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PHYTOCHEMICAL SCREENING OF SOME PLANT SPECIES FOUND IN FEDERAL UNIVERSITY DUTSIN-MA TAKE-OFF SITE, KATSINA STATE, NIGERIA

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Abstract: Chemicals that are present in plants are called secondary metabolites, this is because the plants that produce them could have little need for them. These chemicals are manufactured in different parts of the plant body. This research work was aimed to study the phytochemical composition of some plants found in Federal University Dutsin-ma (FUDMA) take off site. A total of 20 plants species were identified to possess different types of phytochemicals. The plant part (leaves) was collected using knife, air-dried, pulverized into powder using mortar and pestle, the powdered sample was soaked using cold maceration method. About 2g of the powdered sample was boiled with 20 ml of distilled water in a water bath and filtered. Approximately, 10 ml of the filtrate was mixed with 5 ml of distilled water and shakes vigorously for a stable persistent forth. The frothing was mixed with 3 drop of olive oil and shakes vigorously. Phytochemical examination was carried out by using an aqueous extract as per the standard method, and the following phyto-constituents were found to be present (tannins, flavonoids, alkaloids, glycosides, terpenoids, phenols, lignin and saponins), while other chemicals like steroids and starch were not detected in water (aqueous) extract of these plants species.

Keywords: Plant species, phytochemicals, screening, FUDMA take-off site

Introduction

Plant chemicals are regarded as secondary metabolites because the plants that manufacture them may have little need for them. They are synthesized in all parts of the plant body; bark, leaves, stem, root, flower, fruits, seeds etc. i.e. any part of the plant body may contain active components (Techacondo *et al*., 2011). This chemicals work with nutrients and fibers to form an integrated part of defense system against various diseases and stress conditions (Yisa *et al.*, 2010). These chemical substances are called secondary metabolites, the most important of these bioactive groups of plants are alkaloids, terpenoids, tannins, saponins and phenolic, glycosides, anthraquinones compounds (Akinpelu and Onakoya, 2006; Okigbo and Mmeka, 2008). Correlation between the phytoconstituents and the bioactivity of plant is desirable to know for the synthesis of compounds with specific activities to treat various health ailments and

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chronic disease as well (Okigbo *et al*., 2009). Generally, the presence of different phytochemicals in crude plant extracts has been linked to the detrimental effects of leachates, root exudates or decomposing residues of such plants on the other vegetation or succeeding crops. Owing to the significance in the above context, such preliminary phytochemical screening of plants is the need of the hour in order to discover and develop novel therapeutic agents with improved efficacy. Phytochemical analyses of several species of medicinal plants and allelopathic activities of the crude chemical compounds on crops and plants have yielded positive results (Okoli *et al*., 2006).

Medicinal plants contain physiologically active components which over the years have been exploited in the traditional medical practices for the treatment of various ailments (Ajibesin, 2011). A relatively small percentage of less than 20% of all the plants on earth is believed to serve as sources of medicine (Bem *et al*., 2020; Okwu and Nnamdi, 2008). This therefore is the reason why continuous study of plants, it chemical properties, trace element, relative abundance etc. at different location on earth will remain very important.

A general techniques of medicinal plant extraction include maceration, infusion, percolation, digestion, decoction, hot continuous extraction (Soxhlet), aqueous-alcoholic extraction by fermentation, countercurrent extraction, microwave-assisted extraction, ultrasound extraction (sonication), supercritical fluid extraction, and phytonic extraction (with hydrofluorocarbon solvents). For aromatic plants, hydrodistillation techniques (water distillation, steam distillation, water and steam distillation), hydrolytic maceration followed by distillation, expression and enfl eurage (cold fat extraction) may be employed. Some of the latest extraction methods for aromatic plants include headspace trapping, solid phase microextraction, protoplast extraction, microdistillation, thermomicrodistillation and molecular distillation (Handa *et al*., 2008).

Many plants have been phytochemically investigated to explain various natural phenomenon in the plant kingdom; The study of free amino acids in *Ophioglossum* leaves found at different geographical areas, at the time of spike initiation indicates the changing pattern of free amino acids at different stages of life cycle with the changing patterns of metabolism (Akinpelu and Kalawole, 2004; Edoga *et al*., 2005)., For thousands of years the beneficial properties of Neem (*Azadirachta indica* A. Juss) have been recognized in the Indian tradition many parts of the world, (Poongothai *et al*., 2011) after the first discovering of phytochemical by late Pakistani scientist Salimuzzaman Siddiqui at the Scientific and Industrial Research Laboratory at Delhi University, Several chemical compounds have been identified from research to research and scientists feel that there are many more compounds yet to be identified in neem (El-mahmood and Doughari, 2008). This is applicable to other plants too. Therefore, this research was carried out to determine the phytochemical screening of some selected plants species found in Federal University Dutsin-ma (FUDMA) take off site.

Materials and Methods

Collection of Plant Materials

Fresh leaves and stem of plant samples were collected from three different zones in the study site and taken to Ahmadu Bello University (ABU), Zaria for identification and taxonomical studies. The plant species includes all plant parts of trees the samplings, shrubs and trees present in the 3 sections of the study areas. Each of the plant sample was gently washed under running water from the tap, then air dried under shed (not in the sun) and milled to a coarse, fine powder.

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Phytochemical Screening of the Plants

The Preliminary qualitative phytochemical screening was carried out based on the method described by Musa *et al*. (2017).

Alkaloids Forth Test: About 2g of the powdered sample was boiled with 20 ml of distilled water in a water bath and filter. 10 ml of the filtrate was mixed with 5 ml of distilled water and shake vigorously for a stable persistent forth. The frothing was mixed with 3 drop of olive oil and shakes vigorously. The formation of emulsion for the positive result was observed.

Wagner's Test: About 1ml of leaf extract and 1ml of Wagner's reagent (dilute iodine solution) were added and mixed. Formation of reddish brown precipitates indicated the presence of alkaloids.

Flavonoids Shinoda Test: 1ml of the extract was used, followed by addition of 8 - 10 drops of concentrate HCl and a pinch of magnesium powder or filing. It was boiled for 10 to 15 minutes and allowed to cool. A red colouration indicated the presence of flavonoids**.**

Steroids Libermann Burchard Test: About 0.5 ml of the extract was used for this study, it was followed by addition of 2ml of acetic anhydride and 2ml of concentrate H2SO4 in the tube. The formation of green colour indicated the presence of steroids.

Glycosides Keller-Killani Test: About 5ml of the extract was treated with 2ml of glacial acetic acid containing one drop of ferric chloride solution and 1ml of concentrated sulphuric acid. A brownish ring at the interface indicated the presence of cardiac glycosides.

Terpenoids Salkowski Test: About 5ml of the extract was mixed with 2ml of chloroform and 3ml of concentrated H2SO4. Formation of yellow colour ring at the interface of the two liquids that turns reddish brown colour after two minutes, showed the presence of terpenoids.

Phenols Liebermann's Test: About 1ml of extract was added in 1 ml of sodium nitrite, few drops of diluted sulphuric acid and 2ml of diluted NaOH was added. Appearance of deep red or green or blue colour indicated presence of phenol.

Tannins Modified Prussian blue Test: About 1 ml of the extract was added in 1 ml of 0.008 M potassium ferricyanide and 1ml of 0.02M FeCl3 in 0.1 M HCl. Appearance of blue colour indicated the presence of tannins.

Results and Discussion

In Table 1, the results of phytochemical screening of different plants species indicated that flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Albizia lebbeck*, while alkaloids, steroids, glycosides and starch were found to be absent. Likewise, flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Pilostigma thonningi*, while alkaloids, steroids, glycosides and starch were found to be absent. Similarly, flavonoids, terpenoids, phenols, sappnins, and lignin were present in *Tamarindus indica*, while alkaloids, steroids, glycosides, tannins and starch were found to be absent in same plant. Flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Eucalyptus camelduensis*, while alkaloids, steroids, glycosides and starch were found to be absent. Likewise, flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Khaya senegalensis*, while alkaloids, steroids, glycosides and starch were found to be absent in the same plant. Moreover alkaloids, flavonoids, terpenoids, phenols, saponins, and lignin were present in *Terminalia cutappa*, while steroids, glycosides, tannins and starch were found to be absent. Alkaloids, flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Mangifera indica*, while steroids, glycosides, and starch were found to be absent in the same plant. Alkaloids, flavonoids, glycosides, phenols, tannins, and lignin were present in *Ipomea repens*, while steroids, terpenoids, saponins, and starch were found to be absent. Phytochemicals components of the plant like

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alkaloids, flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Azadirachta indica*, while steroids, glycosides, and starch were found to be absent. Finally flavonoids, glycosides, terpenoids tannins, and lignin were present in *Cymbopogon schoenanthus*, while alkaloids, steroids, phenols, saponins, and starch were found to be absent.

Table 1: Preliminary qualitative phytochemical analysis of some plants found in Federal University Dutsin-ma take off site.

S/N	Plant species	phytochemicals									
		Al	Fl.	St	Gly	Ter	Ph	Tan	Sap	Lig.	St
1	*Albizia lebbeck*	-	+	-	-	+	+	+	+	+	-
2	*Pilostigma thonningi*	-	+	-	-	+	+	+	+	+	-
3	*Tamarindus indica*	-	+	-	-	+	+	-	+	+	-
4	*Eucalyptus camelduensis*	-	+	-	-	+	+	+	+	+	-
5	*Khaya senegalensis*	-	+	-	-	+	+	+	+	+	-
6	*Terminalia cutappa*	+	+	-	-	+	+	-	+	+	-
7	*Mangifera indica*	+	+	-	-	+	+	+	+	+	-
8	*Ipomea repens*	+	+	-	+	-	+	+	-	+	-
9	*Azadirachta indica*	+	+	-	-	+	+	+	+	+	-
10	*Cymbopogon schoenanthus*	-	+	-	+	+	-	+	-	+	-

Key= Name of phytochemicals Al, Fl., St, Gly, Ter, Ph, Tan, Sap, Lig, & St, (+). Indicated the presence of phytochemicals and (-), indicate the absence of phytochemicals. Abbreviations Al: Alkaloids; Fl: Flavonoids; St. Steriods; Gly: Glycosides; Ter: Terpenoids; Ph: Phenols; Tan: Tannins; Sap: Saponins;; Lig: Lignin; St: Starch

The result of phytochemical screening of different plants species showed that flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Laptadenia hastate*, while alkaloids, steroids, glycosides and starch were found to be absent. Moreover, in *Indigofera pulchra* plant, flavonoids, terpenoids, phenols, tannins, and lignin were present, while alkaloids, steroids, glycosides, saponins and starch were found to be absent. Flavonoids, terpenoids, tannins, saponins, and lignin were present in *Parkia biglobosa*, while alkaloids, steroids, glycosides, phenols and starch were found to be absent in the same plant. Flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Adansonia digitata*, while alkaloids, steroids, glycosides and starch were found to be absent. Similarly, in *Anacardium occidentale* plant, the flavonoids, terpenoids, phenols, tannins, and lignin were present, while alkaloids, steroids, glycosides, saponins and starch were found to be absent. Flavonoids,

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terpenoids, phenols, tannins, saponins, and lignin were present in *Vernonia amygdalina*, while alkaloids, steroids, glycosides and starch were found to be absent. Phytochemicals components of the plant like alkaloids, flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Portulaca oleracea,* while steroids, glycosides and starch were found to be absent in the same plant. Likewise, in *Portulaca quadrifida* plant, the flavonoids, terpenoids, phenols, tannins, and lignin were present, while alkaloids, steroids, glycosides, saponins and starch were found to be absent. Flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Calotropis procera,* while alkaloids, steroids, glycosides and starch were found to be absent. Finally, flavonoids, terpenoids, phenols, tannins, saponins, and lignin were present in *Delonix regia,* while alkaloids, steroids, glycosides and starch were found to be absent as presented in Table 2.

Table 2: Preliminary qualitative phytochemical analysis of some plants found in Federal University Dutsin-ma take off site.

S/N	**Plant species**	**phytochemicals**									
		Al	**Fl.**	**St**	**Gly**	**Ter**	**Ph**	**Tan**	**Sap**	**Lig.**	**St**
1	*Laptadenia hastate*	-	+	-	-	+	+	+	+	+	-
2	*Indigofera pulchra*	-	+	-	-	+	+	+	-	+	-
3	*Parkia biglobosa*	-	+	-	-	+	-	+	+	+	-
4	*Adansonia digitata*	-	+	-	-	+	+	+	+	+	-
5	*Anacardium occidentale*	-	+	-	-	+	+	+	-	+	-
6	*Vernonia amygdalina*	-	+	-	-	+	+	+	+	+	-
7	*Portulaca oleracea*		+	+	-	-	+	+	+	+	+ -
8	*Portulaca quadrifida*	-	+	-	-	+	+	+	-	+	-
9	*Calotropis procera*	-	+	-	-	+	+	+	+	+	-
10	*Delonix regia*	-	+	-	-	+	+	+	+	+	-

Key= Name of phytochemicals Al, Fl., St, Gly, Ter, Ph, Tan, Sap, Lig, & St, (+). Indicated the presence of phytochemicals and (-), indicate the absence of phytochemicals. Abbreviations Al: Alkaloids; Fl: Flavonoids; St. Steriods; Gly: Glycosides; Ter: Terpenoids; Ph: Phenols; Tan: Tannins; Sap: Saponins;; Lig: Lignin; St: Starch

Results obtained (Table 1 and 2) revealed the presence of different phytochemicals components of the plants found in Federal University Dutsin-ma (FUDMA) take off site. These chemicals present include tannins, flavonoids, alkaloids, glycosides, terpenoids, phenols, lignin and saponins, while other chemicals like steroids and starch were not detected in water (aqueous) extract of these plants species. These findings were similar to the findings of Pieme *et al*. (2006). The findings of this study are also in line with the work of Swarna and Ravidhran, (2013) and Arrais-Silva *et al*., (2014) that detected the same phytochemicals in the stem and leaves while studying some medicinal plants. Bernard *et al.,* (2015) also reported alkaloids, flavonoids and saponins to have the highest mean concentrations in the leaves of some medicinal plants which agree with results obtained in table 1 and 2.

Conclusion

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Phytochemical screenings of different secondary metabolites of the plants species found in Federal University Dutsin-ma (FUDMA) take off site was studied. These chemicals present include tannins, flavonoids, alkaloids, glycosides, terpenoids, phenols, lignin and saponins, while other chemicals like steroids and starch were not detected in water (aqueous) extract of these plants species.

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