Floristic Composition Of Vascular Angiosperms In Faculty Of Life Sciences, Ambrose Alli University, Ekpoma, Edo State, Nigeria

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Abstract
A survey of the floristic composition of the Faculty of Life Sciences site, Ambrose Alli University, Ekpoma, Edo State was carried out. A total of 96 plant species belonging to 32 families were identified and found to be present within the area of study. The family Poaceae had the highest number of species (17), followed by Asteraceae with 11 species and Cyperaceae with nine species. Ten families had two to 8 species while in relation to habit, herbs were the most abundant followed by shrubs, the least were the trees. From this study, it is obvious that the Faculty of Life Sciences site is rich in plant biodiversity of socio-economic values. Proper care and management of these plants especially the exotic ones are advised. The management of the Faculty should put in place modalities to ensure the preservation and protection of these plants so they do not go into extinction or be lost due to future developmental projects or activities.

Keywords: Floristic composition, survey, vascular angiosperms, Poaceae, Asteraceae, Cyperaceae

Introduction
Biodiversity is the degree of variation of life forms within a given ecosystem, biome, or on an entire planet. Biodiversity is not consistent across the earth (Philomena et al., 2011). Most species that have existed on earth are now extinct (WGBH Educational Foundation, 2001). Many species are becoming extinct even before their discovery. This scenario necessitates the urgent need of the conservation of this diversity (Wagay et al., 2015). Unarguably, one of the persistent problems associated with deforestation is the selective exploitation of some targeted species for economic, social and spiritual paraphernalia, and trees are mostly targeted (Alamu and Agbeja, 2011). Diversity among individual plant species and ecosystem provides raw materials that enable human communities to adapt to changes now and in the future. Deprived of biodiversity, the ability of humankind to meet the challenges resulting, for example, from global warming and ozone depletion would be severely limited (Idu et al., 2009). Loss of biodiversity is frequently presented as an environmental problem, but the underlying causes are essentially social, economic and political. Unfortunately, information on the status of biodiversity conservation in Nigeria is currently lacking. Although no reliable record yet exists for assessing the rate of biodiversity loss in Nigeria, substantial evidence shows that biodiversity is being lost at a disturbing rate. The IUCN Red List assessment reports that 141 native animals and 168 native plant species in Nigeria are currently classified into different threat categories (Imnarhiagbe et al., 2020).

The aim of this study is to document the floristic found around the Faculty of Life Sciences, Ambrose Alli University, Ekpoma, Edo State. It will also attempt to provide, create and prepare an updated checklist of the identified plant species to serve as a baseline dataset for future comparison of adequate conservation measures which should be carried out for posterity.

Materials and Methods
Study Area
The study was carried out at the Faculty of Life Sciences, Ambrose Alli University, Ekpoma, Edo State, Nigeria. The study location lies between 6°44'56.904"N and 6°42'23.574"E at an elevation of 358.485. Ekpoma has a tropical climate characterized by two distinct seasons: April to October represents the wet season with a brief dry spell in August while November to March is dry. The annual rainfall in the area exceeds 2000 mm with a bimodal distribution. The first peak occurs in July with a mean monthly precipitation of 344.7 mm while the second is in September with a mean of 457.2 mm. The highest mean monthly temperature of 29.1°C is recorded in March and the lowest of 24.4°C in June. The topography is undulating while the vegetation of the area is tropical rainforest.

Collection and Identification of Plant Specimens
Different plant species found around the Faculty were collected from the front, sides and back of the buildings in the months of June and August 2021. In terms of the floristic composition, data were treated using descriptive analysis. All species encountered within every category were listed according to their family names and scientific names. Floristic species encountered were also categorized according to their habitat, whether it was a tree, a shrub or a herb. The herbaceous species comprised grasses, sedges and vines. Identification of the specimens was done with the aid of descriptive and illustrated texts such as the Flora of Nigeria Grasses (Lowe, 1989); A Handbook of West African Weeds (Akorodu and Agyakwa, 1998); Outlines and Pictures of Medicinal Plants from Nigeria (Ogudugbemi, 2006); Samples of unknown plants were collected and taken to the herbarium of the Department of Plant Science and Biotechnology, Ambrose Alli University for identification.

Results
The plant species identified during the study are shown in Table 1 while Table 2 shows the species distribution according to families. Plate 1 A-D shows the pictorial representation of the species found around the Faculty while Figures 1, 2 and 3 show the distribution of plant species in relation to their major plant group, percentage distribution in relation to their habit and the pattern of ornamental distribution, respectively. A total of 96 plant species belonging to 32 plant families were encountered and recorded (Table 1). Among the dominant families, Poaceae and Asteraceae had the highest species diversity in terms of richness with seventeen and eleven species, respectively. Other families recorded include Cyperaceae (9 species), Euphorbiaceae (8 species), Amaranthaceae (7) and Malvacceae (5) species.
| S/No | Botanical name                                    | Family            | Habit     |
|------|--------------------------------------------------|-------------------|-----------|
| 1.   | Alcalypha wilkesiana Muell. Arg.                 | Euphorbiaceae     | Shrub     |
| 2.   | Acanthus montanus (Nees) T. Anders.              | Acanthaceae       | Herb      |
| 3.   | Acroceras zizanioides Dandy.                     | Poaceae           | Grass     |
| 4.   | Agaratum conyzoides Linn.                        | Asteraceae        | Herb      |
| 5.   | Alchornea laxiflora (Benthe) Pax. and K. Hoffm.  | Euphorbiaceae     | Shrub     |
| 6.   | Alchornea cordifolia (Schum & Thonn. Muell. Arg.)| Euphorbiaceae     | Shrub     |
| 7.   | Alternanthera brasiliana (L.) Kuntze             | Amaranthaceae     | Shrub     |
| 8.   | Alternanthera pungens H. B & K.                  | Amaranthaceae     | Herb      |
| 9.   | Alternathera sessilis. (Linn.) DC                | Amaranthaceae     | Herb      |
| 10.  | Amaranthus spinosus Kunth.                       | Poaceae           | Grass     |
| 11.  | Andropogon gayanus K.                            | Poaceae           | Grass     |
| 12.  | Aphelandra squarrosa Nees.                       | Acanthaceae       | Shrub     |
| 13.  | Aspilia africana (Pers.) C.D. Adams              | Asteraceae        | Herb      |
| 14.  | Asystasia gangetica (L.) T. Anders               | Acanthaceae       | Herb      |
| 15.  | Axonopus compressus (Sw.) P.Beauv.               | Poaceae           | Grass     |
| 16.  | Bidens pilosa Linn.                              | Poaceae           | Grass     |
| 17.  | Boerhavia diffusa Linn.                          | Phyllanthaceae    | Herb      |
| 18.  | Breynia dischicha J.R.Forst. & G.Forst.          | Fabaceae          | Herb      |
| 19.  | Calopogonium mucunoides Desv.                    | Fabaceae          | Herb      |
| 20.  | Chamaecrista minosoides (Linn.) Greene           | Fabaceae          | Shrub     |
| 21.  | Chloris pilosa Schumach.                         | Poaceae           | Grass     |
| 22.  | Chromolaena odorata (L.) R. M. King & Robinson  | Poaceae           | Grass     |
| 23.  | Cleome rutidosperma DC.                          | Cleomaceae        | Herb      |
| 24.  | Commelina benghalensis Linn.                     | Commelaceae       | Herb      |
| 25.  | Codiaeum variegatum Linn.                        | Euphorbiaceae     | Shrub     |
| 26.  | Conyza sumatensis (Retz.) Walker                 | Asteraceae        | Herb      |
| 27.  | Croton hirtus Linn.                              | Euphorbiaceae     | Herb      |
| 28.  | Crotalaria retusa Linn.                          | Fabaceae          | Herb      |
| 29.  | Cyathula prostrata (L) Blume.                    | Poaceae           | Herb      |
| 30.  | Cynodon dactylon (Linn.) Pers.                   | Poaceae           | Grass     |
| 31.  | Cyperus difformis Linn.                          | Cyperaceae        | Sedge     |
| 32.  | Cyperus haspan Linn.                             | Cyperaceae        | Sedge     |
| 33.  | Cyperus iia Linn.                                | Cyperaceae        | Sedge     |
| 34.  | Dactyloctenium aegyptium (Linn.) P. Beauv.       | Poaceae           | Grass     |
| 35.  | Digitaria horizontalis Willd.                    | Poaceae           | Grass     |
| 36.  | Didyma sarmentosa Sw.                            | Rubiaceae         | Herb      |
| 37.  | Duranta erecta Linn.                             | Verbenaceae       | Shrub     |
| 38.  | Eleusine indica (Linn.) Gaertn.                  | Poaceae           | Grass     |
| 39.  | Emilia coccinea (Sims) G. Don                    | Asteraceae        | Herb      |
| 40.  | Ergrostris tenella (Linn.) P. Beauv. ex. Roem & Schult. | Poaceae          | Grass     |
| 41.  | Euonymus fortune (Turcz.)                        | Celastraceae      | Shrub     |
| 42.  | Euphorbia heterophylla Linn.                     | Euphorbiaceae     | Herb      |
| 43.  | Euphorbia hirta Linn.                            | Euphorbiaceae     | Herb      |
| 44.  | Fimbristylis ferruginea (Linn.) Vahl.             | Poaceae           | Grass     |
| 45.  | Gmelina arborea Roxb.                            | Verbenaceae       | Tree      |
| 46.  | Gomphrena celosioides Mart.                      | Amaranthaceae     | Herb      |
| 47.  | Greenwayodendoron suaveolens (Engl. & Diels) Verdc. | Annonaceae      | Tree      |
| 48.  | Heliotropism indicum L.                          | Boraginaceae      | Herb      |
| 49.  | Heterotis rotundifolia (Sm.) Jac.-Fél            | Melastomataceae   | Herb      |
| 50.  | Ipomoea triloba Linn.                            | Convolvulaceae    | Twiner    |
| 51.  | Iresine diffusa Humb. & Bonpl. Ex Wildl.         | Poaceae           | Grass     |
| 52.  | Ischaemum rupsum Salisb.                         | Poaceae           | Grass     |
| 53.  | Kyllinga bulbosa Beauv.                          | Cyperaceae        | Sedge     |
| 54.  | Kyllinga pumila Michx.                           | Cyperaceae        | Sedge     |
| 55.  | Kyllinga erecta Schumach var. erecta             | Cyperaceae        | Sedge     |
| 56.  | Launaea taraxacioida (Willd.) Amin. MS ex C. Jeffrey. | Amaranthaceae    | Herb      |
| 57.  | Laportea aestuans (L.) Chew                       | Urticaceae        | Herb      |
Table 2: Plant species distribution at the Faculty of Life Sciences, Ambrose Alli University, Ekpoma according to families

| S/No | Botanical name | Family | Habit |
|------|----------------|--------|-------|
| 58.  | Ludwigia decurrens Walt. | Onagraceae | Herb |
| 59.  | Melastoma capitatum (Vahl) A. & R. Fern | Melastomaceae | Shrub |
| 60.  | Mariscus alternifolius Vahl. | Cyperaceae | Sedge |
| 61.  | Mimosa pudica Linn. | Fabaceae | Herb |
| 62.  | Mitracarpus villosus (Sw.) DC | Rubiaceae | Herb |
| 63.  | Momordica charantia Linn | Cucurbitaceae | Herb |
| 64.  | Oldenlandia corymbosa Linn | Rubiaceae | Herb |
| 65.  | Olax Spp. | Olacaceae | Shrub |
| 66.  | Opismenus burmannii (Retz) P. Beauv. | Poaceae | Grass |
| 67.  | Panicum laxum Sw. | Poaceae | Grass |
| 68.  | Paspalum scrobiculatum Linn. | Poaceae | Grass |
| 69.  | Peperomia pellucida (L.) H.B. & K. | Piperaceae | Herb |
| 70.  | Perotis indica (Linn.) G. Ktze | Poaceae | Grass |
| 71.  | Phyllanthus amarus Schum. & Thonn. | Euphorbiaceae | Herb |
| 72.  | Physalis angulata Linn. | Solanaceae | Herb |
| 73.  | Platostoma africanum P.Beauv. | Lamiaceae | Herb |
| 74.  | Portulaca oleracea Linn. | Portulacaceae | Herb |
| 75.  | Portulaca quadrifida Linn. | Portulacaceae | Herb |
| 76.  | Pycreus lanceolatus (Poir.) C.B. Cl. | Cyperaceae | Sedge |
| 77.  | Rhynchelytrum repens (Wild.) C. E Hubbard | Poaceae | Grass |
| 78.  | Sclerocephalus africanus Jacq ex Murr. | Asteraceae | Herb |
| 79.  | Scoparia dulcis Linn. | Scrophulariaceae | Herb |
| 80.  | Setaria barbata (Lam.) Kunth. | Poaceae | Grass |
| 81.  | Sida acuta Burm. f. | Malvaceae | Shrub |
| 82.  | Sida rhombifolia L. | Malvaceae | Shrub |
| 83.  | Sida cordifolia L. | Malvaceae | Shrub |
| 84.  | Sida garckeana Polak. | Malvaceae | Shrub |
| 85.  | Smilax anceps Willd. | Smilacaceae | Climber |
| 86.  | Solenostemon monostachys (P.Beauv.) Brig. | Lamiaceae | Herb |
| 87.  | Sparrmacoe ocyblodes Burm. f. | Rubiaceae | Herb |
| 88.  | Syndrella nodiflora Gaertn. | Asteraceae | Herb |
| 89.  | Talium triangulare (Jacq.) Willd. | Portulacaceae | Herb |
| 90.  | Triandthera portulacastrum Linn. | Ficoidaceae/ Aizoaceae | Herb |
| 91.  | Terminalia cattapa L. | Combretaceae | Tree |
| 92.  | Tridax procumbens Linn. | Asteraeae | Herb |
| 93.  | Triumphetra cordifolia A. Rich. | Tiliaceae | Shrub |
| 94.  | Urena lobata L. | Malvaceae | Shrub |
| 95.  | Vernonia cinerea (Linn.) Less. | Asteraceae | Herb |
| 96.  | Zoysia Spp. Willd. | Poaceae | Grass |
| S/No | Family              | Number of species |
|------|---------------------|-------------------|
| 15.  | Ficoidaceae         | 1                 |
| 16.  | Lamiaceae           | 2                 |
| 17.  | Malvaceae           | 5                 |
| 18.  | Melastomaceae       | 2                 |
| 19.  | Nyctaginaceae       | 1                 |
| 20.  | Olacaceae           | 1                 |
| 21.  | Onagraceae          | 1                 |
| 22.  | Phyllanthaceae      | 1                 |
| 23.  | Piperaceae          | 1                 |
| 24.  | Poaceae             | 17                |
| 25.  | Portulacaceae       | 3                 |
| 26.  | Rubiaceae           | 4                 |
| 27.  | Solanaceae          | 1                 |
| 28.  | Smilacaceae         | 1                 |
| 29.  | Scropulariaceae     | 1                 |
| 30.  | Tiliaceae           | 1                 |
| 31.  | Urticaceae          | 1                 |
| 32.  | Verbanaceae         | 2                 |

Plate 1A-D. Pictorial presentation of the plant species occurring at the Faculty of Life Sciences, Ambrose Alli University, Ekpoma, Edo State. Plate 1A, Faculty surrounded with shrubs and grasses; Plate 1B, View of the various ornamental plants in the Faculty; Plate 1C, One of the ornamentals Aphelandra squarrosa; Plate 1D, Some tree species found in the Faculty.
Various studies on the flora composition of Edo State have been undertaken but very few have dealt with plant species on university campuses. The known records of species compositions with regards to universities in Edo State are those of Otaru (1993) which reported the occurrence of 122 weeds in Ujemen Campus of Ambrose Alli University (AAU), Ekpoma, Edo State, Nigeria; Ogie-Odia et al. (2010) carried out a study on the weed flora diversity of Emaudo Campus of the University, and Omolola (2018) produced a preliminary checklist of the flora of Faculty of Life Sciences. The present study in the same Faculty environment has recorded 96 species, which is greater than the findings of Omolola (2018), who recorded only 34 species, showing that the plant species diversity of the plants at this location is greater than previously known. Omolola (2018) recorded Asteraceae as the family with the highest number of plant species, followed by Euphorbiaceae, Fabaceae and Poaceae which is at variance with the current study in which we found Poaceae as the family with the highest species. The herbs were the dominant species and may indicate their ability to grow fast and spread more rapidly. It may also include their ability to adapt to a wide range of environmental conditions and tolerance to drought, full sun to partial shade. Shrubs and grasses were the next set of plants with high species composition. Grasses inhabit the earth in greater abundance than any other comparable group of plants (Ogie-Odia et al., 2010). Grasses tend to survive more than herbs in tough environments due to their adaptability in terms of their tough structural composition. However, in this study, the herb composition was much higher. The possible reason for this may be that...
the prevailing ecological factors like soil and climate favoured the spread of herbs more than grasses. This could also be a result of their ecological flexibility, resilience to disturbance, long-distance seed dispersal and capacity to grow in environments with limited soil moisture. Some ecological problems in the area are grazing, browsing, and trampling by domestic animals, especially cattle. These elements caused the grass species not to reach their climax. Grazing is one of the depressing aspects, which has caused a reduction in vegetation (Khan and Hussain, 2012). During grazing, the palatable species are selected and this gives room for the non-palatable species to increase. This is noticeable in many places, manifesting in stunted growth and not reaching the flowering stage of the plants. Also, students frequently trample on grasses thereby killing them and reducing the population. All these could lead to their extinction. The distribution of grasses is also governed by the chemical and physical nature of the soil in the geographical region (Farooq et al., 2009).

The results from this study revealed that the occurrence of tree species in the study area is extremely low as shown by their poor composition. The identified trees were planted around the car parks. This observation tends to buttress the previous observations of Oladehinde (2016) and Salbitano et al., (2016) that administrators often fail to sufficiently take urban forests as serious issues. EarthTalk (2016) listed the advantages of planting trees by roadsidings including enhancement of the liveability of urban streets and control of noise pollution. Trees also reduce the chance of flood and soil erosion; provide relief to humans, birds and animals from the sun and rain. Wolf (2006) asserted that roadside soils and vegetation capture a reasonable proportion of transportation carbon emissions thus constituting valuable “banks” for meeting ambitious carbon sequestration goals. Trees on campus must be properly labelled with summaries of their values. This will confer respect on the trees from members of the University community (Ajayi et al., 2020).

This study revealed some exotic ornamental species such as Aphanandra squarrosa, Breynia disticha and Duranta erecta ‘Gold dewdrop’ amongst others planted in the faculty to beautify the surrounding. Many of the species that are already endangered are faced with the risk of eventual extinction if human activities such as land development, logging and pollution are not checked. While developmental activities continue on the campus continues, it will be a sound scientific judgment to protect a representative sample of vegetation for posterity. The effectiveness and success of protection in any part of the world normally depend on many local factors of economic, social and political nature (Jianguo et al. 2003). However, the composition of annual herbaceous flora may vary in different seasons. Therefore, these species can be utilized keeping in view the idea of sustainable development and utilization (Surender et al., 2016).

Biodiversity provides valuable bio-resources that support the existence of man on earth (Aguilera 2019). As man continues to depend on the rich flora diversity, it is also important to consider the sustainable use and conservation status of these important plant species. With the continuous degradation of the ecosystem owing to structural and economic development in our world today, there is also the threat of species extinction. Nevertheless, these can be prevented if conservation practices such as forest policies and research programmes are encouraged by governmental and non-governmental agencies, both at national and international levels. Such conservation strategies will ensure that our forests are protected and these species are prevented from going into extinction (Soladoye et al., 2013).

The need to study and update the flora composition in our environment and take necessary measures to maintain the ecological balance of the given area is very important in order to sustain the biodiversity of the environment. Such measures should begin from our immediate environment and, hence, from our campus flora. A healthy ecosystem is built when it is maintained in a sustainable manner. By showing this very relatively small rehabilitated area, usually disturbed by students and grazing animals is serving as a safe haven for a considerable number of animal and plant species, it is possible to show the necessity of delimiting land for the purpose of plant and animal conservation.

Most of the plant species growing in the vicinity of the Faculty of Life Sciences, AAU serve different purposes, which include windbreaks by the tree species and beautification by the ornamental species. Others serve as food for animals such as cattle which graze around there frequently. They protect the ecosystem from degradation and also are edible to animals, and they, thereby, serve as a support system for the ecosystem.

An increase in population will lead to the enrolment of more students into AAU; this creates the need for more infrastructural development, in terms of providing more classrooms and administrative blocks. The consequence is the continuous degradation of the surrounding vegetation. Of particular interest is the fate of the plant species around the Faculty of Life Sciences, if this trend continues unabated. Therefore, it is recommended that while the development of infrastructure around the Faculty of Life Sciences environment continues, the plant species in this locality should receive appropriate care and consideration.

Conclusion
Assessment of biological diversity has continued to be of interest to scientists around the world. Nigeria’s numerous flora and fauna species are faced with challenges of species conservation, which is gradually leading to the total disappearance of these human sustainers, owing to anthropogenic activities. There is therefore the need to properly implement our conservation and sustainable management strategies. A close monitoring of the study area is suggested to avoid indiscriminate habitat destruction by those that daily use the faculty facilities and also by visitors to the university community. In this regard, the University and Faculty management have a great role to play in order to achieve this goal.

References
Aguilera J. (2019). The numbers are just horrendous. Almost 30,000 species face extinction because of human activity. TIME. Available at: https://time.com/5629548/almost-30000species-face-extinction-new-report/ [Accessed: September 15, 2019].

Akobundu, I.O and Agyakwa, C.W. (1998). A Handbook of West African Weeds: International Institute of Tropical Agriculture 564p.

Alamu, I.O. and Agbeja, B.O. (2011). Deforestation and endangered indigenous tree species in South-West Nigeria. International Journal of Biodiversity and Conservation 3 (7): 291–297.

EarthTalk (2016). “Why Can’t We Plant Trees in Highway Medians? [Online] Available at: https://www.scientificamerican.com/article/why-can-t-we-plant-trees-in-highway-medians/ [Retrieved: April 11th, 2016].

Farooq, A., Mir, A.K., Mushtaq, A., Muhammad, Z., Abdul, N. and Sarfraz, K.M. (2009). Taxonomic studies of grasses and their indigenous uses in the salt range area of Pakistan. African Journal of Biotechnology 8 (2): 231 – 249.
Idu, M., Erhabor, I.O., Timothy, O. and Ogie- Odia, E.A. (2009). Flora diversity of the wetland of Udu and Ughiewen communities, Delta State, Nigeria. Plant Archives 9 (2): 633 – 638.

Ajayi, I.K., Kayode, I. and Adeniluyi, B.O. (2020). Study on urban trees in Ekiti State University, Ado Ekiti, Nigeria: 1. Structure and composition Budapest International Research in Exact Sciences (BirEx) Journal, 2 (2): 147 – 156.

Jiangou, L., Daily, G.C., Ehrlich, P.R. and Luck, G.W. (2003). Effects of household dynamics on resource consumption and biodiversity. Nature, 421 (6922): 530 – 533

Lowe, J. (1989). The Flora of Nigeria: Grasses. Ibadan University Press, Ibadan. 326p.

Imariagbe, O., Egbeduku, W.O. and Nwankwo, B.I. (2020). A review of the biodiversity conservation status of Nigeria. Journal of Wildlife and Biodiversity, 4 (1): 73 – 83

Odugbemi, T. (2006). Outlines and Pictures of Medicinal Plants from Nigeria. University of Lagos Press, Akoka, Yaba-Lagos, Nigeria. 283p.

Ogie-Odia, E.A., Ogbernudia, F.O., Erhenhi, H.A. and Oluowo, E.F. (2010) Weed flora diversity study of Emaudo Campus, Ambrose Alli University, Ekpoma, Edo State. International Journal of Biotechnology and Allied Sciences, 5 (1): 596 – 601.

Oladehinde, R.G. (2016). Lagos, tree planting and the environment. The Guardian Newspaper, 30th July, 2016. p24

Omolola, R.O. (2018). Checklist of flora of Faculty of Life Sciences. B.Sc. Project, Department of Botany Ambrose Alli University, Ekpoma, Edo State. 31p.

Otalu, E.O. (1993). A conspectus of weeds of the Edo state University Campus, Ekpoma, Nigeria. B.Sc. Project, Department of Botany, Ambrose Alli University Ekpoma, Edo State. 41p.

Philomena, G., Arekar, C and Subhashini, D. (2011). Biodiversity survey of trees and ornamental plants in Karunya University, Coimbatore, India. International Journal of Biodiversity, 3(9): 431 – 443.

Salbitano, F., Borelli, S., Conigliaro, M. and Chen, Y. (2016). Guidelines on Urban and Peri-Urban Forestry FAO Forestry Paper No. 178. Food and Agriculture Organization of the United Nations, Rome, 172p.

Soladoye, M.O., Irotun, T., Chukwuma, E. C., Ariaodo, J.O., Ibhanesebor, G.A., Agbo-Adeediran, O.A. and Owolabi, S.M. (2013). Our plants, our heritage: Preliminary survey of some medicinal plant species of Southwestern University Nigeria Campus, Ogun State, Nigeria. Annals of Biological Research, 4 (12): 27 – 34

Surender, K., Sunita, D., Laura, J.S., Singh, N and Kudesia, R. (2016). Phyto-Diversity on Campus of K.M. Government College Narwana, India. International Journal of Current Microbiology and Applied Science, 5(7): 565 – 570

Wagay, N.A., Deshmukh, V.R. and Rothe, S.P. (2015). A floristic survey of flowering plants from Vidyabharati Mahavidyalaya Campus, Amravati (Maharashtra) India International Journal of Life Sciences, 3(3): 249 – 254.

WGBH Educational Foundation (2001). Roundtable: mass extinction, evolution; a journey into where we’re from and where we’re going. [Online] [Available at: http://www.pbs.org/wgbh/evolution/extinction/massext/index.html] [Accessed: 31st August, 2022].

Wolf, K.L. (2006). Roadside urban trees: balancing safety and community values. Arborist News 15(6): 56 – 58.

Taiwo A. A., Abayomi, T. O, Umar, B., Abubakar, N. M. and Ibrahim, B. B. (2020). Assessment of bacteriological quality and physico-chemical parameters of domestic water sources in Samaru community, Zaria, Northwest Nigeria. Heliyon 6(8): 47-53.

Tsegahun, A., Letemichael, N., Amlisha, K. and Yemane, W. (2017). Antibiotic Resistant Bacteria from Treated and Untreated Hospital Wastewater at Ayder Referral Hospital, Mekelle, North Ethiopia, Advances in Microbiology7: 871-886.

Uhuo, C. A., Uneke, B. I., Okereke, C. N., Nwele, D. E. and Ogbanshi, M. E. (2014). The bacteriological survey of borehole waters in Peri-Urban areas of Abakaliki, Ebony State, Nigeria. International Journal of Bacteriology Research 2(2): 28-31.

Ukpong, E.C. and Okon, B.B. (2013). Comparative analysis of public and private borehole water supply sources in Uruan Local Government Area of AkwaIbom State. International Journal of Applied Science and Technology 3(1): 14-18.

US EPA, 2015. Private drinking water wells. Retrieved from. http://www2.epa.gov/privatewells. (Accessed 28 April, 2021).

Wegener, H.C. (2012). Antibiotic resistance-linking human and animal health. Journal of Medical Microbiology 296 (41):11–13.

WHO (1993). Guideline for Drinking Water Quality Recommendation (2nd ed). World Health Organization, Geneva, Switzerland. 12pp.

WHO (2004). Sulfate in Drinking Water: Background document for development of WHO Guidelines for Drinking-water Quality. Published on behalf of the World Health Organization and the United Nations Environment Programme. Oxford, Alden Press.

WHO (2011). Guideline for Drinking Water Quality. World Health Organisation, Geneva. 33pp.

Young, M., Artsatbanov, V., Beller, H.R., Chandra, G. and Greenblatt, C.L. (2010). Genome sequence of the Fleming strain of Micrococcus luteus, a simple free-living actinobacterium. Journal of Bacteriology 192 (3): 841-860.

Zhang, T., Fan, X., Hanada, S., Kamagata, Y. and Fang, H. P. (2006). Bacillus macauensis sp. nov., a long-chain bacterium isolated from a drinking water supply. International Journal of Systematic and Evolutionary Microbiology 56(2):349-353.