Biological and Environmental Sciences Journal for the Tropics
Volume 23. Number 1, April 2026. Pp 55 - 66
https://dx.doi.org/10.4314/bestj.v23i1.6
Research article

Floral Diversity of Modibbo Adama University Yola: A Preliminary Investigation

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Submission: 14/02/2026
Accepted: 16/06/2026

Abstract
Biodiversity supports ecosystem balance and human well-being, yet floral resources in many Nigerian regions remain underexplored. This study provides a preliminary account of floral diversity within Modibbo Adama University, Yola, Adamawa State**.** - Field surveys of plant species with the University community were conducted between July 2023 and October 2024. Whole plant was for small sized plants such as herbs or parts of plants along with fruits or flowers were collected for large sized plants, the specimen for each species was identified using the taxonomic keys and confirmed with existing collections deposited in the Herbarium of Department of Plant science, Modibbo Adama University, Yola. Ninety-two (92) plant species belonging to 34 families were noted from the fauna composition of the campus. Members of the family Fabaceae were the most dominant (19.6%), followed by Malvaceae (8.7%) and Lamiaceae (7.6%). Herbs constituted the largest growth form (39%), followed by trees (37%), shrubs (19%), and grasses (5%). The dominance of legumes is indicative of their adaptability to the climatic conditions of savanna regions and their ecological role in the enrichment soil with valuable nutrients. The diversity observed points to the university's ecological significance as a refuge for species with medicinal, nutritional, and ornamental value. This study provides an essential baseline data for biodiversity conservation and sustainable management within the Northern Guinea Savanna zone of Nigeria.

Keywords: Floral, Diversity, Fabaceae, Savanna, Vegetation and Conservation

INTRODUCTION

Biodiversity plays a vital role in maintaining ecological balance and supporting human livelihoods. It forms the foundation of ecosystem services that sustain life on Earth, including food production, medicinal resources, and climate regulation (Yerima & Belel, 2025). Taxonomic surveys have contributed significantly to documenting the diversity and distribution of plant species across various parts of Nigeria (Soladoye *et al*., 2015). Soladoye *et al*. (2015) reported a total of 119 angiosperm species belonging to 47 families in their survey of Bowen University. These species comprised trees, shrubs, herbs, and climbers. Among the recorded families, Euphorbiaceae was the most dominant, represented by 15 species (12.6% of the total), and followed by Asteraceae with eight species (6.7%), and Moraceae and Papilionaceae**,** each with seven species (5.9%). Similarly, at the Federal University of Kashere in Gombe State, Kolawole *et al*. (2022) identified 76 plant species distributed across 38 families. The family Fabaceae accounted for the highest number of species (six), closely followed by Apocynaceae (five), while Euphorbiaceae and Malvaceae each had four species. Eight families were represented by three species, seven by two species, and nineteen by only one species each.

Modibbo Adama University (MAU) is located in Adamawa State, North-eastern Nigeria. It harbors a wide variety of plant species. Despite the ecological and economic importance of this flora, the botanical resources of MAU remain underexplored and are increasingly threatened by human activities such as urban expansion, agricultural encroachment, and infrastructure development (Yerima & Belel, 2025). The floral diversity of MAU not only provides valuable medicinal resources but also supports essential ecosystem functions, including carbon sequestration, soil fertility enhancement, water regulation, and the provision of habitat for wildlife (Balvanera *et al*., 2019).

A decline in flora diversity can disrupt ecosystem stability, reduce the availability of ecosystem services, and increase vulnerability to environmental stressors (Cardinale *et al*., 2012). Given the growing environmental pressures from ozone layer depletion, deforestation, and rapid urbanization, there is an urgent need for continuous biodiversity assessment within the MAU landscape (Chukwuma & Adebisi-Fagbohungbe, 2015). The present study therefore documents the existing floral species within Modibbo Adama University, Yola, providing baseline data that can guide future ecological research, conservation planning, and sustainable management of plant resources in the area.

MATERIALS AND METHODS

Study Area

The study was conducted within Modibbo Adama University, Yola, in Girei Local Government Area of Adamawa state, North Eastern Nigeria. It is located on latitude 9°20'00"-9°21'30" N and longitude 12°29'00" E-12°30'30" E.

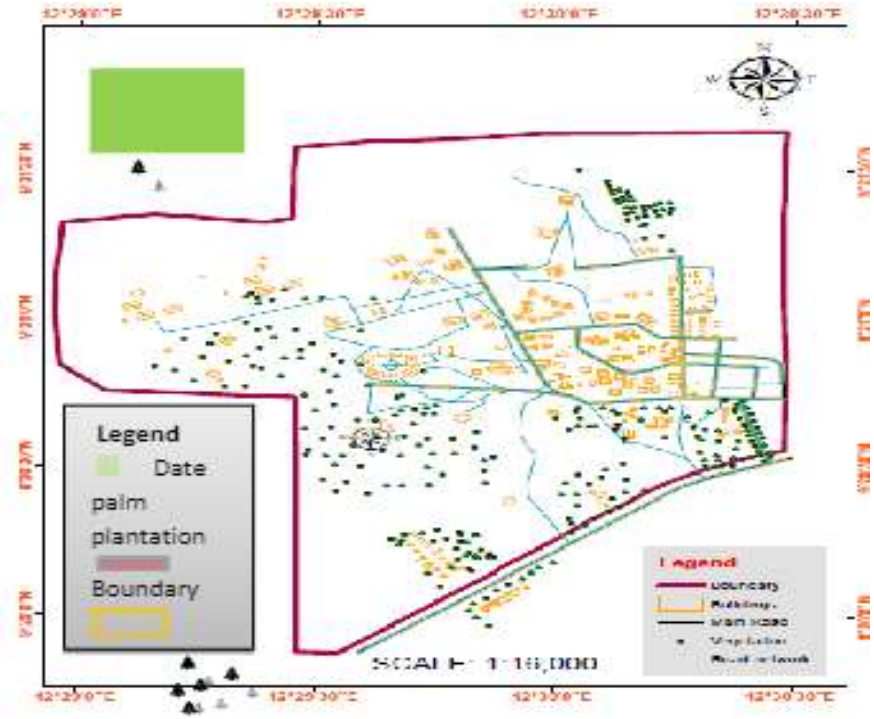

Figure 1: Map of Modibbo Adama University, Yola
Source: GIS UNIT, Department of Geography, MAUTECH, 2015).

Floral Species Enumeration and Identification

The study commenced in July 2023 and was completed in October 2024. A purposive sampling approach was adopted to cover all accessible vegetation types across the campus, field collections of plant species within the university environment were carried out. For herbaceous species, whole plants were collected, however, for larger plants such as trees and shrubs, representative parts including leaves, flowers, and fruits were collected for identification using a sharp scissors or knife to neatly cut out the desired part from the parent plant. All insects, spider-webs and foreign bodies, were carefully removed before putting it into the collection bag (Manilal & Kumar, 1998). The specimen for each species was identified using the taxonomic keys provided by Lowe (1989) & Keay (1989) and confirmed with existing collections deposited in the Herbarium of Department of Plant science, Modibbo Adama University, Yola. A comprehensive list of species was documented along with their families, growth habits and common names.

Data analyses

Data were analysed using Microsoft Excel (2013). Descriptive statistics including percentages and frequency distribution were computed. Results were presented using charts and tables**.**

Percentage composition of species per family

The number of species in each family was expressed as a percentage of the total number of species recorded.

$$\frac{Number\ of\ species\ in\ a\ family}{Total\ number\ of\ plant\ species\ in\ all\ families} \times \frac{100}{1}$$

Percentage composition of genera per family: The number of genera in each family was expressed as a percentage of the total number of genera in all families recorded.

$$\frac{Number\ of\ genera\ in\ \ family}{Total\ number\ of\ genera\ in\ all\ families} \times \frac{100}{1}$$

Percentage distribution of plant species based on growth habit: the number of plant species belonging to a particular growth habit (climber, grass, herb, shrub and trees) was counted and expressed as a percentage of the total plant species.

$$\frac{Number\ of\ species\ with\ a\ specific\ growth\ habit}{Total\ number\ of\ plant\ species} \times \frac{100}{1}$$

RESULTS

A total of ninety-two (92) plant species, representing thirty-four (34) families, were identified within the study area (Table 1). The family Fabaceae exhibited the highest species richness, comprising 18 species and accounting for 19.57% of the total flora. This was followed by Malvaceae with eight (8) species (8.70%), Lamiaceae with seven (7) species (7.61%), and Asteraceae with five (5) species (5.43%). The family Amaranthaceae was represented by four (4) species (4.33%). Families such as Anacardiaceae, Combretaceae, Cyperaceae, Myrtaceae, and Rubiaceae each contained three (3) species (3.26%), while Apocynaceae, Arecaceae, Caryophyllaceae, Cucurbitaceae, Meliaceae, Plantaginaceae, and Verbenaceae were each represented by two (2) species (2.17%). The remaining families: Asparagaceae, Capparaceae, Cleomaceae, Convolvulaceae, Euphorbiaceae, Fagaceae, Geraniaceae, Lauraceae, Lythraceae, Moraceae, Nyctaginaceae, Phyllanthaceae, Sapotaceae, Solanaceae, and Zygophyllaceae-were each represented by a single species (1.09%) (Figure 2).Figure 3 illustrates the percentage distribution of floral species based on the number of genera represented within each family. The Fabaceae family exhibited the highest proportion of genera (17.50%), followed by Malvaceae (8.75%) and Lamiaceae (7.50%). The families Poaceae and Asteraceae each accounted for 5.00% of the total genera, while Amaranthaceae, Anacardiaceae, Myrtaceae, and Rubiaceae contributed 3.75% each. Families including Apocynaceae, Arecaceae, Caryophyllaceae, Combretaceae, Cucurbitaceae, Meliaceae, Plantaginaceae, and Verbenaceae each represented 2.50% of the recorded genera. The remaining families: Annonaceae, Asparagaceae, Capparaceae, Cleomaceae, Convolvulaceae, Cyperaceae, Euphorbiaceae, Fagaceae, Geraniaceae, Lauraceae, Lythraceae, Moraceae, Nyctaginaceae, Phyllanthaceae, Sapotaceae, Solanaceae, and Zygophyllaceae—each contributed 1.25% to the overall genera distribution.

Based on the growth habit of the plant species identified within the study area, herbaceous species constituted the highest proportion, accounting for 39% of the total flora. This was closely followed by tree species at 37%, while shrubs represented 19%. Grasses exhibited the lowest occurrence, comprising only 5% of the recorded species (Figure 4).

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**Table 1:** Floristic composition of Modibbo Adama University, Nigeria

| S/No. | Botanical Name | Common Name | Family | Voucher No. | Growth Habit |
|---|---|---|---|---|---|
| 1 | *Amaranthus retroflexus* | Red-root Amranth | Amaranthaceae | MAU/PLS/0035 | Herb |
| 2 | *Abelmoschus manihot* | Sunset Hibiscus | Malvaceae | MAU/PLS/0064 | Shrub |
| 3 | *Acacia erioloba* | Camelthorn | Fabaceae | MAU/PLS/0054 | Tree |
| 4 | *Acacia senegal* | Gum Arabic | Fabaceae | MAU/PLS/0102 | Tree |
| 5 | *Adansonia digitata* | Baobab | Malvaceae | MAU/PLS/0073 | Tree |
| 6 | *Adenium obesum* | Desert Rose | Apocynaceae | | Shrub |
| 7 | *Agave sislamaperrine* | Sisal Hemp | Asparagaceae | | Herb |
| 8 | *Ageratum conyzoides* | Goat weed | Asteraceae | MAU/PLS/0063 | Herb |
| 9 | *Albizia lebbeck* | Woman's Tongue | Fabaceae | MAU/PLS/0060 | Tree |
| 10 | *Anacardium occidentalis* | Cashew | Anacardiaceae | | Tree |
| 11 | *Aristida adscensionis* | Common Needle Grasss | Poaceae | MAU/PLS/0045 | Grass |
| 12 | *Aristida bipartite* | Three-Awned Rolling Grass | Poaceae | MAU/PLS/0030 | Grass |
| 13 | *Azadirachta indica* | Neem | Meliaceae | MAU/PLS/0004 | Tree |
| 14 | *Balanite aegyptiaca* | Desert Date | Zygophyllaceae | MAU/PLS/0020 | Tree |
| 15 | *Bougainvillea spectabilis* | Great Bougainvillea | Nyctaginaceae | MAU/PLS/0029 | Shrub |
| 16 | *Calotropis procera* | Sodom apple | Apocynaceae | MAU/PLS/0058 | Shrub |
| 17 | *Cassia fistula* | Golden shower | Fabaceae | MAU/PLS/0003 | Tree |
| 18 | *Cassia mimosoides* | Feather-leaved Cassia | Fabaceae | MAU/PLS/0066 | Shrub |
| 19 | *Cassia occidentalis* | Coffee senn | Fabaceae | MAU/PLS/0017 | Shrub |
| 20 | *Cassia semia* | Siamesse senna | Fabaceae | MAU/PLS/0016 | Tree |
| 21 | *Cassia tora* | Sickle senna | Fabaceae | MAU/PLS/0012 | Shrub |
| 22 | *Celosia trigyna* | Woolflower | Amaranthaceae | MAU/PLS/0038 | Herb |
| 23 | *Centaurea nigra* | Common knap-weed | Asteraceae | MAU/PLS/0021 | Herb |
| 24 | *Chamaecrista rotundifolia* | Round-leaf Cassia | Fabaceae | MAU/PLS/0010 | Herb |
| 25 | *Citrullus lanatus* | Watermelon | Cucurbitaceae | MAU/PLS/0053 | Herb |
| 26 | *Cleome brachycarpa* | Spider flower | Cleomaceae | MAU/PLS/0041 | Herb |

NOTE: Voucher numbers correspond to specimens deposited in the Herbarium of the Department of Plant Science, MAU
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|---|---|---|---|---|---|
| 27 | *Corchorus capsularis* | White jute | Malvaceae | MAU/PLS/0057 | Herb |
| 28 | *Crateva religiosa* | Sarcred Barma | Capparaceae | | Tree |
| 29 | *Crotalaria retusa* | Rattleweed | Fabaceae | MAU/PLS/0065 | Herb |
| 30 | *Cucumeropsis mannii* | White-seed melon | Cucurbitaceae | MAU/PLS/0059 | Herb |
| 31 | *Cymbopogon citratus* | Lemon grass | Poaceae | MAU/PLS/0070 | Grass |
| 32 | *Cyperus amabilis* | Foothill flat sedge | Cyperaceae | MAU/PLS/0024 | Herb |
| 33 | *Cyperus rotundus* | Nutgrass | Cyperaceae | MAU/PLS/0025 | Herb |
| 34 | *Cyperus strigosus* | Straw Flatsedge | Cyperaceae | MAU/PLS/0048 | Herb |
| 35 | *Delonix regia* | Flamboyant | Fabaceae | | Tree |
| 36 | *Detarium microcarpum* | Sweet Dattock | Fabaceae | MAU/PLS/0013 | Tree |
| 37 | *Dicoma tomentosa* | Wolly Dicoma | Asteraceae | MAU/PLS/0039 | Herb |
| 38 | *Duranta erecta* | Golden dewdrop | Verbenaceae | MAU/PLS/0042 | Shrub |
| 39 | *Elaeis guinensis* | Oil Palm | Arecaceae | | Tree |
| 40 | *Eucalyptus globulus* | Blue Gum | Myrtaceae | MAU/PLS/0005 | Tree |
| 41 | *Euphorbia hirta* | Snakeweed | Euphorbiaceae | MAU/PLS/0006 | Herb |
| 42 | *Evolvulvus alsinoides* | Slender Dwarf Morning glory | Convolvulaceae | MAU/PLS/0036 | Herb |
| 43 | *Ficus platyphylum* | Brodleaf fig | Moraceae | | Tree |
| 44 | *Geranium dissectum* | Cut-leaved Crne's bill | Geraniaceae | MAU/PLS/0044 | Herb |
| 45 | *Gmelina arborea* | Beechwood | Lamiaceae | MAU/PLS/0033 | Tree |
| 46 | *Gomphrena celosioides* | Bachelor's weed | Amaranthaceae | MAU/PLS/0056 | Herb |
| 47 | *Gomphrena serrata* | Prostrate Gomphrena | Amaranthaceae | MAU/PLS/0007 | Herb |
| 48 | *Guiera senegalensis* | Senegal Tea | Combretaceae | MAU/PLS/0129 | Shrub |
| 49 | *Hyphaene thebaica* | Doum palm | Arecaceae | | Shrub |
| 50 | *Hyptis suaveolens* | Wild spikenard | Lamiaceae | MAU/PLS/0014 | Herb |
| 51 | *Khaya senegalensis* | African mahogany | Meliaceae | | Tree |
| 52 | *Lantana camara* | Wild sage | Verbenaceae | MAU/PLS/0027 | Shrub |
| 53 | *Malvastrum coromandelianum* | False Mallow | Malvaceae | MAU/PLS/0051 | Herb |
| 54 | *Mangifera indica* | Mango | Anacardiaceae | | Tree |

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|---|---|---|---|---|---|
| 55 | *Misopates orontium* | Lesser snapdragon | Plantaginaceae | MAU/PLS/0047 | Herb |
| 56 | *Mitracarpus hirtus* | Girdle pod | Rubiaceae | MAU/PLS/0034 | Herb |
| 57 | *Ocimum americanum* | American basil | Lamiaceae | MAU/PLS/0052 | Herb |
| 58 | *Oldenlandia auricularia* | Eared-leaf Diamond flower | Rubiaceae | MAU/PLS/0046 | Herb |
| 59 | *Parkia biglobosa* | African locust bean | Fabaceae | | Tree |
| 60 | *Pavonia urens* | Stinging pavonia | Malvaceae | MAU/PLS/0061 | Shrub |
| 61 | *Pennisetum pedicellatum* | Deenanath grass | Poaceae | MAU/PLS/0023 | Grass |
| 62 | *Persea Americana* | Avocado pear | Lauraceae | | Tree |
| 63 | *Phyllantus pavonians* | Seed Under leaf | Phyllanthaceae | MAU/PLS/0026 | Herb |
| 64 | *Physalis angulate* | Cutleaf Groundcherry | Solanaceae | MAU/PLS/0011 | Herb |
| 65 | *Piliostigma thonningii* | Camel's foot | Fabaceae | MAU/PLS/0015 | Tree |
| 66 | *Polyalthia longifolia* | False Ashoka | Annonaceae | | Tree |
| 67 | *Polycarpaea linearifolia* | Linear leaved carpetweed | Caryophyllaceae | MAU/PLS/0028 | Herb |
| 68 | *Pongomia pinnata* | Indin beech | Fabaceae | | Tree |
| 69 | *Prosopis africna* | African mesquite | Fabaceae | | Tree |
| 70 | *Psidium guajava* | Guava | Myrtaceae | MAU/PLS/0002 | Tree |
| 71 | *Punica granatum* | Pomegranate | Lythraceae | MU/PLS/0098 | Shrub |
| 72 | *Quercus laurifolia* | Laurel oak | Fagaceae | MAU/PLS/0062 | Tree |
| 73 | *Sagina apetala* | Annual Pearlwort | Caryophyllaceae | MAU/PLS/0037 | Herb |
| 74 | *Salvia sclarea* | Clary sge | Lamiaceae | MAU/PLS/0009 | Herb |
| 75 | *Schkuhria pinnata* | Dwrf Marigold | Asteraceae | MAU/PLS/0040 | Herb |
| 76 | *Scoparia dulcis* | Sweet broom | Plantaginaceae | MAU/PLS/0049 | Herb |
| 77 | *Setaria pumila* | Yellow foxtail | Poaceae | MAU/PLS/0031 | Grass |
| 78 | *Sida acuta* | Common wireweed | Malvaceae | MAU/PLS/0018 | Shrub |
| 79 | *Sida cordifolia* | Flannel weed | Malvaceae | MAU/PLS/0043 | Shrub |
| 80 | *Spermacoce pusilla* | Tiny Buttonweed | Rubiaceae | MAU/PLS/0050 | Herb |
| 81 | *Spondias mombin* | Hog plum | Anacardiaceae | MAU/PLS/0008 | Tree |
| 82 | *Stylosanthes biflora* | Pencilflower | Fabaceae | MAU/PLS/0055 | Herb |

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|---|---|---|---|---|---|
| 83 | *Syzygium cumini* | Malabar plum | Myrtaceae | | Tree |
| 84 | *Tamarindus indica* | Tamarind | Fabaceae | | Tree |
| 85 | *Tectona grandis* | Teak plant | Lamiaceae | MAU/PLS/0019 | Tree |
| 86 | *Terminalia catappa* | Tropical lmond | Combretaceae | | Tree |
| 87 | *Terminalia mantaly* | Madagascar Almond | Combretaceae | | Tree |
| 88 | *Tridax procumbens* | Coatbuttons | Asteraceae | MAU/PLS/0001 | Herb |
| 89 | *Vitellaria paradoxa* | Shea Tree | Sapotaceae | | Tree |
| 90 | *Vitex doniana* | Black plum | Lamiaceae | | Tree |
| 91 | *Vitex trifolia* | Simple-leaf chaste-tree | Lamiaceae | MAU/PLS/0022 | Shrub |
| 92 | *Waltheria indica* | Sleepy Morning | Malvaceae | MAU/PLS/0032 | Shrub |
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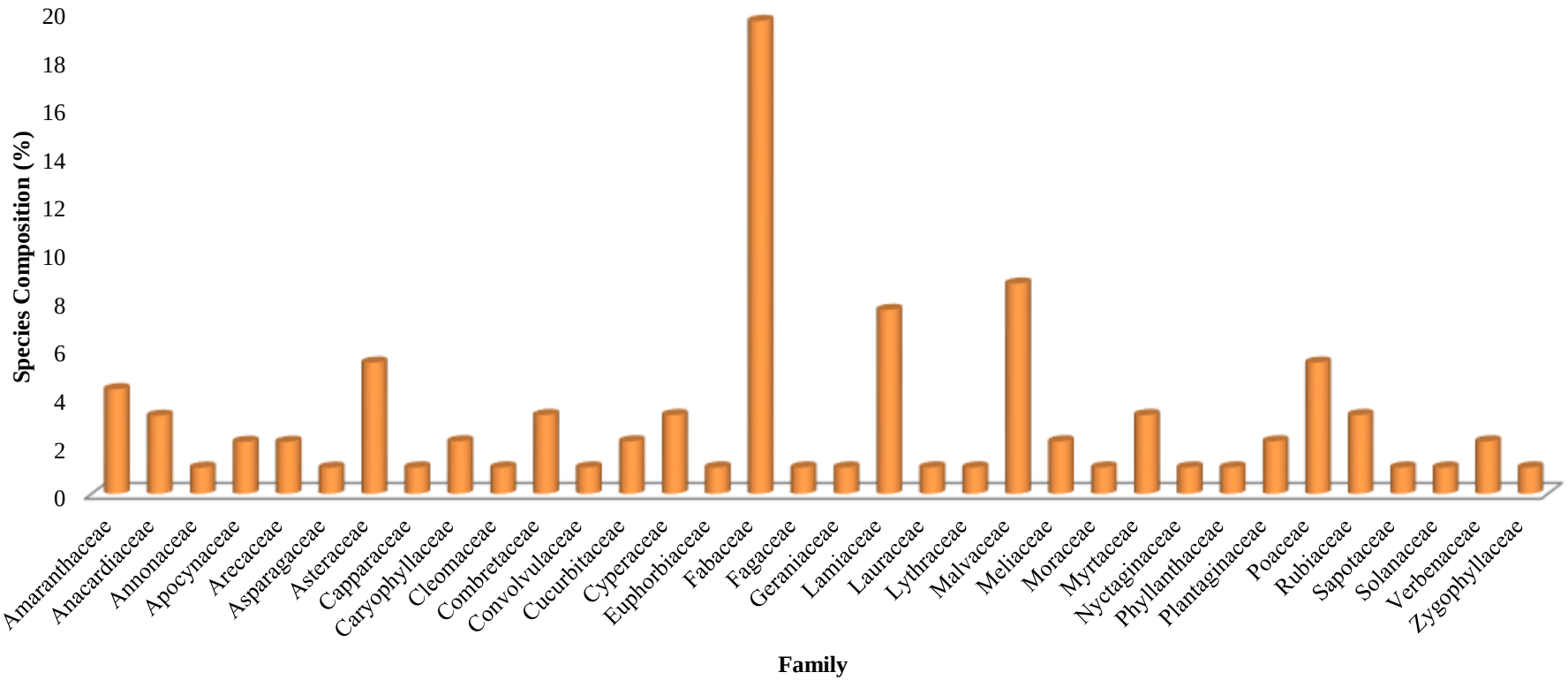


**Figure 2:** Percentage composition of plant species within families
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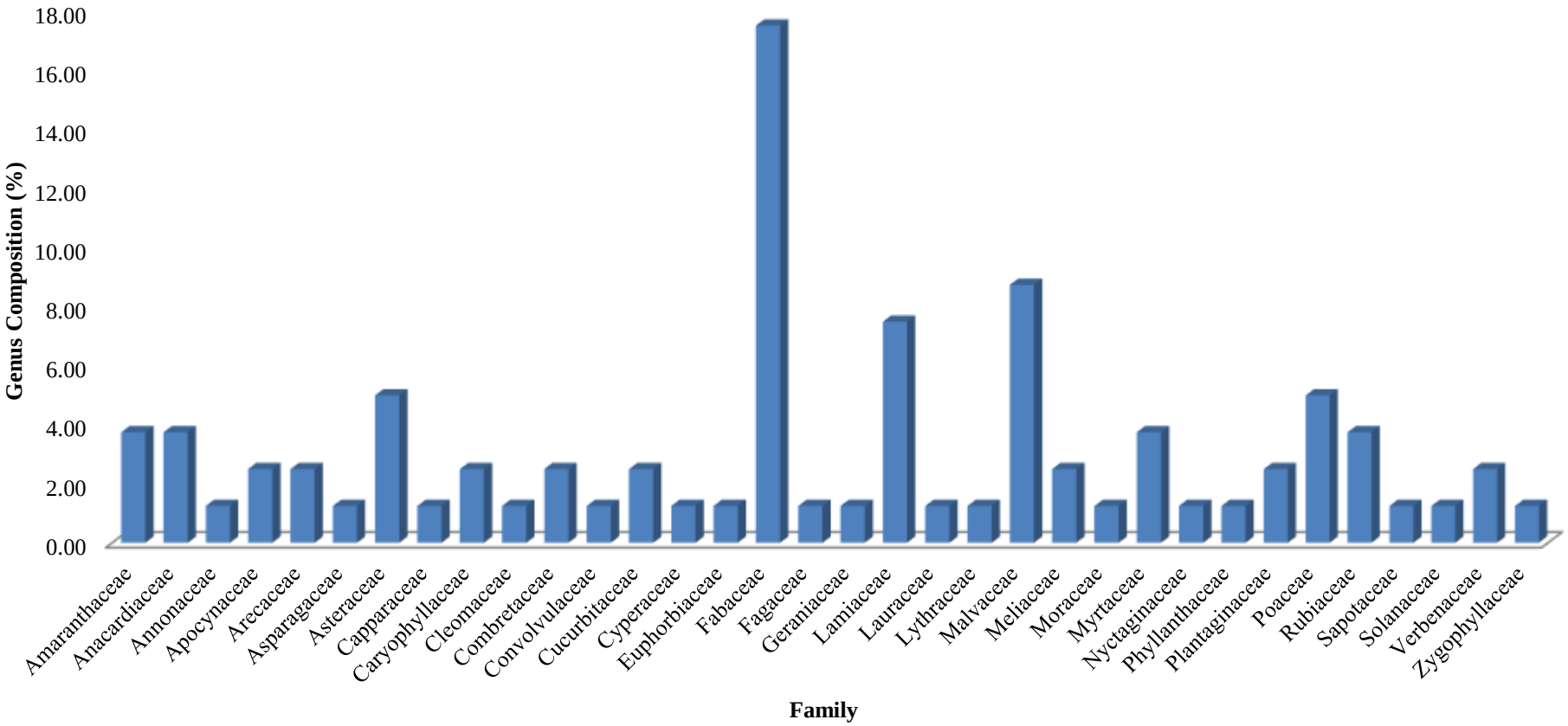


**Figure 3:** Percentage composition of plant genera within families
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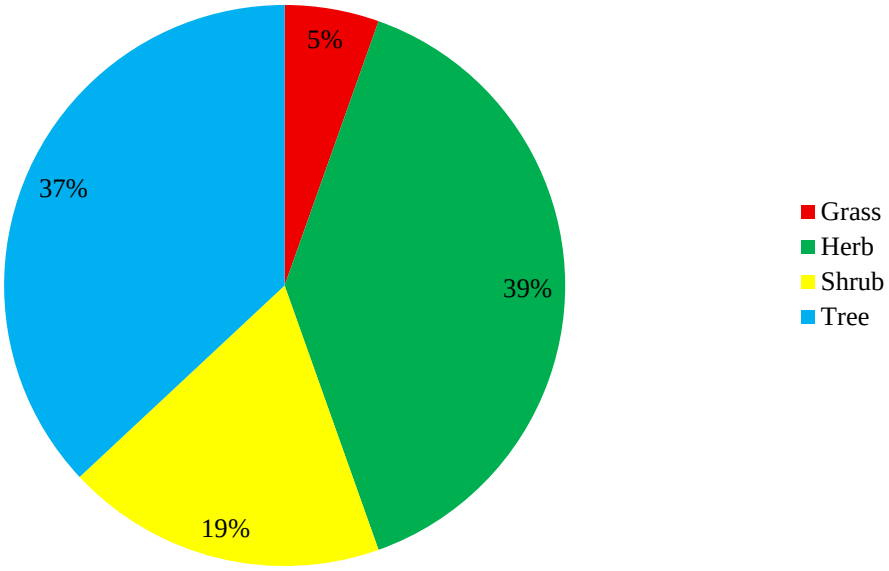


**Figure 4:** Distribution of floral species by growth habit

## DISCUSSION

The vegetation of Modibbo Adama University, Yola, hosts a rich assemblage of plant species with significant economic and ethnobotanical value. These species fulfil diverse functions, including nutritional, medicinal, and ornamental uses, reflecting the multifaceted relationship between local communities and their flora. Several of the recorded taxa have previously been documented for their roles in traditional medicine (Odugbemi, 2008; Soladoye *et al*., 2014; Soladoye *et al*., 2018). The floristic richness observed in this study aligns with patterns reported in similar institutional landscapes. For instance, Soladoye *et al*. (2015) identified 110 species across 96 genera and 42 families at Bowen University, while Kolawole *et al*. (2022) recorded 76 species representing 38 families at the Federal University, Kashere. These findings collectively underscore the role of university campuses as valuable refugia for plant biodiversity and repositories of ethnobotanical resources within urban and semi-urban ecosystems.

A notable finding of this study is the predominance of species belonging to the family Fabaceae. This dominance likely reflects the favorable climatic and edaphic conditions such as low nitrogen content of savanna soils, which favors nitrogen-fixing species that facilitate the establishment and persistence of Fabaceae members within the study area. A comparable pattern was reported by Kolawole *et al*. (2022), where a high representation of Fabaceae species in a similar floristic survey. The ecological and economic prominence of this family is well established, particularly within tropical ecosystems. Fabaceae play a pivotal role in ecosystem functioning through their nitrogen-fixing capabilities, which enhance soil fertility and promote vegetation productivity. Additionally, members of this family provide a wide range of valuable resources, including food, fibers, timber, and bioactive compounds of medicinal relevance (Soladoye *et al*., 2015).

The predominance of herbaceous species, followed by trees and shrubs, contrasts with the pattern reported by Soladoye *et al*. (2015), where a higher proportion of tree species was documented. This variation likely reflects differences in ecological zonation and vegetation type. Modibbo Adama University is located within the Northern Guinea Savanna, a region characterized by a mosaic of grasses and herbaceous plants interspersed with sparsely distributed trees and shrubs.
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The abundance of herbaceous taxa recorded in this study is therefore consistent with the structural composition typical of savanna ecosystems. A similar distribution pattern was reported by Chukwuma and Adebisi-Fagbohungbe (2015), with herbs representing 37% of the total recorded species, followed by trees (29%) and shrubs (17%), confirming the dominance of herbaceous vegetation in comparable ecological settings.

The high abundance of herbaceous species in the study area suggests that the local environmental conditions are conducive to their growth, establishment, and regeneration. Additionally, anthropogenic disturbances such as land clearing and construction may promote opportunistic herbaceous species. This floristic richness holds considerable ecological importance, as herbaceous plants contribute substantially to primary productivity and serve as key sources of medicinal and nutritional compounds. The diversity documented in this study further underscores the ecological value of the Modibbo Adama University landscape, which functions as an important refuge for a wide range of plant species. Overall, the observed floristic composition reflects the inherent resilience and biodiversity of the savanna ecosystem, emphasizing the necessity for its conservation and sustainable management.

To enhance conservation efforts, the university management should establish designated conservation zones within the campus, implement tree planting programs focusing on indigenous species, develop standard botanical gardens for education and preservation, promote awareness through labelling of plant species and encourage further ecological monitoring studies. This study is preliminary and may not fully capture seasonal variations in species composition. Some species may have been missed due to temporal limitations. Future studies should incorporate year-round sampling and quantitative ecological indices.

## CONCLUSION

The findings of this study demonstrate that the ecosystem surrounding Modibbo Adama University sustains a rich diversity of plant species with substantial ecological, nutritional, and medicinal value. These species represent vital resources for improving agricultural productivity and contributing to sustainable healthcare practices in Nigeria. However, the observed decline in species abundance and diversity highlights emerging ecological pressures that may threaten the integrity of the local flora. This study therefore recommends regular floristic monitoring, establishment of conservation zones, and integration of biodiversity management into campus planning policies.

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