



PHYTOCHEMICAL AND PROXIMATE ANALYSIS OF CITRULLUS LANATUS SEED AND CYPERUS ARTICULATUS

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Abstract: The study was carried to analyze the phytochemical constituents of the *Citrullus Lanatus* seed and *Cyperus Articulatus*. The samples were extracted using methanol and water in the ratio of 9:1. From the study the extract of the both samples were found to contain saponin; the *Citrullus Lanatus* has tannin, flavonoid and steroid while *Cyperus Articulatus* has only glycoside. The presence of these important phytochemicals in the plant seeds is a scientific justification of the plant use in the traditional treatment against various diseases affecting humans and animals. However, more research needs to be done to identify the specific compounds, their structural formulas and contribution towards medicinal value of plant.

Keywords: Phytochemicals, Proximate, *Citrullus Lanatus* Seed, *Cyperus Articulatus*.

INTRODUCTION

Proximate analysis refers to the determination of the major constituents of lignocellulosic biomass materials. Principally, the process involves determination of carbohydrate contents, starch, moisture, ash, crude fiber, crude protein, ether extract and Nitrogen- free extract of the biomass. The energy building food (Carbohydrates) are plant products which are formed as major by-products of photosynthetic pathway. They are eaten by man and animals as the major source of energy (Choudhary *et al.*, 2015). This is hydrolyzed in the body to yield glucose which can be used immediately, or stored as glycogen in the muscles and liver for future use (Choudhary *et al.*, 2015). When they are eaten in excess of the body requirement, it is converted to fat and stored in the adipose tissue under the skin (Choudhary *et al.*, 2015). While the ash content of a plant food is the function of the mineral elements present (Sadiq *et al.*, 2013). However, dietary fats, the fat-soluble vitamins and essential fatty acids contained in the fat of natural foods. Fats and oils help to control blood pressure and play useful role. Water content is a universal solvent which is soluble in other substances, carries nutrients and other materials throughout the body, making it possible for every organ to perform its function effectively (Megan, 2019).

Another useful part is crude fibers which are parts of fruits, grains and vegetables that can neither be digested nor absorbed by the human system. Therefore, dietary fiber help in the body to reduce the rate of glucose absorption into the blood stream, reducing the risk of hyperglycemia (Choudhary *et al.*, 2015). They decrease the levels of cardiovascular diseases, plasma cholesterol and prevent colon cancer. The plant under investigation belongs to the family of Cucurbitaceae commonly referred to as gourd and called "kankana" in Hausa. It is flowering plant originated in West Africa and is one of the common cultivated fruits in African having more than one thousand varieties. *Citrullus Lanatus* is around 90% water, which makes

it useful for staying hydrated in the summer. It can also satisfy a sweet tooth with its natural sugars (Warri *et al.*, 2011). *Citrullus Lanatus* also contains antioxidants and it help to remove molecules known as free radicals, or reactive species from the body. The body produces free radicals during natural processes, such as metabolism. They can also develop through smoking, air pollution, stress, and other environmental pressures. If too many free radicals stay in the body, oxidative stress can occur. This can result in cell damage and may lead to a range of diseases, such as cancer and heart disease. The body can remove some free radicals naturally, but dietary antioxidants support this process (Choudhary *et al.*, 2015). *Citrullus Lanatus* fruit can be classified into three major parts which are the rind (peel), pulp and seeds respectively. *Citrullus Lanatus* constitutes approximately 68 % flesh, the rind 30% and the seed 2% of the total fruit weight. Scientific evidences have shown that *Citrullus Lanatus* contains vitamin C which is an essential nutrient for humans because it aids in the synthesis of collagen in addition to protecting against oxidative damage. However, *Citrullus Lanatus* extract is recommended to formulate cosmetic products at protecting the hair integrity and skin against oxidative process (Kiin-Kabari and Kusu, 2014).

The useful process of these natural phytochemicals are terpenoids, carotenoids, flavonoids, steroids, alkaloids, tannins and glycosides are antibiotic principles of plants (Ajayi *et al.*, 2011). They are usually distributed in plants, yet these compounds were not well established due to the lack of knowledge and techniques (Hafiza *et al.*, 2002; Sadiq *et al.*, 2016). These phytochemicals have been reported to exhibit foaming activity, antifungal property, hemolytic and anti-inflammatory (Ajayi *et al.*, 2011). There has been a keen interest in search for phytochemicals of naturalized plants for nutritional purposes and pharmaceutical (Wani *et al.*, 2004). This recognition that plant-derived products have good potential as sources of pharmaceuticals (Borchardt *et al.*, 2008). Although roots, flowers, leaf and whole plants, and stems were examined for useful phytochemicals in many research projects, few reports referred to seeds as sources for pharmaceuticals (Borchardt *et al.*, 2008).

While that of *Cyperus articulatus* is an aromatic species of sedge know by the common names jointed flat edges and pripioca. *Cyperus articulatus* linn, (cyperaceae), commonly known as pipiriri is a useful Indian medicinal plant which has been credited with therapeutic properties to treat several diseases such as headaches, migraine, epilepsy and in the treatment of malaria in the traditional medicine (Asain chemed *et al* 2020). It grows as a perennial (forero-Doria *et al*, 2014) herb which grows in water or near its rivers, streams, leak and swamps with a hyper hydrate (emergent aquatic) possibly teregophyte (submerged juvenile and terrestrial adult) or possibly pattern (chandhuri *et al* 2012). It is wide spread across tropical and subtropical region in Africa, southern Asia, northern Australia, south eastern united states, the west Indian and Latin American (Van den Boorn je *et al* 2011). It is closely related to highly invasive sedges such as purple nut seed (*Cyperus rotundus*). *Cyperus articulatus* contains. Saponin, cardenolide, and many of its biological actions are attributed to various sesquiterpene called cyperones. The root contains a sesquiterpene ketone and articulone which are identical cyperone. Two of these chemicals, cyperotundone and alpha-cyperone, have been reported with antimalaria action as well as the ability to inhabit nitric oxide synthesis (a pro-oxidant) (Arendrup *et al* 2012). The decoction of rhizomes of *Cyperus articulatus* was shown to possess sedative properties in mice (Olawore, *et al* 2006). The root extract has been used as corminative, antiemetic, sedative. The rural person takes aqueous extract in night for various enteral diseases and to be physically and mentally well-being. The present study was undertaken to study the possible hepatoprotective role of methanol extract of *Cyperus articulatus* linn.

Citrullus Lanatus is an annual herb. It is largely cultivated in India and another warm country. It is lying on ground with long stem (up to 10 m and 32.8ft), curly tendrils and large hairy leaves. Leaves are rough on both side with 3-5 lobe. The plant is monoecious male and female both flowers found in same plant with hairy and long flower stalk. The fruit in wild form is 1.5-20 cm in diameter mottled, greenish, sub globose, dark green with 50 mm long fruit stalk. The pulp may be yellow or green (wild form) and dark red (cultivar). The seeds are inn yellow to dull brown or black and rarely white, ovate, flattened 9-12×5-7mm (Van *et al.*, 2004).

Citrullus Lanatus (*Citrullus lanatus*) a fruit crop, is a herbaceous creeping plant belonging to the family Cucurbitaceae. It is mainly propagated by seeds and thrives best in warm areas. It is a tropical plant and requires a lot of sunshine and high temperature of over 25°C for optimum growth. *Citrullus Lanatus* thrives best in a drained fertile soil of fairly acidic nature. It can be grown along the coastal areas of Ghana, the forest zone and especially along river beds in the Northern Savannah areas (Collins *et al.*, 2007).

The sugar content and sweetness are the critical factors in determining the quality of many *Citrullus Lanatus* varieties. It is known to be low in calories but highly nutritious and thirst quenching. *Citrullus Lanatus* can be used as fresh salad, dessert, snack, and for decorations. Drinks can also be made from the juice. In Namibia, the juice is fermented into a refreshing, lightly alcoholic drink (Mandel, 2003). In some parts of Africa, the rind is sliced, dried, cooked and eaten. Pickled *Citrullus Lanatus* rind is widely eaten in some parts of USA. The fruit is known to be a good source of lycopene and carotenoid. It helps quench the free radicals that contribute to conditions like asthma, atherosclerosis, diabetes, colon cancer and arthritis. It is also high in fibre and citrulline; an amino acid the body uses to make arginine (Arora *et al.*, 2011).

While *Cyperus articulatus* linn (Cyperaceae) is a perennial herb with underground perennial rhizomes having scales which grade into culm leaves. They have exceptionally high photosynthesizing function compared to other plants and are also regarded as herbal switch plants as they are a reservoir of potentially useful drugs for the treatment of metabolic disorders (Testa R, et al, 2016). Immemorially human societies have been using herbs and their products as sources of medicine, nutrition and industrial applications (Aeganathan, *et al*, 2015). As an examples of the role of plant species in human life, in ancient Egypt, the first paper was made from papyrus (*Cyperus papyrus* L.) a species of the cyperaceae family include grass-like monocots comprising around 5600 species and 100 genera, and the family is widespread on all continents with the exception of Antarctica (Pereira *et al*, 2015). The second largest genus in this family is cyperus, with 950 species are most commonly known as weeds, despite some cultures using them for medicinal purposes and as a source of food (Kobagashi CCBA *et al*, 2009). *Cyperus* spp. predominantly exist in the wet lands throughout the globe in the tropical regions and act as source of primary productivity. The tubers, shoots and fruits of this species are produced in larger quantities and act as a source of food for amphibians. The Cyperaceae family is one of the largest flowering plant families and is ranked the third largest monocot family after Orchidaceous and Poaceae (Geisbuhler *et al*, 2002). A rising number of studies have highlighted that the multiple potentialities of the species of this family as medicines are attributed to the presence of several bioactive constituents. For example, the Cypriol, isolated from *Cyperus scariosus*. Essential oil is present in various perfumes and medicines, in fact, cypriol ambery, balsamic, spicy, warm and woody features make oil highly demanded in perfume industry (Hung WL, et al, 2016). In addition, the essential oil is also present as *C. articulatus*, and *C. rotundus* (Testa *et al*, 2016).

The *Citrullus Lanatus* originated in the deserts of Kalahari in Africa. Even today, it grows abundantly in this region. However, *Citrullus Lanatus* is an ancient fruit. The ancestors of the *Citrullus Lanatus* called this Tsamma melon, which are still found in the Kalahari Desert even today. Biologists claimed that the fruit has to be the native of the African continent only. Some of the African slaves who went to the United State brought along the Tsamma melon, and that is how it started growing in Baja in California. *Citrullus Lanatus* was being cultivated in the African continent as early as 2000BC. Some of the hieroglyphics found in the pyramids of Egypt show *Citrullus Lanatus* as a fruit. It was taken to China at the end of the 9th century. The Chinese also started cultivating it rapidly and it soon became a preferred fruit. Today, China is the top producer of *Citrullus Lanatus* in the entire world. Throughout history, several other Asian countries like Pakistan and India have cultivated *Citrullus Lanatus*. It is largely found in the northern parts of India (Arora et al., 2011). While *Cyperus articulatus* is aromatic species of sedges known by the common jointed flat-seed and priprica it is also being known as guinea rush or adrué, it grows as a perennial herb, in water or near a river, stream, lake and swamps with a hyper hydrate (emergency aquatic). Growth pattern it is widespread across tropical and subtropical region in Africa, Southern Asia, northern Australia, the Southern United State. The west indices and Latin America which is closely related to highly invasive sedges such as purple nut sedges. *Cyperus articulatus* is a sedge plant also commonly known as piripiri or jointed flat sedges with a wide geographic distribution across the tropical and subtropical parts of the world. It grows in marshy regions and along river banks to the height of about 2-meters forming clumps at the base as from the dividing rhizome. The plant has been used extensively in traditional medicine for the treatment of different diseases worldwide (Ameen et al., 2011).

Nutritional Value and Health benefits of *Citrullus Lanatus* and *Cyperus articulatus*

Citrullus Lanatus is a rich source of carotenoids. Some of the carotenoids in *Citrullus Lanatus* include lycopene, phytofluene, phytoene, beta-carotene, lutein, and neurospirene. Lycopene makes up the majority of the carotenoids in *Citrullus Lanatus*. The carotenoid content in red fleshed *Citrullus Lanatus* varies 37-121 mg/kg fresh weight, whereas lycopene varies from 32-112 mg/kg fresh weight. Carotenoids have antioxidants activity due to the free radical scavenging property. Several researches have reported an association between dietary lycopene consumption and lower incidence in diseases such as prostate and oral cancers. Lycopene may also help reduce risks of cardiovascular disease. *Citrullus Lanatus* seeds are excellent sources of protein (both essential and non-essential amino acids) and oil. *Citrullus Lanatus* seed is about 35% protein, 50% oil, and 5% dietary fiber. *Citrullus Lanatus* seed is also rich in micro and macro nutrients such as magnesium, calcium, potassium, iron, phosphorus, zinc etc. the fruit *Citrullus lanatus* carried 92% water by weight and about 6% sugar. It is a very good source of vitamin A, B, and C which is necessary for energy production. *Citrullus lanatus* carry about 6% sugar and 92% water by weight. It is a good source of vitamin C. composition of dried seed without shell per 100g include protein 28.3g, fat 47.4g, water 5.1g, energy 2340 KJ (557 Kcal), carbohydrates 15.3g, calcium 54mg, phosphorus 755mg, iron 7.3mg, thiamin 0.19mg, riboflavin 0.15mg, niacin 3.55mg and folate 58µg. the seed oil reported to carry oleic, palmitic, stearic acid and glycoside of linoleic (Schippers, 2019). Medicinal plants are good source of antioxidants, vitamins and minerals. They can be used to develop different types of food products like cookies to increase their nutritional values, which help to fulfil nutritional requirements and combat with various degenerative diseases (Kumari and Gupta, 2016). While *Cyperus articulatus* (Cyperaceae) is commonly known as piripiri is useful in Indian medicinal plants that

has been credited with therapeutic properties for the treatment of various diseases such as migraine headache. In African and American countries, *Cyperus articulatus* rhizomes are popular medical practices to treat many disorders including infection, fever, pain, seizures, gastrointestinal and urinary disorders, bleeding, irregular menstruation and cancer. Piripiri has a long history of use in herbal medicine systems in South America and other areas of its range. It is particularly valued for its beneficial effects upon the digestive system and is commonly used to treat nausea, vomiting, stomach aches and intestinal tract gas. The plant, especially the rhizome is anthelmintic, antibacterial, antiemetic, antifungal, aphrodisiac, caminative, contraceptive, digestive, febrifuge and sedative. More recently, interest has grown about the plants possible use in treating conditions such as epilepsy and convulsions including malaria. Researchers in Africa have published several studies which suggest that the plant can meditate many of the brain chemical reactions which are required in epilepsy and report the rhizome has antiepileptic actions. In addition, other laboratory research reports that the plant has anti-convulsant actions as well as sedative actions (Wang *et al.*, 2013).

Citrullus Lanatus has been cultivated in southern Africa with other crops like sorghum and maize since precolonial times. The leaves and young fruits are used as green vegetables and fruit flashed cooked with maize meal as porridge for cooking purpose and for storing berries the vacuous fruit can be used as container. Pulp and seeds are used to prepared different dishes. The flat brown seeds have a nice nutty taste and have a good food value then the flash. They are rich source of vitamin c, mineral and fat. They can be eaten as such or in roasted form and can be used in flour mix. In this study it is shown that the seeds pulp is used to produce a sweetener which is locally known as Ogiri or they are boiled with leaves wrap to make another sweetener called Igbalo (Moldenke 1992). The seed of *Citrullus lanatus* are used for their oil and also used in this cosmetic and pharmaceutical industry is increasing. For their high protein and fat content seeds are also used in the improvement of infant nutrition (Maynard 2011). While *Cyperus articulatus* has been reported from all world as remedy against various human ailment including treatment of malaria, stomach and bowel disorder, as diuretic, digestant and lactodepurant purposes (Carocho M *et al.*, 2018.). Interestingly and despite *Cyperus* including more than 950 species in three most commonly reported species are purple nut sedge (*Cyperus articulatus*) yellow sedge (*Cyperus articulatus*) and *C. papyrus*, *Cyperus refund* is the most well-known species of *Cyperus* is south Asia, a perennial weed that grows beat in high-moisture soil and reproduce easily through rhizomes tubes. This species is indigenous to the tropical and subtropical parts of the world, and despite the fact that it can be found detrimental in cultivated field. It has several beneficial uses as medicine since ancient times (Lee *et al.*, 1978). *Cyperus rotundus* rhizomes and tubers are mentioned in oriental traditional medicine to treat malarial, fever, digestive disorder and menstrual irregularities in several countries including China, India, Iran and Japan (Dha *et al.*, 2017)

Bioactivity of *Citrullus lanatus* and *Cyperus articulatus*

A study in vivo and vitro for ant –inflammatory activities of *Citrullus lanatus* seed oil (CLSO) in vivo anti- inflammatory activities was screen by carrageenan induce paw edema in rat model and human red blood cell membrane stabilization in-vitro anti-inflammatory activities. Comprises of oil potency was done with standard diclofenac (10MG/KG). The significant reduction of edema shown by the oil in carrageenan induced rat- paw edema model maximum at 3hr (percentage reduction in paw volume 44.44% 55.56% and 63.11% for CLSO (50mg/kg) CLSO(100mg/kg) and diclofenac (10mg/kg) respectable and CLSO at concentration of 100,250 and 500mcg/ml showed 42.35% 68.68% and 78.50% protection of HRBC in hypotonic solution respectable (Madhavi *et al.*, 2012) while cyperacea are a plant family of monocot comprising

5600 species with a cosmopolitan distribution in temperate and tropical region. Phytochemically, Cyperus is one of the most promising health supplementing genera of the Cyperaceae family housing the most 950 species with Cyperus articulatus being the most reported species in pharmacological studies. Cyperus spp are known to contain a plethora of bio active compounds such as a cyperone, germacrene D, mustakone and zicrone which impart pharmacological properties to its extract. Therefore Cyperus spp. Extracts were preclinically studied, anti-depressive, anti-cancer, neuroprotective, anti-depressive, anti-arthritis, anti-obesity, vasodilator, spasmolytic, bronchodilator and estrogenic bio functionalities (Byun *et al*; 2015)

The study about ulcerogenic property has been done by crude methanolic extract of Citrullus Lanatus seeds dissimilar to models pyloric ligation (PL, 4h ligation) and in water immersion (Ws25oc for 3h) stress induced ulcer model in albino wistar rats. The Citrullus lanatus shows to decrease the gastric volume (53.55%), free acidity (57.02%) and total acidity (36.53%) in case of pyloric model. The methanolic seeds extract shows to exhibit a dose related anti-ulcer with maximum activity at 800mg/kg (Alok, 2011)

Research demonstrates for antimicrobial activity of chloroformic, hexane and ethanolic extracts of leaves, fruit, stem and seed from Citrullus lanatus var Citroides (CL) against bacteria (Escherichia Coli, Staphylococcus aureus, pseudomonas aureginosis, Bacillus subtilis and proteus vulgaris) and fungi (Aspergillus thus nigar and candida albica) Antimicrobial CL was tested by using cup-plate and disc-diffusion method. The result of this study shows that the chloroform extract of fruit shows the highest antibacterial activity. It showed antibacterial activity against S aureus 36mm, B. subtilis 38mm, E coli :37mm, P. vulgaris: 23mm P. gerguinosa:19mm the highest anti-fungal activity shown by ethanolic extract of the seed (37mm) and the ethanolic extract of the leaves (37mm) (Ioily and Ahmed, 2011). It is also reported in studies about the antibacterial activity of Citrullus lanatus seed extract they found the seed extract against the selected bacteria indicate that extracts obtained by cold maceration, Soxhlet extraction, as well as using chloroform and methanol have potential as antibacterial agent especially against staphylococcus spp. And P. auruginosis (Adelani 2015). While Cyperus articulatus. Is widely distributed in various geographical region of the world, and it has been used as a folk medicine for treating hemorrhoid diarrhea, and other disease. The present study aimed to analyze the chemical constituent and antimicrobial activity of essential oil (EO) extracted from C. articulatus grown in the karnataka region in southwest India to explore its potential pharmaceutical usage. The EO from the rhizome of C articulatus was extracted by hydro-distillation and was tested for its anti-microbial activity against selected bacteria (staphylococcus aureus, salmonella enteric a serovar Abony and Escherichia coli) and fungi (candida Aspergillus flavus and Aspergillus nigar) the EO yield was 1.24g/100g of dried rhizome powder. The EO recorded a significant inhibition against S. aureus and A. flavus. GCMS analysis of EO showed the predominance of important metabolites such as mustakone (20.2%) longidols aldehyde (14.9) cedroxyde (8.7%), a-copace (4.7%) cyperene (2%), cyperotundone (2.6%) khusino (2.3%), and corymbolone (1.1%) along with several other monoterpene pinene and sesquiterpene. The study revealed the EO of C. articulatus as a promising source of antibacterial and antifungal metabolites which may lead to its application in managing bacterial and fungal infections and storage mould (Jaradat NA *et al*; 2017)

Antioxidant activity of Citrullus lanatus of chloroform ethyl acetate and methanol extract in their study. DPPH method was used for antioxidant activity of all chloroform, ethyl acetate

and methanol extract. The maximum antioxidant potential shown by methanolic extract of *Citrullus lanatus* (MECL) seed (GILL, 2011)

The hepatoprotective effect was varied out by *Citrullus lanatus* seeds carbon tetrachloride induced hepatotoxicity in rat through estimated serum hepatic enzyme level and histopathological study of liver tissue. *Citrullus lanatus* seed oil CLSO (1.25%mg) and CLSO (250mg) were used to deliver orally in rats for 10 days and compared with standard silymarin (100mg/kg) orally. The result shown ALT, AST and ALP level significantly decrease in serum intreated groups which were increase due to CCL4 induce liver damage are comparable with standard drug. Histopathology study of liver tissue reveals the hepatoprotective activity of *Citrullus* seed oil (Madhavi, 2012)

Phytochemical profile of *Citrullus Lanatus* and *Cyperus articulatus*.

In desert regions water melon can be considered a substitute for water. It contains essential mineral (Table 2) and vitamin (Table 3) and is a suitable source of cyclopene and citrulline (Table 1) (Perkins- veazi et al. 2001). *Citrullus Lanatus* seeds are high in protein, mineral (such as magnesium, potassium, iron, zinc, sodium, phosphorus, copper and manganese) B vitamins, and fat among other nutrient including phytochemicals (Braide *et al*, 2012). *Citrullus Lanatus* seeds are known to provide economic benefits, especially in areas where farming is becoming more intensive. *Citrullus Lanatus* seeds oil is also used cosmetically (Jensen et al; 2011) due to its moisturizing therapeutic and anti-oxidant properties. *Citrullus Lanatus* comprises to vitamin C (8.1mg/100g) in its nutritional composition. Vitamin C is a powerful antioxidant with radical scavenging properties that is useful for treatment of photo-aging (Chiu and Kimball, 2003). *Citrullus Lanatus* is an incredibly nutrient dense, thirst quenching and low-calorie fruit (Okonmah et al ;2011) the water content of the *Citrullus Lanatus* is approximately 92% (Anon 2008). *Citrullus Lanatus* is also cholesterol free and high in vitamin especially B1, B6, C and A (Table 1) as well as lycopene which is a carotenoid (table 1) and minerals (Table2) such as magnesium and potassium (Leskovart et al 2004). Free radicals support conditions such as Maclehorse's, arthritis, asthma, atherosclerosis, diabetes, and colon cancer by assisting in their quenching (Oyeleke *et al*, 2012). *Citrullus Lanatus* is also comprised of phenolic component (Jaskani et al 2005; Kaurandv leapoo- 2001).and its seed contain glycoside, alkaloid, saponin, tripterpenoid phytates and tannin but it does not contain oxalate or flavoind (Johnson *et al* 2012) vitamin B is utilized by the human body to help replenish its energy and can be consider a substitute to supplements or energy drinks (Anon 2008) vitamin A is an influential natural antioxidant which helps to maintain the health growth of elastin cells an new collagen (Table 3). The consumption of vitamin A is also a widely accepted strategy by which to defend against oral cavities and hug cancers (Edwards et al, 2003). Vitamin C is associated with damaging the free radicals of oxygen- scavenging an immune-boosting effects in the human body. Healthy collagen growth is also encouraging by vitamin C (Jian et al 2005). An imperative constituents of body fluids and the cells that assist in blood pressure and heart rate monitoring is potassium. Potassium prevents against coronary heart disease and a stroke (Jian et al., 2005). The indispensable role of demotic progression in the body by maintaining the electrolytic balance and the extent of body fluid to make the body pH more alkaline is due to both calcium and potassium Lee *et al.*, 2018 MacWilliam, 2005). While in *Cyperus articulatus* several factors contribute to the resistance of some pathogenic microorganisms and this fact requires the search for new the rapeutic alternative the genus *Cyperus* (Cyperaceae) family groups species that present chemical compounds of pharmacological interest mainly with antimicrobial action. Thus, the present work was carried out to investigate the anti-microbial activities antioxidants and the

phytochemicals profile of *Cyperus articulatus* L and *Cyperus iria* L Hydroscopic extracts (I: I, V: V) of the aerial and underground parts of these species were used to analyze in total phenol content and to evaluate the invitro antioxidant activity against the DPPH (2,2-diphenyl-1-picrylhydrazyl). The ethyl acetate and chloroform phases resulting from liquid-liquid partitioning of *C. articulatus* and *C. iria* extracts were evaluated in antimicrobial assays and subject to high performance liquid chromatography (HPLC-DAD) analysis. The chromatograms obtained by HDLC- DAD) allowed us to identify four compounds: chlorogenic acid, catechin quercetin, and quercilin, the hydrochloric extracts of *C. articulatus* and *L. iria* showed a weak antioxidant activity IC₅₀ of 395.57 and 321.33ml (aerial parts), and 1,114.01 and 436.82/ml (underground parts), respectively. Regarding antimicrobial activity, the chloroform phase of *C. Iria* showed the best result at the concentration of only 31.2ml against the pathogens *Candida Albi* and *Staphylococcus aureus*. The ethyl acetate phases of the aerial parts of *C. articulatus* and *C. Iria* did not show antimicrobial activity (Nascimento *et al.*, 2019)

METHODOLOGY

The water melon was purchased at Gamboru Moro-moro market, custom area and was chopped into pieces. The seeds were removed and shade dried at room temperature, and then was ground into powder form. Phytochemical screening involved simple chemical tests to investigate the probable presence of secondary plant metabolites. These included the following: cardiac glycosides, carbohydrates, soluble starch, anthraquinones, tannins, cardenolides, terpenoids, alkaloids, flavonoids, saponins and glycosides.

The extract (0.5g) was stirred with 5ml of aqueous HCl on water bath and filtered. Then 3ml of the filtrate was taken and divided equally into 3 portions in test tubes. To the first portion, a few drops of Dragendoff's reagent was added. The occurrence of orange red precipitate indicated the presence of alkaloids. To the second; 1ml of Mayer's reagent was added and the appearance of buff-coloured precipitate indicated the probable presence of alkaloids to the third portion, 1ml of a few drops of Wagner's reagent was added and a dark brown precipitate indicated presence of alkaloids.

The extract (small quantity) was boiled with distilled water and then filtered. To a 2ml of the filtrate, few drops of 10% ferric chloride solution were added. A green blue or violet coloration indicated the probable presence of phenolic hydroxyl group (Evans, 2002).

To the extract (0.5g), 10ml of distilled water was added and stirred. The mixture was filtered. The filtered mixture was used for the following test.

To 2ml of the filtrate, few drops of 1% ferric chloride solution were added. The occurrence of a blue black, green or blue-green precipitate indicated the presence of tannins. A mixture of equal volume of 10% lead ethanoate was added to 2ml of the filtrate. The formation of white precipitate indicated the presence of tannins. The filtrate of the extract was boiled with 3 drops of 10% HCl, and a drop of methanol. A red precipitate indicates the probable presence of tannins (Sofowora, 1993; Trease and Evans, 2002).

The extract (1g) was boiled with 5ml distilled water and filtered. The filtrate was divided into two portions. To the first portion, about 3ml distilled water was added and shaken for about 5 min. Frothing, which persisted on warming was evidence for the presence of saponins (Sofowara, 1993). To the second portion, 2.5ml of a mixture of equal volume of Fehling's solution A and B was added. The appearance of brick-red precipitate indicated the probable presence of saponin glycosides.

To the extract (0.5g), 2ml of acetic anhydride was added. The mixture was cooled in ice and then conc. tetraoxosulphate (VI) acid was added carefully. Colour development from violet to bluish-green indicated the probable presence of a steroidal ring.

RESULT AND DISCUSSION

Table: result of phytochemical analysis of Citrullus Lanatus and Cyperus articulatus

S/N	CITRULLUS LANATUS PARAMETERS
1	Tannin +
2	Saponins +
3	Flavonoid +
4	Alkaloid -
5	Cardiac glycoside -
6	Steroid +
7	Cardenolide -
Cyperus articulatus	

s/n	Parameters
1	Tannin -
2	Saponins +
3	Flavonoid -
4	Alkaloid -
5	Cardiac glycoside +
6	Steroid -
7	Cardenolide -

Key = + (presence) – (absence)

4.2. table 2: result of the proximate analysis of Citrullus Lanatus and Cyperus articulatus

S/n	Citrullus Lanatus Parameters
1	Carbohydrate present
2	Ash 3.2
3	Protein
4	Starch absent
S/n	Cyperus articulatus Parameters value %

Discussion

Results obtained from the phytochemical screening of Citrullus Lanatus seed indicate the presence of tannins, saponins, flavonoids and steroid while alkaloids, cardiac glycoside and cardenolide are absent. While in Cyperus articulatus, the results obtained indicates the presence of saponins and cardiac glycoside while tannins, flavonoids, alkaloids, steroids and cardenolide are absent. These results implies that the presence of these phytoconstituents in

Citrullus Lanatus and Cyperus articulatus indicate its medicinal value to man and also serve as food (Sadiq et al., 2016). However, the presence of phytoconstituents, saponins, steroids, tannins etc. are also used as antifungal agent and antimicrobial agent and boost the immune system (Braide et al., 2012; Sadiq et al., 2016).

The ash content is the inorganic content of mineral that does not volatilize after subjecting the sample to high temperature. The ash content of the seeds contained in Cyperus articulatus is 5.85% respectively. While the ash content of the seeds contained in Citrullus Lanatus is 3.2% respectively. These results agreed with the report of (Mustafa et al., 1992) who indicate that the ash content of Citrullus Lanatus seed was 2.96% while it was also revealed that the ash content of Citrullus Lanatus seeds analysed as a whole seed and kernel in their study was 2.84 and 2.71% (Das et al., 2002). While (Hassan, 1998) reported that the ash content of the kernel and coat of seeds were 2.7% and 1.6% respectively.

However, with regard to crude protein the Cyperus articulatus contained 7.791% while the seed of Citrullus Lanatus contained 37.86% have the highest value which implies that the seed is rich in protein thereby help to build the body and replace worn-out tissues according to FAO (1988), kernel contained about 38% protein which is in agreement with Hassan (1998) who found that the protein content of the Citrullus Lanatus seed was 38.10% for the kernel and 21.3% for the whole seed, while it was reported that 0.64% for the seed coat, while it was reported that the protein content of Citrullus Lanatus seeds for two Nigerian varieties (Bara/Serewe) were 35.7% and 35.7% and 30.6% respectively (Ojenuga et al., 1975).

The carbohydrate value for the seed contained 46.3% respectively. This implies that the seed is very rich in energy. However, carbohydrate generally is energy giving food (Sadiq et al., 2016).

Summary

Phytochemicals are bioactive compounds found in plant that have been associated with various health benefits such as antioxidants and anti-inflammatory effects. Citrullus Lanatus and Cyperus articulatus, although often discarded have gained attention due to their potential nutritional value and phytochemical content.

These researches employ various analytical techniques in extract and analyze the phytochemical techniques which include solvent extraction, chromatography (such as high-performance liquid chromatography) and spectroscopy. By using this method, this researcher will be able to identify and qualify the different types of phytochemical present in the Citrullus Lanatus seed and Cyperus articulatus, which may include, alkaloids, saponins, flavonoids, alkaloid, cardiac glycoside, steroids and cardenolide and other bioactive compounds.

Proximate analysis is a standard method used to determine the basic nutritional compound of a food or plant material. It involves analysing parameters such as carbohydrate content, protein content, ash content, moisture content and fats content. These measurements provide valuable information about the overall nutritional composition and potential dietary value of the Citrullus Lanatus and Cyperus articulatus.

This sample will turn under the necessary extraction and analysis techniques to determine the phytochemical composition and proximate properties.

This finding contributes to the existing knowledge about the chemical constituent and nutritional profile of Citrullus Lanatus seed and Cyperus articulatus the result can be used to

evaluate the potential health benefit and dietary significance of incorporating Citrullus Lanatus seed and Cyprus articulatus into human or animal diet.

CONCLUSION

However, the present research indicates that the Citrullus Lanatus seed and Cyprus articulatus is rich in carbohydrate and vitamin C which justifies its claim as being used of fruit and food supplement. However, Cyprus articulatus is used in treating some disease traditionally because of the presence of achieve phytochemical in Cyprus articulatus in Citrullus Lanatus seed and peel also from the analyses indicator they are rich in mineral element and peel indicator the presence of alkaloids saponins, carbohydrate, cardiac glucoside and terpenoids, while the pulp indicate the presence of saponins and seed of Citrullus Lanatus revealed the presence of alkaloids, carbohydrate, steroid and cardiac glycoside respectively, this result implies that the presence of these phytoconstituent of Citrullus Lanatus is highly medicinal and also serve as food (Sadiq et al., 2016) Citrullus Lanatus peel, much like Citrullus Lanatus flesh, is mostly made of water because presence of phytoconstituent, saponin, steroids tannin, terpenoids used as antibacterial and antifungal agent and boost-the immune system

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