dry season (managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.938[a]	.879	.872	1.02551

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	129.806	1	129.806	123.427	.000[a]
	Residual	17.879	17	1.052		
	Total	147.684	18			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	1.315	.268		4.912	.000
Abundance measure (Flat)	.039	.003	.938	11.110	.000

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Herbs in family Dry season (managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.938[a]	.879	.872	1.02551

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	129.806	1	129.806	123.427	.000[a]
	Residual	17.879	17	1.052		
	Total	147.684	18			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	1.315	.268		4.912	.000
Abundance measure (Flat)	.039	.003	.938	11.110	.000

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Herbs-Slope Dry season (unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. **All requested variable entered**

b. **Dependent Variable Spp. Popn**

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.395[a]	.156	.015	.75008

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	.624	1	.624	1.110	.333[a]
	Residual	3.376	6	.563		
	Total	4.000	7			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	1.735	.347		5.006	.002
Abundance measure (Flat)	-.004	.004	-.395	-1.053	.333

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Herbs-Slope Dry season (unmanaged).Sav.

Variables Entered/Removed

Model	Variable Entered	Variable Removed	Method
1	Abundance measure[a]		Enter

a. All requested variable entered

b. Dependent Variable Spp. Popn

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.395[a]	.156	.015	.75008

a. Predictor (Constant), Abundance measures

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	.624	1	.624	1.110	.333[a]
	Residual	3.376	6	.563		
	Total	4.000	7			

a. Predictors (Constant), Abundance measures

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	1.735	.347		5.006	.002
Abundance measure (Flat)	-.004	.004	-.395	-1.053	.333

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Short Term fallow Site Herbs in family Dry season (managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.861[a]	.741	.723	1.19824

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	57.649	1	57.469	40.152	.000[a]
	Residual	20.101	14	1.436		
	Total	77.750	15			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Spp. Popn.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	1.257	.348		3.617	.003
Abundance measure (Flat)	.023	.004	.861	6.337	.000

a. Dependent Variable Spp. Popn.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Long Term fallow Site Grass (Rainy season).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.966[a]	.934	.924	8.63765

a. Predictor (Constant), Abundance measures (Slope)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	7361.737	1	7361.737	98.671	.000[a]
	Residual	522.263	7	74.609		
	Total	7884.000	8			

a. Predictors (Constant), Abundance measures (Slope)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	-3.881	3.773		-1.029	.338
	Abundance measure (Flat)	.623	.063	.966	9.933	.000

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Shrubs-Rainy season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.991[a]	.983	.974	11.89513

a. Predictor (Constant), Abundance measures (Slope)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	16261.762	1	16261.762	114.929	.009[a]
	Residual	282.988	2	141.494		
	Total	16544.750	3			

a. Predictors (Constant), Abundance measures (Slope)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	-51.723	10.554		-4.901	.039
	Abundance measure (Slope)	5.053	.471	.991	10.720	.009

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Shrubs-Dry season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.908[a]	.825	.781	2.22556

a. Predictor (Constant), Abundance measures (Slope)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	93.521	1	93.521	18.881	.012[a]
	Residual	19.812	4	4.953		
	Total	113.333	5			

a. Predictors (Constant), Abundance measures (Slope)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	-1.313	1.845		-.711	.516
	Abundance measure (Slope)	.419	.096	.908	4.345	.012

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Shrubs in family-Rainy season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.297[a]	.088	-.824	45.96194

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	204.167	1	204.167	.097	.808[a]
	Residual	2112.500	1	2112.500		
	Total	2316.667	2			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	41.389	41.014		1.009	.497
	Abundance measure (Flat)	-.389	1.251	-.297	-311	.808

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Shrubs in family-Dry season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.240[a]	.058	-.413	54.76756

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	367.779	1	367.770	.123	.760[a]
	Residual	5998.971	2	2999.486		
	Total	6366.750	3			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	31.737	34.787		.912	.458
	Abundance measure (Flat)	.134	.381	.240	.350	.760

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Grass-Dry season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.730[a]	.532	.298	8.55616

a. Predictor (Constant), Abundance measures (Slope)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	166.584	1	166.584	2.276	.270[a]
	Residual	146.416	2	73.208		
	Total	313.000	3			

a. Predictors (Constant), Abundance measures (Slope)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	21.171	8.267		2.561	.125
	Abundance measure (Slope)	-.593	.393	-.730	-1.508	.270

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Grass-Dry season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.911[a]	.829	.772	4.25393

a. Predictor (Constant), Abundance measures (Slope)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	263.712	1	263.712	14.573	.032[a]
	Residual	54.288	3	18.096		
	Total	318.000	4			

a. Predictors (Constant), Abundance measures (Slope)

b. Dependent Variable Species Population.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	-6.091	4.625		-1.317	.279
Abundance measure (Slope)	.894	.234	.911	3.817	.032

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Grass in family-Rainy season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.186[a]	.034	.287	18.23523

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	35.629	1	35.629	.107	.765[a]
	Residual	997.571	3	332.524		
	Total	1033.200	4			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Species Population.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	13.674	10.713		1.276	.292
Abundance measure (Flat)	-.152	.463	-.186	-.327	.765

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Grass in family-Dry season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.192[a]	.037	-.444	3.46944

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	.926	1	.926	.077	.808[a]
	Residual	24.074	2	12.037		
	Total	25.000	3			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients		
		B	Std Error	Beta	t	Sig.
1	(Constant)	11.481	4.061		2.827	.106
	Abundance measure (Flat)	.037	.134	.192	.277	.808

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Herbs in family-Rainy season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.117[a]	.014	-.033	3.59914

a. Predictor (Constant), Abundance measures (Slope)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	3.795	1	3.795	.293	.594[a]
	Residual	272.031	21	12.954		
	Total	275.826	22			

a. Predictors (Constant), Abundance measures (Slope)

b. Dependent Variable Species Population.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	3.410	.959		3.557	.002
Abundance measure (Slope)	-.005	.010	-.117	-.541	.594

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Herbs in family-Dry season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.038[a]	.001	-.082	3.50002

a. Predictor (Constant), Abundance measures (Slope)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	212	1	.212	.017	.897[a]
	Residual	147.002	12	12.250		
	Total	147.214	13			

a. Predictors (Constant), Abundance measures (Slope)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	3.465	1.244		2.785	.016
	Abundance measure (Slope)	-.001	.008	-.038	-.132	.897

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Herbs in family-Rainy season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.919[a]	.846	.836	1.66211

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	241.576	1	241.576	87.444	·000[a]
	Residual	44.202	16	2.763		
	Total	285.778	17			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Species Population.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized coefficients	t	Sig.
		B	Std Error	Beta		
1	(Constant)	.577	.476		1.212	.243
	Abundance measure (Flat)	.034	.004	.919	9.351	.000

a. Dependent Variable Species Population.

Regression

(DataSet1) C:/Users/Dr. F. C. Eze/Desktop/Farm in current usage site Herbs in family-Dry season (Managed).Sav.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.884[a]	.799	.786	1.46330

a. Predictor (Constant), Abundance measures (Flat)

ANOVA[a]

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	127.764	1	127.764	59.668	·000[a]
	Residual	32.119	15	2.141		
	Total	150.882	16			

a. Predictors (Constant), Abundance measures (Flat)

b. Dependent Variable Species Population.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	Std Error	Beta		
1 (Constant)	.720	.413		1.744	.243
Abundance measure (Flat)	.021	.003	.894	7.725	.000

a. Dependent Variable Species Population.

T-Test for percentage Nitrogen for the Dry/Rainy seasons at 20-40cm soil depth.

[DataSet0]

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dry Season	.0667	6	.01211	.00494
	Rainy Season	.0250	6	.00548	.00224

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Dry Season & Rainy Season	6	-.302	.561

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Dry Season - Rainy Season	.04167	.01472	.00601	.02622	.05711	6.934	5	.001

Interpretations

1. The correlation is negative.
2. The mean difference is significant since the p-value of 0.001 is less than 0.05.

1. The correlati[redacted] is [redacted].
2. The mea[redacted]ifference is [redacted]ficant[redacted]ce the [redacted]e of 0.001 is less than 0.05.

Oneway ANOVA for percentage Nitrogen for the Dry/Rainy seasons at 20-40cm soil depth.

[DataSet1]

Warnings

Post hoc tests are not performed for Results because there are fewer than three groups.

ANOVA

Results	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.005	1	.005	58.962	.000
Within Groups	.001	10	.000		
Total	.006	11			

The one-way ANOVA was performed to confirm the paired Test that was significant as seen in one way ANOVA. However the multiple comparisons cannot be performed since we have only two groups, the dry and rainy season.

T-Test for pH for the Dry/Rainy seasons at 0-20cm soil depth.

[DataSet0]

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dry Season	5.2067	6	.06772	.02765
	Rainy Season	3.9700	6	2.00459	.81837

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Dry Season & Rainy Season	6	.621	.189

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Dry Season - Rainy Season	1.23667	1.96329	.80151	-.82368	3.29701	1.543	5	.183

Interpretations

1. The correlation is positive.
2. The mean difference is non-significant since the p-value of 0.183 is greater than 0.05.

T-Test for pH for the Dry/Rainy seasons at 20-40cm soil depth.

[DataSet0]

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dry Season	5.1783	6	.18978	.07748
	Rainy Season	4.3767	6	.51999	.21228

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Dry Season & Rainy Season	6	.347	.500

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Dry Season - Rainy Season	.80167	.48775	.19912	.28981	1.31353	4.026	5	.010

Interpretations

1. The correlation is positive.
2. The mean difference is significant since the p-value of 0.10 is less than 0.05.

T-Test for percentage organic carbon for the Dry/Rainy seasons at 0-20cm soil depth.

[DataSet0]

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dry Season	.8417	6	.19944	.08142
	Rainy Season	.3883	6	.14703	.06002

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Dry Season & Rainy Season	6	.301	.562

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Dry Season - Rainy Season	.45333	.20916	.08539	.23384	.67283	5.309	5	.003

Interpretations

1. The correlation is positive.
2. The mean difference is significant since the p-value of 0.003 is less than 0.05.

T-Test for percentage organic carbon for the Dry/Rainy seasons at 20-40cm soil depth.

[DataSet3]

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dry Season	.6083	6	.15237	.06220
	Rainy Season	.2067	6	.02733	.01116

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Dry Season & Rainy Season	6	-.501	.311

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Dry Season - Rainy Season	.40167	.15774	.06848	.22563	.57770	5.966	5	.002

Interpretations

1. The correlation is positive.
2. The mean difference is significant since the p-value of 0.002 is less than 0.05

T-Test for percentage organic matter for the Dry/Rainy seasons at 0-20cm soil depth.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dry Season	1.4487	6	34852	14228
	Rainy Season	.8667	6	25017	10213

Paired Samples Correlations

		N	Correlation	Sig
Pair 1	Dry Season & Rainy Season	6	.300	.563

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Dry Season - Rainy Season	.78000	.35293	.14817	.39913	1.16087	5.264	5	.003

Interpretations

1. The correlation is positive.
2. The mean difference is significant since the p-value of 0.003 is less than 0.05.

T-Test for percentage organic matter for the Dry/Rainy seasons at 20-40cm soil depth.

[DataSet0]

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Dry Season	1.0467	6	.25766	.10519
	Rainy Season	.3433	6	.04502	.01838

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Dry Season & Rainy Season	6	-.365	.451

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Dry Season - Rainy Season	.70333	.27811	.11354	.41147	.99519	6.195	5	.002

Interpretations

1. The correlation is negative.
2. The mean difference is significant since the p-value of 0.002 is less than 0.05.

Oneway ANOVA for percentage Nitrogen for the Dry/Rainy seasons at 0-20cm soil depth for sites

[DataSet0]

ANOVA

Result

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.238	5	.048	.915	.529
Within Groups	.312	6	.052		
Total	.550	11			

Interpretation: The sites are non-significant %age Nitrogen since the p-value of 0.529 is greater than 0.05.

Oneway ANOVA for percentage Nitrogen for the Dry/Rainy seasons at 20-40cm soil depth for sites

[DataSet0]

ANOVA

Result

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.000	5	.000	.071	.995
Within Groups	.006	6	.001		
Total	.006	11			

Interpretation: The sites are non-significant for %age Nitrogen since the p-value of 0.995 is greater than 0.05

Oneway ANOVA for pH for the Dry/Rainy seasons at 0-20cm soil depth for sites

[DataSet0]

ANOVA

Result	Sum of Squares	df	Mean Square	F	Sig
Between Groups	1.260	5	.256	.557	.669
Within Groups	2.336	6	.389		
Total	3.616	11			

Interpretation: The sites are non-significant for pH since the p-value of 0.669 is greater than 0.05

Oneway ANOVA for pH for the Dry/Rainy seasons at 20-40cm soil depth for sites

[DataSet0]

ANOVA

Result	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.937	5	.187	.446	.803
Within Groups	2.523	6	.420		
Total	3.460	11			

Interpretation: The sites are non-significant for pH since the p-value of 0.803 is greater than 0.05

Oneway ANOVA for percentage organic carbon for the Dry/Rainy seasons at 0-20cm soil depth for sites

[DataSet0]

ANOVA

Result

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.198	5	.040	.327	.880
Within Groups	.726	6	.121		
Total	.924	11			

Interpretation: The sites are non-significant for %age organic carbon since the p-value of 0.880 is greater than 0.05

Oneway ANOVA for percentage organic carbon for the Dry/Rainy seasons at 20-40cm soil depth for sites

[DataSet0]

ANOVA

Result

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	049	5	.010	.107	987
Within Groups	.554	6	092		
Total	.604	11			

- Interpretation: The sites are non-significant for %age organic carbon since the p-value of 0.987 is greater than 0.05

Oneway ANOVA for percentage organic matter for the Dry/Rainy seasons at 0-20cm soil depth for sites

[DataSet0]

ANOVA

Result	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.591	5	.118	.329	.878
Within Groups	2.154	6	.359		
Total	2.745	11			

Interpretation: The sites are non-significant for %age matter carbon since the p-value of 0.878 is greater than 0.05

Oneway ANOVA for percentage organic matter for the Dry/Rainy seasons at 20-40cm soil depth for sites

[DataSet0]

ANOVA

Result	Sum of Squares	df	Mean Square	F	Sig
Between Groups	.149	5	.030	.106	.997
Within Groups	1.677	6	.280		
Total	1.826	11			

Interpretation: The sites are non-significant for %age matter carbon since the p-value of 0.987 is greater than 0.05