International Journal of Recent Advances in Medical & Pharma Research
Vol. 1, Issue 1 - 2017

BIOLOGICALLY ACTIVE PHYTOCHEMICAL CONTENTS AND BIOLOGICAL ACTIVITIES OF WHOLE *MUSA ACUMINATA* (BANANA) PLANT

MOHAMMAD ASIF[*], AMARJEET KAUR[*]

ABSTRACT

The banana serves as a natural store of various healths beneficial phytochemicals and exist significant differences in the phytochemical composition. *Musa species* (*Musaceae*) is a tropical plant, have been consumed by mankind for its nutritious and delicious fruits. Banana is one of the most widely distributed and consumed fruit in the tropical and subtropical countries. Considering the nutritional aspects, it is one of the world's leading food crops with a great source of minerals, vitamins, carbohydrates, flavonoids, phenolic compounds etc. It is economical and easily accessible to peoples. It can be consumed both as cooked and uncooked form. Banana serves as a low cost food source for developing countries where most of the populations rely mostly on bananas for food. Banana plant parts are useful as insecticide, metal chelating power, reducing power, antioxidant, colour absorber, in preparation of various functional foods, wine, alcohol, biogas, cattle feed etc. Musa species have been reported to have various biological activities like antiulcerogenie, antidiabetic, antiatherogenic, antidiarrheic, antitumoral, antimutagenic, migraine, hypertension, cholesterol and hiperoxalury. In this review discusses about usefulness of banana fruits, peel, leaves, pseudostem, sheath, pith and male bud, and use in industry and their biological activities.

KEYWORDS: Banana, Bud, Peel, Pseudostem, Flavonoid, Polyphenol, Musa, Biological Activities, Tropical Plant.

INTRODUCTION

Traditional medicines using herbal drugs exist in every part of the world. The major areas are Chinese, India and European traditions. Herbal drugs have to fulfill the world requirement on quality, safety and efficacy. Herbal drugs have the the advantages of being available for patients in the geographical area of the special traditional medicine. It is well known that herbal medicines medicines can enhance human health. The opportunistic diseases have been developed to a a serious state where the survival rate of patient patient decreasing drastic.

[*]Department of Pharmacy, GRD (PG) Institute of Management & Technology, Dehradun-248009, (Uttarakhand), (Uttarakhand), India. ***Correspondence E-mail Id:*** editor@eurekajournals.com

© Eureka Journals 2017. All Rights Reserved.

Numerous epidemiological and biomedical studies indicated the consumption of fruits and vegetables may help to protect the human body against many diseases like diabetes, cancer and cardiovascular diseases. This is due to various naturally occurring natural compounds present in plants and herbs. Phenolics are one class of naturally occurring bioactive compounds present in many fruits and vegetables and have antioxidant properties that have been implicated in suppressing various health related disorders, like skin cancer and human immunodeficiency virus (HIV). The raw materials for Ayurvedic medicines were mostly obtained from plant sources. Also Siddha, Unani are traditional health care system have been flourishing for many centuries. Plants are source of a number of complex compounds of different composition which have medicinal properties (Gold *et al.,* 1994; Halliwell. 1991; Holt and Chandra. 2002; Jeger *et al.,* 1995; Johanson *et al.,* 2000; Justesen *et al.,* 1998; Karugaba and Kimaru. 1999; Kashaija *et al.,* 1994; Kochhar. 1998). The presences of bioactive constituents like alkaloids, glycosides, saponins, tannins, terpenoids, coumarins, phenols, steroids, flavonoids, phenols, vitamins, minerals, carbohydrates, terpenoids, polyketides, amino acids, peptides, proteins, lipids, nucleic acid bases etc. Some phytochemicals can be used in the treatment of bronchitis, constipation, ulcer, diabetics, to reduce painful and excess menstrual bleeding and improve lactation (Abdel Hameed 2009). Fruits and vegetables are rich sources of various health beneficial phytochemicals.

These compounds have revealed the roles in the the reduction of incidence of certain degenerative diseases such as cardiovascular diseases, cancers, arthritis, pain, palliatives or curatives. The nutritional quality of fruits and vegetable is highly variable with its varieties, climatic conditions, soil type, temperature, light intensity and many more factors. The phytochemical profiles of fruits is dependent on maturity, cultivars, geographical origin, growing season, post harvest storage condition and processing techniques (Amin *et al.,* 2006; Arabbi Arabbi *et al.,* 2004; De Langhe *et al.,* 2001; Diaz-Perales *et al.,* 2003; Duke *et al.,* 2006; González-González-Montelongo *et al.,* 2010).

BANANA

Musa sp. (Musaceae), called banana in English, is one of the interesting tropical plants which have been consumed by humans and animals as a nutricious food. The Indo-Malesian area is the main center of the plant. The banana is such a pan-tropical that it grows everywhere man has planted it. There are hundreds of edible banana varieties; in Indonesia alone, there are over 230 recorded. Two species of banana that are considered to be the parents of most edible seedless bananas eaten by man are *Musa acuminata* and *M. balbisiana*. In addition to being eaten fresh, bananas may be cooked, chipped, made into alcoholic drinks or processed into starch in far eastern countries. The leaves are used to wrap foods or to line utensils in which food is prepared particularly in Philippines. The flowers of inflorescence and the center of the stem is also edible in some countries in Asia. Another banana with the striking red flowers, *Musa coccinea*, is ornamental as its fruits are small and hard (Chan, *et al.,* 1984). In Turkey, *M. acuminata*, is cultured in Alanya and Anamur located in Mediterranean region. The potent health protective phytochemicals of most widely consumed varieties of banana. Variety of banana has to be included in the daily diet for best possible health benefits (Kokate *et al.,* 1996; Vogel, 1991; Zhan-Wu sheng , *et al.,* 2011; Ramarao *et al.,* 1990; Handa SS*, et al.,* 1991; Mukherjee *et al.,*1998; Sumathy, *et al.,*2011; Schoental, *et al.,* 2002; Nakanishi K. 1999).

© Eureka Journals 2017. All Rights Reserved.

GEOGRAPHICAL DISTRIBUTION

Musa acuminata is most abundantly found in India. It is one of the oldest tropical fruits cultivated by man from prehistoric time in India with great socio-economic significance, interwoven in the cultural heritage of the country. It is also fourth important food crop in terms of gross value after paddy, wheat and milk products and forms an important crop for subsistence farmers. It is also desert fruit for millions apart from a staple food owing to its rich and easily digestible carbohydrates with a calorific value of 67 to 137/100 gm fruit. It is the most important fruits of India. In Sikkim it is fourth most important fruit and cultivated throughout the state in the kitchen garden, boundaries of field and farms etc. The cultivation of banana in orchard was started with introduction of high yielding variety such as Dwarf Cavendish from Bihar, Bengal and other states of India. The important banana growing states of India are Tamil Nadu, Karnataka, Madhya Pradesh, Kerala, Assam, UP, Maharashtra, West Bengal, Himachal Pradesh, Bihar, Gujarat etc. It is a rich source of Vitamin C and minerals, and makes healthy and salt-free diet. In India, banana contributes 31.72% of the total fruit production. India is the largest producer of banana in the world**.**

MUSACEAE

The *Musaceae* are a family of flowering plants, placed in the order Zingiberales. The family is native to the tropics of Africa and Asia. The plants plants have a large herbaceous growth that grows to 5-9 m in height. It is tuberous subterranean rhizome from which the leaves emerges. This is a small family of only about 40 species in two genera (*Musa* and *Ensete*) found in in wet tropical lowlands, although recently one or or two species have been found in higher latitudes. They are grown mainly for their fruit, and for their fibres, manila and hemp, used for making rope. They are also grown as ornamental ornamental plant for its striking shape and foliage**.** Musa species a tropical plant have been consumed since many years by mankind for its nutricious and delicious fruits. The banana is such such a pan-tropical that is grows everywhere man man has planted it. The flower of inflorescence and the centre of the stem is also edible in some some countries in Asia. Wild banana (*Musa acuminata*), one of the pioneer plant species, rapidly establish on disturbed areas where there there is a great fluctuation in environmental conditions, especially, high light intensity and large vacant spaces for their regeneration, even though they may not have occupied the site before. There are number of important plants found in *Musaceae* family, those that bear edible edible fruit are the most significant. In addition to to fruit, banana and plaintains provide many cultures with medicines, beverages, fibres, edible edible floral parts, dyes, fuel, steam for cooking, cooking, cordage, wrapping materials, etc. With few exceptions, the familiar eating bananas are naturally occurring hybrids among the various subspecies of *M. acuminata* and interspecific hybrids between *M. acuminata* and *M. balbisiana balbisiana* (Chopra, *et al.,* 1952; Verma and Singh. Singh. 2006; Joshi. 2000; Sharma. 2003; Jarald and Jarald. 2006; Wong, *et al.,* 2002; Volmayor, *et et al.,* 2002; Morton, *et al.,* 1987).

GENUS

The genus *Musa* was first named by Carl Linnaeus Linnaeus in 1753. *Musa acuminata* commonly called as Dwarf Cavendish banana, belong to family *Musaceae* which has two genera: Musa and Ensete. All edible species are grouped into Musa in five section; *Emusa, Rhodochlamys, Callimusa, Australimusa Incertae sedis.* The section *Emusa* is the largest and most widespread widespread geographically and includes all the major edible cultivated parthenocarpic bananas including *Musa sapientum* that is derived from two species *Musa acuminata colla* and *Musa balbisiana* colla. It is a species of wild banana

© Eureka Journals 2017. All Rights Reserved.

native to south-east Asia. The individual flowers are white to yellowish white in color, and they are negatively geotropic (that grows upwards and and away from the ground). The seeds of *M. acuminata* are around 5 to 6mm (0.20 to 0.24 in) in) in diameter, the size depends on the number number of seeds they contain. Each fruit can have 15 to 62 seeds. It is an evergreen perennial perennial herb, not a tree. The trunk (known as the pseudostem) is made of tightly packed layers layers of leaf sheaths emerging from completely completely or partially buried corms. The wild species contains seeds, while cultivated bananas bananas are almost always seedless (parthenocarpic) and are therefore sterile and dependent on vegetative propagation by means of corms. For this reason, they lack genetic diversity.

Classification		**Common vernacular name**	
Kingdom	*Plantae*	English	*Banana*
Subkingdom	*Angiosperm*	Gujarat	*Kerlun*
Class	*Monocot*	Hindi	*Kella*
Order	*Zingiberals*	Sanskrit	*Kadali*
Family	*Musaecae*	Malayalam	*Yethampazham*
Genus	*Musa*	Bengali	*Mocha*
Species	*acuminata*	Tamil	*Vazhaipazham*
Binomial name	*Musa acuminata Linn.*	Telugu	*Arati chettu*
		Urdu	*Kela (Mouz)*
		Punjabi	*Kela*

MORPHOLOGY

Banana is a monocotyledonous, perennial herb. It is the largest herbaceous flowering plant. Banana plants are often mistaken for trees. It have a false stem (called pseudostem), which is made by the lower part of the leaves. This pseudostem can grow to be two to eight metres tall. Each pseudostem grows from a corm. A pseudostem is able to produce a single bunch of bananas. After fruiting, the pseudostem dies and is replaced. When most bananas are ripe, they turn yellow or, sometimes, red.

LEAVES

The leaf sheaths produce several trunk like structures called pseudo-stems. Leaves are spirally arranged and may grow 2.7 metres (8.9 ft) long and 60 cm (2.0 ft) wide.

INFLORESCENCE

The inflorescence, a transformed growing point, point, is a terminal spike shooting out from the heart in the tip of the stem. The inflorescence grows horizontally or obliquely from the trunk. At At first, it is a large, long-oval, tapering, purple-clad bud. As it opens, it is seen that the slim, nectar-rich, tubular, toothed, white to yellowish-yellowish-white in colors flowers are clustered in in whorled double rows along the floral stalk, each cluster covered by a thick, waxy, hoodlike bract, purple outside, deep-red within. Both male male and female flowers are present in a single inflorescence. Female flowers located near the base (and develop into fruit), and the male flowers located at the tipmost top-shaped bud in in between leathery bracts.

COMMON MUSA SPECIES

Some common species of Musa are *Musa azizzi, Musa acuminate, Musa balbisiana, Musa johnsii, Musa ornate, Musa muluensis, Musa lokok, Musa exotica, Musa boman, Musa velutin, Musa paradisiacal, Musa tuberculata, Musa monticola, Musa loloden, Musa jackeya and Musa hirta.*

© Eureka Journals 2017. All Rights Reserved.

FRUIT

The fruit has a "leathery berry", turns from deep-green to yellow or red, or, in some forms, green- and white-striped, and may range from is up to 12cm long and 2.5cm wide and from oblong, cylindrical and blunt to pronouncedly 3-angled, somewhat curved and hornlike. There is a protective outer layer (a peel/skin) with numerous long, thin strings (the phloem bundles), which run lengthwise between the skin and the edible inner portion. The inner part of the common yellow dessert variety splits easily lengthwise into three sections that correspond to the inner portions of the three carpels.

CULTIVATION AND COLLECTION

Musa acuminata was commonly known as Dwarf Dwarf Cavendish banana, it is one of the most important and most widely distributed over the tropical and subtropical regions of the world. Banana is one of the oldest fruits known to mankind. It is monocotyledonous, perennial herb herb it grows to be two to eight metres. It grows grows in fields in all the seasons. It is originated from Indo-Malayan area and somewhere in the mountainous regions of Assam, Myanmar. The USA is the leading importer of bananas. In gardens it is used as a hardy 'tropical foliage' plant. If pseudostem is killed, the banana will resprout from the ground where rapidly grows to to full size in a season under optimal conditions. conditions. The cultivated bananas are broadly classified into two groups: The dessert varieties and the cooking varieties. The fruits eaten as dessert, without any cooking are called banana, while the more starchy types with a less pleasant pleasant flavor and that need cooking before they can be consumed as a vegetables are called" called" Plantains. Banana cultivation in the country occupies an area of 380 thousand hectares. It is cultivated mainly in the plains, occupying an area of nearly 290 thousand hectares. The north-eastern states are rich in both wild and cultivated types. Some hilly tracts are covered with wild types which have formed banana forest. It is one of the most important plantation crops in Andhra Pradesh grown on 23,200 hectares producing 39 lakh tones of banana annually.

CHEMICALS CONSTITUENTS

Musa contains many bioactive compounds including Flavonoids, Alkaloids, Phenols, Steroids, Glycosides, Terpenoids, Saponins, Carbohydrates, Vitamin C, Vitamin A_1, Vitamin B_6, Vitamin B_{12}, Gallic acid, Volatile components. Different chemical constituent like Serotonin, Nor-epinephrine, Dopamine, un identified Catecholamine, Tryptophan, Indole compound in banana ovaries**.** Alanine, Glycerol, Histidine, Serine, lysine, Aspartic acid, Flavan-3(S)-4(R)-diol, Elaidic acid, Butan-1-one, Oleic acid, Vanillic acid, Benzaldehyde-3-4-dihydroxy, Valine, Lauric acid, Emenolone, etc.

BANANA AS A CROP

Bananas and plantains constitute the fourth most most critical worldwide sustenance item (after rice, wheat and maize) developed in excess of 100 nations over a collected territory of roughly 10 million hectares, with a yearly generation of 88 million tons (Frison and Sharrock, 1999). It therefore contributes significantly to food and income security of people engaged in its production and trade, particularly in developing countries. In Africa they provide more than 25% of the carbohydrate requirements for over 70 million people (IITA, 1998). Eastern and Southern Southern Africa produces over 20 million tonnes tonnes of bananas which accounts for 25.58% of of total world output (Karamura et.al., 1999; Smale, 2006). Uganda positions second after India on the planet banana generation with a yearly yield of 9.84 million tons representing 11.18% of the world's aggregate creation (INIBAP, (INIBAP, 1999). Be that as it may, banana bacterial wither infection is truly influencing the

© Eureka Journals 2017. All Rights Reserved.

creation of all genotypes (Tushemereirwe et al., 2003). Bananas fall in the products of the soil gather and the nutrition type which generally contain starch. Sweet pastry bananas are for the the most part eaten crude (organic product), while cooking bananas and plantains are bubbled, bubbled, steamed, broiled or simmered (sustenance). A man ought to eat no less than 5 segments of foods grown from the ground each day where one entire banana natural product is comparable to one part similarly as two tomatoes tomatoes and additionally half cucumber. Bananas give a decent wellspring of supplements supplements for both human and creature utilization and the wholesome esteems per 100 grams of eatable segment where a similar measure of grams yield up to 120 kcal of vitality (ED informatics, 2006). The banana provides energy primarily in the form of carbohydrate with with minimal contribution to energy from fat and and food containing carbohydrates should be the the main part of our daily meals. In unripe bananas the carbohydrates are mostly starches. In the process of ripening the starches are converted to sugars; a fully ripe banana has only only 1-2% starch (Forsyth, 1980). It is considered considered important to know about the minerals minerals and vitamins because a significant drop drop in their volume leads to dreadful disease and pathological symptoms. Most vitamins are not produced in the body, but a diet rich in fruits, fruits, vegetables, grains and cereals can provide provide the essential vitamins needed by the body, in small doses, and in a balanced way. Minerals can be broken down into two basic groups based on their requirement, macro and micro minerals. The macro minerals, such as Calcium, Magnesium, sodium (salt) potassium and phosphorus are needed in fairly substantial amounts for proper health, whereas, the micro minerals are needed in far smaller quantities and and include substances such as Zinc, Iron, Copper Copper Manganese Chromium, Selenium and Iodine. Though minerals and vitamins are required in trace quantity these trace minerals function in a wide and varied form to regulate and balance the body from certain disease and improper functions. The need of the vitamins and and minerals is reflected at the time of physiological symptoms of the disease and their required value. The minerals and vitamins found found in the ripe bananas and their required levels in the body to function properly. Other uses and/or products include: hand crafts from the leaves and fibre, ropes, peels for animal feeds feeds and leaves for wrapping foodstuff (Frison and Sharrock, 1999).

BANANA FRUIT

Banana is highly nutritious and easily digestible than many other fruits. Digestion time of banana fruit is less (105 min) than apple (210 min). Bananas are popular for aroma, texture and easy to peel and eat, besides rich in potassium and calcium and low in sodium content (Sharrock & Lustry., 2000; Wall, 2006; Anhwange, 2008; Archibald,1949; Adisa and Okey.,1987)

MOISTURE CONTENT

Moisture content in pulp raises during ripening process due to respiratory breakdown of starches into sugar and migration of moisture from peel to pulp. The moisture content could be 68% due to presence of starchier balbisiana genome and incomplete conversion of starch into sugar; even when banana is fully ripe, still some starch is left in pulp tissue (Marriott,*et al.,*1981)

CARBOHYDRATES

Amid maturing process, starch is changed into into sugar, by enzymatic breakdown process. The starch sum could be as high as 11% relying relying upon assortment. Sugar substance of completely develop banana is very high that makes it a perfect substrate for wine making. Sugar compose in banana is safe starch and

© Eureka Journals 2017. All Rights Reserved.

non-starch polysaccharides, which have low glycemic list or low edibility. This property makes it an outstanding element for various utilitarian and simplicity nourishments like treats and chips (Yang and Hoffman.,1984; Cheirsilp and Umsakul., 2008; Lehmann and Robin., 2007; Aparicio-Saguilán, et al., 2007; Agunbiade, et al., 2006).

PROTEINS

Bananas protein (1-2.5%), contingent upon assortment, height, and atmosphere, raises over maturing process (3.8-4.2%) (Loeseck.1950; Luster, et al., 1976; Akaninwor and Sodje., 2005).

FAT

Fat substance in mash remains relatively consistent (1%) amid aging procedure. Peel contains lipid (2.2-10.9 %) and is rich in polyunsaturated unsaturated fats, especially linoleic corrosive and alfa-linolenic corrosive (Emaga, et al., 2007).

PECTINS

Ready mash contains pectin (0.7-1.2%). Amid maturing, insoluble protopectin is changed over into solvent pectin that causes relaxing of cell divider and surface corruption prompting softening of organic product. Gel framing capacity of pectin has a changed use as added substances in jams, jams and jellies, as thickeners, texturizers, emulsifiers, fat or sugar replacer (Smith,et al.,1989; Emaga , et al., 2008; Prasanna, et al., 2007).

POLYPHENOLS AND PIGMENTS

Bananas are rich in polyphenolics and flavanoids, flavanoids, which have antioxidant properties. Astringent taste of unripe banana is due to polyphenolics. Bananas are rich in dopamine with with an antioxidant activity. Browning is due to polyphenol oxidase, monophenol monooxygenase and o-diphenoloxidase activities activities on dopamine, which makes tannins resulting in brown spots on peel. When stored below 13°C, brown patches develop on peel. Polyphenol content for Cavendish banana, indicates high antioxidant activity. Banana peel is green when fully mature, gradually turns yellow and in some cases brown spots are found. Similar changes also observed in pulp. pulp. Some amount of ß-carotene (40-4960 µg/100g), found in pulp and peel of fruit, might explain explain color changes from off white, yellow and, in some cases, orange color of pulp. But change in peel color is due to degradation of chlorophyll or unmasking unmasking of carotenoids, rather than carotenoid synthesis (Kanazawa and Sakakibara.2000; Alothman, *et al.,* 2009; Wuyts,*et al.,* 2006; Wainwright and Hughes. 1989; Englberger, *et al., al.,* 2003; Drury, *et al.,*1999;Yang, *et al.,* 2009).

VITAMINS AND MINERALS

Mash is rich in vitamin A, vitamins B (thiamine, 40 µg; riboflavin, 70 µg; niacin, 610 µg; pantothenic corrosive, 280 µg; pyridoxine, 470 µg; folic corrosive, 23 µg) and ascorbic corrosive (Vit C). Potassium is most bounteous mineral present in eatable bit of banana, after that magnesium, calcium, and phosphorus. Measure of iron is high, though copper is found in little amount. It can be filled in as amazing infant sustenance and nibble nourishment (Aurore, et al., 2009; Ruales ,et al., 1990).

Employments OF OTHER PARTS OF BANANA PLANT

Musacea plants can be utilized to produce vitality through decay, and utilized as great treating the soil material. Banana squander materials are rich in supplements and minerals (Clarke, et al., 2008; Ultra, et al., 2005; Cordeiro, et al., 2004; Oliveira, et al., 2007).

BANANA PEEL

© Eureka Journals 2017. All Rights Reserved.

Banana peel is a rich wellspring of starch (3%), rough protein (6-9%), unrefined fat (3.8-11%), add up to dietary fiber, (43.2-49.7%), and polyunsaturated unsaturated fats, fundamentally linoleic corrosive and a-linolenic corrosive, pectin, basic amino acids (leucine, valine, phenylalanine and threonine), and micronutrients (K, P, Ca, Mg). Development of natural products includes, increment in dissolvable sugar, diminish in starch and hemicelluloses, and slight increment in protein and lipid content. Debasement of starch and hemicelluloses by endogenous chemicals may clarify increment in dissolvable sugar content. Skins can likewise be used for extraction of banana oil (amyl acetic acid derivation) that can be utilized for nourishment seasoning. Banana peels are additionally a decent wellspring of lignin (6-12%), pectin (10-21%), cellulose (7.6-9.6%), hemicelluloses (6.4-9.4%) and galactouroninc corrosive. Pectin extricated from banana peel likewise contains glucose, galactose, arabinose, rhamnose, and xylose, Micronutrients (Fe and Zn) were found in larger amount in peels contrasted with pulps. Along these lines, peels could be a decent bolster material for steers and poultry, ethanol generation. Banana peel can likewise be utilized as a part of wine, as substrate for biogas development, and as base material for pectin extraction. Peel fiery debris can be utilized as manure for banana plants and as wellspring of soluble base for cleanser development. Ethanol concentrate of M. sapientum peels can be utilized as an inhibitor for gentle steel consumption. Peel can likewise be utilized as a part of waste water treatment plants (Davey, et al., 2009; Dormond, et al., 1998a; Dormond, et al., 1998b; Adeniji,et al., 2008;Faturoti, et al., 2006; Tewari, et al., 1986; Tewari,et al., 1985; Castro-Gomez, et al., 1988; Ilori, et al., 2007; Udosen and Enang. 2000;Eddy and Ebenso 2008;Memon,et al., 2008).

BANANA LEAVES AND SHEATHS

Leaves are utilized for weaving bushels, mats, sustenance wrapper for showcasing and cooking, covers over nourishment, table materials, and plates for eating and in addition container for drinking soup. Old leaves are utilized as a part of wrapping up banana clusters for insurance against bats and winged animals. Rustic individuals utilize vast leaves of triploid bananas as umbrella amid stormy season. Dried banana leaves are utilized as fuel, and substrate to develop shellfish mushroom. In India, individuals utilize banana leaves for conventional custom and ceremonies and getting ready dishes by cooking or steaming fixings wrapped in banana takes off. Generally, individuals take sustenance on banana clears out. Banana leaves are likewise a decent wellspring of lignin, which is higher than banana pseudostem. Leaves can be given to ruminants with expansion of some protein separate for better absorbability. Squander materials from banana plant like leaf cutting edge, flower stalk, leaf sheaths and rachis are inadmissible for pulping because of generally high measure of slag content (19-27%). Great measure of pentoses is available in petiole, leaf cutting edge, and leaf sheaths. Protein content in leaf edge is considerable and subsequently could be perfect for dairy cattle sustain (Kambuou. 2002; Mustaffa and Sathiamoorthy. 2002; Katongole, et al., 2008).

BANANA PSEUDOSTEM, PITH AND MALE BUD

Various products sulike chips, fig, rech as drink, flour, jam, confections, dehydrated slices, and pickles can be made from male bud, immature fruit and pseudo stem. Paper board, tissue paper paper can be prepared out of banana pseudo stem. Banana fibres can be used as natural sorbent, bio-remediation agent for bacteria in natural water purifier, for mushroom production,

© Eureka Journals 2017. All Rights Reserved.

production, in handicrafts and textiles when mixed with paddy straw. It is used in production of marine cordages, high quality paper cardboards, tea bags, string thread, high quality fabric material, paper for currency notes, and good rope for tying purposes. Fibres from pseudo pseudo stem, leaf sheath and rachis are used in making fibre based products. Pseudo stem fibre bundles have higher specific strength modulus and lower strain at break than leaf sheath and rachis fibre bundles, having values comparable to to other lignocellulosic fibres. Banana fibre being being a natural sorbent has high potential in absorbing spilled oils in refineries. With fairly low low amount of ash and lignin and high amount of of holocellulose, pseudo stem and petioles are suitable for pulping in paper industry. Banana and and banana pseudo stem contain possessing antimicrobial properties. Lectins, found in banana banana plant tissues, can be effectively used for human consumption. Pseudo stem can be recycled to be used as bio-fertilizer.

PATHOGENESIS-PROTEINS

It contains great measure of cellulose and starch starch and can be utilized as cows nourish. External covering of pseudostem is for the most part cellulosic material while center or essence is is rich in polysaccharides and other follow components however bring down in lignin content. Squander banana substance can be utilized as shading spongy in wastewater containing material colors. Essence is utilized as sustenance subsequent to bubbling and expansion of flavors in numerous parts of India. Banana sheath (Composition: dry issue, 6.4; unrefined protein, 3.4; rough fiber, 31.4; cellulose, 34.6; hemicelluloses, 15.5; and lignin, 6%) can be a reasonable nourish for ruminant. Flower stalk contain high measure of starch (26%) (26%) and can be utilized as a part of pharmaceutical and nourishment industry. Glucose is rich in a large portion of the plant parts parts with the exception of rachis. Sucrose can be be acquired from banana through saccharification. Male bud is cooked and devoured as vegetable. Juice from male bud of banana gives solution for stomach issues (Katongole, et al., 2008; Uma, et al., 2005;Baree , , et al., 2000;Rüdiger and Gabius. 2001;Peumans, 2001;Peumans, et al., 2000; Phirke, et al., 2001;Namasivayam and Kanchana .1992; Namasivayam, et al., 1998;Yavuz and Audin. 2006;Subramanian, et al., 1988; Baig ,et al., 2004; 2004; Hassan. 2002; Khanum , et al., 2000).

Table 1.The nutritional values of bananas per 100g of edible fresh portion (ED informatics, 2006)

Nutrients		**Amount**	**Daily recommended values**
1.	Water	74%	240ml
2.	Carbohydrates	23 %	300 grams
3.	Protein	1%	50 grams
4.	Fats	0.5%	65 grams
5.	Fibre	2.5%	25 grams

Table 2.Vitamin content of the banana (nutrients per 100g ripe, edible banana). The banana nutrition group (UK); Dickinson, 2000).

Vitamins		**Amount**	**Daily recommended intake per normal adult**
1	Carotene	21 micrograms	800 micrograms
2.	Vitamin E	0.27mg	15mg
3.	Thiamin (B1)	0.04mg	1.5mg
4.	Riboflavin (B2)	0.06mg	1.7mg
5	Niacin	0.7mg	20mg

© Eureka Journals 2017. All Rights Reserved.

6.	Pyridoxine (B6)	0.29mg	1.3-1.7mg depending on age
7.	Folic Acid	14 micrograms	400micrograms
8.	Pantothenate	0.36mg	10mg
9.	Biotin	2.6 micrograms	300micrograms
10.	Vitamine C	11mg	75mg women, 90mg for men

Table 3.Mineral content of the banana (nutrients per 100g ripe, edible banana). The banana group (UK); Dickinson, 2000).

Minerals		**Amount**	**Daily recommended in take per normal adult**
1.	Sodium	1mg	2400mg
2.	Potassium	400mg	3500mg
3.	Calcium	6mg	1000mg
4.	Magnesium	34mg	400mg
5.	Phosphorus	28mg	1000mg
6.	Iron	0.3mg	18mgs
7.	Copper	0.1g	2.0mgs
8.	Zinc	0.2mg	15mg
9.	Chloride	79mg	3400mg
10.	Manganese	0.4mg	2.0mg
11	Iodine	8 micrograms	150 micrograms

BIOLOGICAL ACTIVITIES OF BANANA PLANT

Banana is the second biggest created organic product after citrus, contributing around 16% of of the world's aggregate natural product generation. India is biggest maker of banana, adding to 27% of world's banana creation. Unexpectedly, creation of banana in India has outperformed mango generation. In India, Tamil Tamil Nadu is the main maker of banana, trailed trailed by Maharashtra. Banana is a standout amongst the most broadly developed tropical organic products, developed more than 130 nations, along the tropics and subtropic of Capricorn. Palatable bananas are gotten from Australimusa and Eumusa arrangement, which have distinctive starting points from same variety. A large portion of the palatable bananas bananas are either gotten exclusively from Musa accuminataor are cross breed between two wild diploid species, M. acuminata Colla and M. balbisiana Colla. Plant has a starting point from India and eastern Asian district and a a few assortments are observed to be hereditarily connected with a few animal varieties from Africa. Different assortments likewise exist normally or created by hybridisation of these genomes, which have diverse terminologies. Three basic types of Musa (M. cavendishii, M. paradisiaca and M. sapientum) are broadly developed on the planet. M. cavendishii, unadulterated triploid sharpen known as treat banana, is sweeter and and less boring than M. paradisiaca, while M. sapientum, known as obvious banana, is normally eaten crude when completely develop. develop. Both M. paradisiaca and M. sapientum sapientum are portrayed by higher starch fixation contrasted with unadulterated sharpen

© Eureka Journals 2017. All Rights Reserved.

sharpen gathering. There is an incredible assorted variety of sweet bananas as far as plant stature, organic product size and shading shading (yellow, green, red, and orange), to be be specific M. nana Lour for Dwarf Cavendish, M. rubra Firming von Wall for red banana, M. corniculata Lour for horn plantain, and numerous others. Most profitable cultivars are are Cavendish bananas and monster French plantains. Out of more than 50 assortments of banana developed crosswise over India, 20 are are normally developed (simmonds, 1962; Robinson, 1996; Stover and Simmonds, 1987; Valmayor et al., 1999; Valmayor et al., 1999; Mohapatra et al., 2010).

PARTS USED

Various parts of banan are used in the treatment of various diseases. Commoly used parts are: fruits, stem, roots and flower. The fruit is used as astringent and mild laxative. It aids in combating diarrhaea and dysentery and promotes healing of intestinal lesions in ulcerative colitis and also useful in celiac disease, constipation and peptic ulcer. Root is used in anthelmintic disease, flower is used as astringent and juice of stem is used as otalgia and haemoptysis (Mitchel. 1980; Namaganda *et al.,* 2000; Ndowora and Lockhart. 2000; Nyine and Pillay. 2007; Ortiz *et al.,* 1995; Vijayakumar *et al.,* 2008; Vuylsteke *et al.,* 1997; Zake *et al.,* 2000).

COMMOM MEDICINAL USES

Bananas are broadly devoured by the general population everywhere throughout the world because of its nourishment esteem and fantastic fantastic remedial impact. Musa Species are having different important pharmacological exercises like antiulcer, sterile, diuretic, against disease, safe depressant, hostile to jungle fever, against dysentary, hostile to heart consume, stomach settling agent, cell reinforcement and so so forth. Musa species having gigantic pharmacological activity are as take after:

Iron deficiency

High in press, bananas can invigorate the creation of hemoglobin in the blood thus help in instances of paleness.

Circulatory strain

The remarkable tropical organic product is to a great degree high in potassium yet low in salt, making it the ideal sustenance for containing pulse and decrease the danger of circulatory strain and stroke.

Intellectual prowess

Having bananas at breakfast, break and lunch in an offer to help the mental aptitude.

Clogging

High in fiber, incorporating bananas in the eating routine can help reestablish typical inside capacity beating the issue without falling back on purgatives.

Discouragement

As per current study embraced by mind among individuals experiencing misery numerous felt much better in the wake of eating banana. This is on account of bananas contain tryptophan, a sort of protein that the body changes over into serotonin-known to influence you to unwind, enhance your mind-set and by and large influence you to feel more joyful.

Aftereffects

One of the snappiest methods for curing an aftereffect is to make a banana milkshake, sweetened with nectar. The banana quiets the stomach and with the assistance of the nectar, develops exhausted glucose levels, while the drain calms and rehydrates your framework.

© Eureka Journals 2017. All Rights Reserved.

Acid reflux

Bananas have a characteristic acid neutralizer impact in the body so on the off chance that you experience the ill effects of heart-consume, have a go at eating a banana for calming help.

MORNING SICKNESS

Eating on bananas between suppers keeps glucose step up and abstain from morning disorder.

MOSQUITO BITES

Before going after the creepy crawly nibble cream, take a stab at rubbing the influenced territory with within a banana skin. Numerous individuals discover it incredibly fruitful at decreasing swelling and disturbance.

NERVES

Bananas are high in B vitamins that assistance quiet the sensory system.

DEPRESSION

Banana are good as they contain a protein called serotonin-which is called the happy hormone' as it makes one feel happy and relaxed.

SMOKING

Bananas can also help people trying to give up smoking as the high levels of vitamin C, vitamin A_1, vitamin B_6, vitamin B_{12} they contain, as well as the potassium and magnesium found in them, help the body recover from the effects of nicotine withdrawal.

STRESS

Potassium is an essential mineral, which standardizes the pulse, sends oxygen to the mind mind and controls your body's water-balance.when we are focused on, our metabolic rate rises, in this way diminishing our potassium levels. These can be re-adjusted with the assistance of a high-potassium banana nibble.

TEMPERATURE CONTROL

Numerous different societies consider bananas to be a 'cooling' natural product that can bring down both the physical and enthusiastic temperature.

ULCERS

The banana is utilized as the dietary sustenance against intestinal scatters due to its delicate surface and smoothness. It is the main crude organic product that can be eaten without trouble in finished interminable ulcer cases. It additionally killed over-corrosiveness and lessens disturbance by covering the coating of the stomach.

Saturating

A pounded banana is connected on a face is extraordinary saturating and sustaining worn out and dry skin.

Impact ON GASTROINTESTINAL SYSTEM

Different arrangements of dried unripe plantain banana were utilized as a part of headache medicine incited ulcerations in rats. Albeit ready ready natural product bananas were dormant, dried unripe bananas indicated antiulcer action and were powerful both as a prophylactic treatment and in recuperating ulcers officially initiated by headache medicine. They found that that the dynamic part was water dissolvable and and the antiulcer activity of banana gave off an impression of being because of its security to animate the development of gastric mucosa (Best, et al., 1984). The impacts of various natural natural factors on the antiulcer impact of banana banana were likewise detailed and this impact was available in essentially in the unripe, green plantain banana and the antiulcer standard gave gave off an impression of being available in

© Eureka Journals 2017. All Rights Reserved.

develop unripe organic products (Goel, et al., 1985). Orally directed mash powder of M. sapientum var. paradisiaca had a noteworthy antiulcer movement in rats. Banana powder expanded mucosal thickness as well as expanded expanded thymidine fuse into mucosal DNA. The The banana treatment expanded recoloring by alcian blue in the apical cells. In addition, banana-banana-treated and control segments were likewise recolored for DNA. The banana-treated segments demonstrated a more noteworthy accumulation and force of pink spots when contrasted with controls. The banana powder treatment fortified mucosal protection against ulcerogens as well as advanced recuperating by inciting expansions (Goel, et al.,1986; Orhan. 2001) and its impacts on gastric mucosal protection (Mukhopadhyaya, et al., 1987). Banana suspensions have demonstrated that bananas are exceptionally surface dynamic at both fluid air and strong fluid interfaces and go about as gastric mucosal boundary (Hills, and Kirwood, 1989). Concentrates of plantain banana, banana, collection of eicosanoids in hatches of human gastric and colonic mucosa. The ethanolic ethanolic separate caused a fixation subordinate subordinate increment in the eicosanoid aggregation however the water division was inert. Since all the eicosanoids contemplated tended to build, banana may act by expanding the accessibility of arachidonate (Goel, et al., 1989).The defensive limits of new green sweet bananas alongside phosphatidylcholine and pectin as banana fixings against intense (ethanol-(ethanol-or indomethacin-actuated) and constant constant (indomethacin-incited) gastric mucosal mucosal sores were assessed in rats. The banana banana suspension reduced acute lesions as did pectin and phosphatidylcholine in higher concentrations. In the model of chronic ulcers, the banana suspension provided an incomplete and temporary protective effect (Dunjic, el al., 1993). The active antiulcerogenic ingredient was was extracted from unripe plantain banana by solvent fractionation and it was identified as the the flavonoid leucocyanidin (Lewis, *et al.,* 1999).

1999).

EFFECTS ON BLOOD GLUCOSE AND CHOLESTEROL

Banana is frequently limited in the eating regimen for diabetics attributable to the high substance of free sugar. In under-ready bananas, bananas, starch contitutes 80-90 % of the starch starch content as the banana ages changes into free sugars. The expansion in blood glucose in insulin subordinate diabetics after various organic organic product dinners including apple, banana banana and orange by contrasting and an equivalent measure of glucose was examined. The postprandial blood glucose reactions to glucose, apple and banana were relatively indistinguishable. In this way, it was presumed that these natural products contain significant measures of fructose (Vaaler, et al., 1982). The glycaemic reaction to suppers with banana, apple, orange, grapes, honeydew, and strawberry strawberry in 10 insulin-subordinate diabetics, the little measure of starch in apple and banana may have added to their lower blood-glucose reaction contrasted with alternate natural products tried (Hoover-Plow,et al.,1987). The plasma glucose and insulin reactions were resolved in 10 non-insulin-subordinate diabetes mellitus female patients following the ingestion of some tropical organic products including pineapple, mango, banana, durian and rambutan. rambutan. The outcomes displayed that the glucose-reaction bends to mango and banana were essentially not exactly those to rambutan, durian and pineapple (Roongpisuthipong, et al., 1991). The impact of maturing on the postprandial blood glucose and insulin reactions reactions to banana, 10 compose 2 noninsulin subordinate diabetic patients expended three suppers comprising of under-ready banana and over-ready banana on independent days. Glycaemic files of the under-ready and over-ready bananas varied. The low glycaemic reaction

© Eureka Journals 2017. All Rights Reserved.

reaction of under-ready contrasted and over-ready bananas might be credited to the high starch content (Hermansen, et al., 1992). In an investigation on banana (Musa sapientum), fundamentally utilized as a part of Indian society society drug for the treatment of diabetes mellitus, oral organization of chloroform concentrate of the banana blossoms in alloxan-prompted diabetic rats for 30 days appeared in a a huge decrease in blood glucose, glycosylated heamoglobin and an expansion in complete hemoglobin (Pari and Maheswari.1999). Considering there is a decline in starch and an expansion in free sugar substance of banana because of dynamic readiness, plasma glucose, serum insulin, C-peptide, and plasma glucagon reactions to bananas with expanding degrees of readiness were inspected on 7 male subjects with with untreated non-insulin subordinate diabetes diabetes mellitus. The glucose, insulin, C-peptide, peptide, and glucagon zone reactions differed little with readiness of the bananas (Ercan, et al., al., 1993). Impact of bolstering disengaged dietary fiber of banana (M. paradisiaca) on the digestion of starches in the liver was examined. Fiber encouraged rats indicated fundamentally bring down levels of fasting blood glucose and higher convergence of liver glycogen (Usha, et al., al., 1989). The mash of banana natural product (M. sapientum var. covendishii) was inspected for for its cholesterol-bringing down impact with male rats encouraged on an eating routine containing grease and cholesterol. Stop dried banana mash demonstrated a noteworthy cholesterol-bringing down impact when consolidated into an eating regimen. Starch and tannin arranged from banana mash were not in charge of this impact. Banana lipids did not influence the convergence of serum cholesterol. cholesterol. Both dissolvable and insoluble filaments fractionated from banana mash had a cholesterol-bringing down impact. The dissolvable and insoluble segments of dietary fiber take part in the hypocholesterolaemic impact of banana mash (Horigome, et al., 1992, Usha, et al., 1984). Dietary fiber detached from unripe banana adjusted the level of aortic glycosaminoglycans in rats nourished sans cholesterol and cholesterol eat less carbs. Level of hyaluronic corrosive, heparan sulfate, chondroitin-4-sulfate, chondroitin-6-sulfate, dermatan sulfate and heparin brought up in aorta aorta of the rats sustained without cholesterol abstain from food. In rats encouraged cholesterol cholesterol eat less carbs, level of heparan sulfate, chondritin sulfate and heparin raised while hyaluronic corrosive demonstrated an abatement (Usha, et al., 1991).

EFFECT ON DIARRHEA

Diarrhea is among the foremost disorders responsible for high mortality and morbidity in children. Banana flakes were examined against diarrhea in eternally fed patients. These patients with diarrhea and receiving enteral feedings were randomized to receive both banana flakes and medical treatment for diarrhea. Both banana flakes and medical treatments reduced the severity of diarrhea in critically ill tube-fed patients. The banana flakes can be used as a safe, cost-effective treatment for diarrhea (Emery, *et al.,* 1997, Malik, *et al.,* 1991).

EFFECT ON URINARY SYSTEM

Impact of stem extact of banana on glycolic corrosive oxidase (GAO) and lactate dehydrogenase (LDH) chemicals in liver tissues of of sodium glycolate-incited hiperoxaluric rats. Movement of GAO was fundamentally brought down in the concentrate treated rats contrasted contrasted with that of the glycolate-nourished rats. The LHD brought altogether up in glycolate directed rats when contrasted and the concentrate treated rats (Kailash and Varalakshmi. 1992). The banana stem extricate on urinary hazard factors in a creature model of hyperoxaluria was performed on male rats. In the the rats treated with fluid banana stem remove,

© Eureka Journals 2017. All Rights Reserved.

remove, urinary oxalate discharge was decreased decreased when contrasted and the controls. The The concentrate decreased urinary oxalate, glycolic and glyoxylic corrosive and phosphorus discharge in the hyperoxaluric rats. The concentrate seemed to have no impact on urinary calcium discharge. The banana stem concentrate might be a helpful operator in the treatment of patients with hyperoxaluric urolithiasis (Poonguzhali and Chegu.1994).

EFFECT ON MUSCULAR SYSTEM

Banana trunk press as a neuromuscular blocker. The juice of banana trunk makes a non-depolarising neuromuscular piece and oxygenation of the think enhances its energy (Lee, et al., 1980; Lee, et al., 1980). What's more, the focus of banana stem juice was represented to start twitch expansion in skeletal muscles (Singh, and Dryden, 1990). The think of the banana trunk juice was estimated in the limited phrenic nerve-stomach muscle plan of the rat. Monopotassium oxalate was seen to be the dynamic compound and the effect of this compound on the muscle plan was analyzed. The monopotassium oxalate could be accountable for the strong loss of movement caused by the juice of banana trunk (Benitez,et al.,1991). The stem juice of banana, used as a jolt hurt in Africa, was attempted in a comparative kind of trial. Lyophilized, to some degree sterilized concentrates of the juice extended and after that blocked both direct and by suggestion evoked withdrawals of the mouse stomach. The dynamic portions were perceived as potassium nitrate and magnesium nitrate. The two dynamic genuine measures in the banana stem juice were potassium nitrate and magnesium nitrate (Singh, et al., 1993).

EFFECT AGAINST CANCER AND MUTAGENITY

The protective effect provided by banana and papaya for colorectal cancer (Lohsoonthorn and Danvivat. 1995). Dietary patterns were assessed assessed in detail by use of a food frequency. The The strongest protection was observed for banana intake (Deneo-Pellegrini, *et al.,* 1998). Methanol extracts prepared from 48 plant families which were comprised of edible Indonesian plants were tested for their in vitro antitumor-promoting activities using the tumor promoter 12-0-hexadecanoylphorbol-13-acetate acetate (HPA)-induced Epstein-Barr virus (EBV) activation test in Raji cells. A high capability of consumable Southeast Asian plants including banana for tumor chemoprevention was shown (Murakami, et al., 1998). Antimutagenic properties of three concentrates from every one one of the chose plants were researched utilizing utilizing a preincubation mutagenity examine with Salmonella typhimurium strain TA1538 against the mutagenity of the heterocyclic amine amine 2-amino-3-methylimidazol [4,5-f]quinoline f]quinoline (IQ). The solid antimutagenic activites activites in a few nourishment plants, for example, rice, watercress, pawpaw, taro leaves, green banana and mango. Conceivable dynamic mixes in these concentrates were accounted for to incorporate chlorophylls, carotenoids, flavonoids, and coumarins, a large number of which are likewise known to be anticarcinogens (Botting, et al.,(1999).

EFFECT ON MIGRAINE

In patient suffering from migraine, establish the possible correlation between migraine and food intolerance. Each patient was challanged weekly in an open trial, introducing in the diet the different foods. They were controlled in a simple double blind study. Skin tests, plasma levels of total and spesific IgE and histamine plasma levels at the beginning and at the end of the diet. After the dietetic treatment, the food responsible of the migraine attacks recognized as cacao, banana, egg, and hazelnuts (Guariso, *et al.,* 1993).

EFFECT ON HYPERTENSION

© Eureka Journals 2017. All Rights Reserved.

The impact of banana on icy pressure incited hypertension, top expiratory stream rate and plasma angiotensin changing over chemical (ACE) movement in sound human volunteers was tried. Systolic circulatory strain, diastolic pulse and mean blood vessel pulse were essentially diminished amid chilly worry after banana treatment contrasted with controls subjected to cool pressure. There was no critical changes in heart rate and pinnacle expiratory stream rate yet just noteworthy diminishing in plasma ACE movement after banana treatment (Sarkar, et al., 1999).

EFFECT AGAINST BACTERIAL GROWTH

Concentrates arranged from the peel and pulps of bananas in expanding phases of maturing were assessed for their capacity to tweak the development of non-pathogenic and pathogenic microbes. Concentrates expanded the development of gram-negative bacterial strains Escherichia coli, Shigella flexneri, Enterobacter cloacae and Salmonella typhimurium, and also two nonpathogenic E. coli strains. The development of gram-positive microorganisms was not adjusted by any of the concentrates (Lyte, et al., 1997). In an antibacterial examine performed in Japan, banana demonstrated antibacterial action against E. coli and S. aureus (Ono, et al., 1991).

Impact ON ENZYMES

The proteolysis of casein by trypsin, chymotrypsin chymotrypsin and papain was hindered by matured and unripened banana cultivars named named as bontha, poovan, nendran, cavendish and rasthali bananas in India. The restraint of trypsin, chymotrypsin and papain by various matured banana cultivars was substantially more more than that of unripened banana cultivars. In In this investigation, the plausible part of unripened banana papain inhibitors in curing stomach ulcers and antinutritional part of matured banana trypsin inhibitors were shown (Rao, et al., 1991). The concentrate arranged from banana blossoms (M. sapientum) caused a diminishing in free radical development in the rodent tissues. The lessening in thiobarbituric corrosive receptive substances and the expansion expansion in diminished glutathione, glutathione glutathione peroxidase, superoxide dismutase and catalase demonstrated the cell reinforcement properties of the banana bloom remove (Pari and Umamaheswari. 2000). As oxidative harm of lipids, proteins, and nucleic acids is ensnared in the pathology of numerous constant maladies, an awesome intrigue was produced by numerous exploration bunches in investigating the significant phytochemicals with with cancer prevention agent properties in banana. This investigation is of principal significance as the nourishing nature of products products of the soil is exceedingly factor with its its assortments, climatic conditions, soil compose, temperature, light power and numerous more factors. The phytochemical profiles of natural products is subject to development, cultivars, topographical birthplace, birthplace, developing season, post reap capacity capacity condition and preparing procedures (Zarina and Tan. 2013; Ortiz and Vuylsteke. 1998; 1998; Ortiz and Vuylsteke. 1994; Rawal. 1996; Sengooba. 1986; Sharrock et al., 2001; Simmonds Simmonds and Weatherup. 1960; Simmonds. 1966; Smith et al., 2005; Ssebuliba. 2002).

Discussion

Products of the soil are rich wellsprings of different wellbeing valuable phytochemicals, for for example, flavonoids, phenols, vitamins, minerals, sugars and so forth (Craig and Beck. 1999). These phytochemicals are utilized as a part part of the diminishment of occurrence of certain certain degenerative ailments, for example, cardiovascular maladies, diseases, joint inflammation and so forth (Atmani, et al., 2009; Southon, et al., 2000). Banana is a standout amongst the most broadly dispersed and expended organic product in the tropical and

© Eureka Journals 2017. All Rights Reserved.

subtropical nations (Mohammad and Saleha. 2011). Thinking about the wholesome viewpoints, it is one of the world's driving sustenance crops with an extraordinary wellspring of minerals, vitamins, sugars, flavonoids, phenolic mixes and so on (Guyle`ne Aurorea, *et al.,* 2009; Argent. 1976; Blomme and and Ortiz. 2000; Chandler. 1995; Daniells *et al.,* 2001; Fortescue and Turner. 2004; Fullerton and and Stover. 1990; Lim *et al.,* 2007; Lockhart *et al., al.,* 1995; Maria *et al.,* 2004; Marinova *et al.,* 2005; Meda *et al.,* 2005; Miean and Mohamed. 2001). It can be consumed both as cooked and uncooked form. As oxidative damage of lipids, proteins, and nucleic acids is implicated in the pathology of many chronic diseases, a great interest was developed. The phytochemical composition and the antioxidant properties of banana fruit, to date a comparative evaluation of of various phytochemicals and its antioxidant properties in banana varieties mostly consumed. consumed. This study is of paramount importance as the nutritional quality of fruits and and vegetable is highly variable with its varieties, varieties, climatic conditions, soil type, temperature, light intensity and many more factors. The phytochemical profiles of fruits is dependent on maturity, cultivars, geographical origin, growing season, post harvest storage condition and processing techniques (Shixin, *et al.,* 2010; Burda, *et al.,* 1990; De Freitas and Glories. 1999; Donovan, *et al.,* 1998; Kim, *et al.,* 2001). The fact that banana is used in the preparation of many commercial dietary supplements and processed food products highlights the importance of studies on the phytochemical and antioxidant studies of the most popular and widely consumed varieties of banana in a region (Guyle`ne Aurorea, *et al.,* 2009). A wide variability in the local availability of of different varieties of a particular fruit, along with an inter alia cultural and socio economic difference influence the dietary pattern of people people living in different parts of the world. In this context analysis of potent health protective phytochemicals of most widely consumed varieties of banana locally available is of vital importance as it provides information on phytochemical and antioxidant intake. Besides, it it provides an idea regarding the type and variety variety of banana that has to be included in the daily diet for best possible health benefits. The disease protective role played by fruits and vegetables in the human diet has tremendously increased the research on fruits and vegetables (Jimaima, *et al.,* 2007; Alothman, *et al.,* 2009; Li, Li, *et al.,* 2011; Torunn, *et al.,* 2009; Jittawan and and Sirithon 2011; Hyeonji, *et al.,* 2012; Hui-Yin and Gow-Chin 2007; Shixin, *et al.,* 2010; Antonio, Antonio, *et al.,* 2010; Dae-Ok, *et al.,* 2003; Shaida, Shaida, *et al.,* 2011). Phenolics and flavonoids, the bioactive health beneficial factors implicated implicated in the prevention of a variety of diseases like cardiovascular diseases, cancers and and neurodegenerative disorders has gained considerable interest (Atmani, *et al.,* 2009; Gonzalez-Gallego, *et al.,* 2010; Pari and Umamaheswari. 2000; O'Hara, *et al.,* 1998). It was seen that total phenolic and flavonoids contents varied significantly between the varieties.

CONCLUSIONS

Whole banana plant is useful in food, feed, pharmaceutical, packaging, and many other industrial applications. In India, huge numbers of of the social and religious services require entire entire banana tree, aside from leaves and organic organic products. Product of this plant isn't just a a rich wellspring of sugar, cell reinforcements, yet yet in addition a decent wellspring of mineral, particularly potassium and iron, perfect nourishment for weaning mother and babies. Peel is rich in vitamins, pectin, sugar, and lignin and can be utilized as dairy cattle bolster, base material for liquor creation, biogas generation and for pectin extraction. Fiber got from banana banana pseudostem and sheath can be used as biodegradable restricting ropes. Substance can be

© Eureka Journals 2017. All Rights Reserved.

be used as shading safeguard and even as nourishment when appropriately handled. Leaves Leaves are great lignocellulosic source and have assortments of employments from encourage to to wrapping materials for specific sustenance item and even as covering material in banana developing spots. Aside from starch recouped from plant, squeeze too has nutraceutical properties and has a potential use in pharmaceutical industry. Musa species (Musaceae), are utilized as a society drug in India, India, Pakistan and some other southeast nations. nations. Top notch and consumable products of Musa sp. have been a nourishment hotspot for people since hundreds of years. In this way, banana is developed especially for its organic products on the planet. Notwithstanding its healthful esteem, various organic movement thinks about have been done on banana and these investigations demonstrated that this nourishment plant has had bioactivities including including antidiabetic, antiulcerogenic, antitumoral, and so forth. The speculation of its utilization in people medication against a few issue, additionally inquire about is expected to recognize the dynamic segments in banana removes and to assess their natural exercises. Musa acuminata have different phytoconstituents, the botanical parts of this plant contained Carbohydrates, Phenols, Steroids, Flavanoids, Saponins. The banana blooms are great wellsprings of cell reinforcements including phenolics and flavonoids. Banana blooms ought to be considered as a standout amongst the most dynamic substance which may emphatically influence human-wellbeing and can be utilized as as a part of sustenance industry as an added substance. Regular cell reinforcements that are available in M. acuminata are in charge of repressing or keeping the injurious results of oxidative pressure. The banana fills in as a characteristic store of different strengths valuable phytochemicals and there exist noteworthy contrasts in the phytochemical sythesis. Musa is thought to be more advantageous to wellbeing as far as cancer prevention agent potential. The levels of a few different phytochemicals display. Hence it is exceedingly prescribed to incorporate appropriate blend of natural products in your everyday count calories, whose phytochemicals synergistically act to diminish the danger of degenerative maladies like cardiovascular ailment, tumor and so on. In future, hereditary building of these natural products can be embraced in a view to hoist the phytochemical levels, subsequently joining applicable sums through our day by day consume less calories.

REFERENCES

[1]. Abera AM, Gold CS, Kyamanywa S, Karamura EB. Banana weevil, Cosmopolites sordidus (Germar), ovipositional preferences, timing of attack and larval survivorship in a mixed cultivar trial in Uganda. In: Craenen, K, Ortiz, R, Karamura, E.B, & Vuylsteke (Eds.) Proceedings of the International Conference on Banana and Plantain for Africa. Acta Horticurae No. 540. 2000, Pg.487-495, International Society for Horticultural Science (ISHS), Leuven, Belgium

[2]. Adeniji T A, Barimalaa I S, Tenkouano, A, Sanni L O, Hart A D. Antinutrients and heavy metals in new Nigerian Musa hybrid peels with emphasis on utilization in livestock production, Fruits, 2008, 63, 65-73.

[3]. Adisa VA, Okey EN. Carbohydrate and protein composition of banana pulp and peel as influenced by ripening and mold contamination, Food Chem, 1987, 25; 85-91.

[4]. Agunbiade SO, Olanlokun JO, Olaofe OA. Quality of chips produced from rehydrated dehydrated plantain and banana. Pak J Nutr, 2006, 5, 471-473.

© Eureka Journals 2017. All Rights Reserved.

[5]. Akaninwor JO, Sodje M. The effect of storage on the nutrient composition of some Nigerian food stuffs: banana and plantain. J Appl Environ Manage, 2005, 9, 9-11.

[6]. Alothman M, Bhat R, Karim AA. Antioxidant capacity and phenolic content of selected tropical fruits from Malaysia, extracted with different solvents. Food Chem, 2009, 115, 785- 788.

[7]. Amin I, Norazaidah Y, Emmy Hainida KI. Antioxidant activity and phenolic content of raw and blanched Amaranthus species, Food Chem, 2006, 94, 47-52.

[8]. Anhwange BA. Chemical composition of Musa sapientum (banana) peels, J Food Technol, 2008, 6, 263-268.

[9]. Antonio J, Melendez M, Fraser PD, Bramley PM. Accumulation of health promoting phytochemicals in wild relatives of tomato and their contribution to in vitro antioxidant activity. Phytochem, 2010, 71, 1104–1114.

[10]. Aparicio-Saguilán A, Sáyago-Ayerdi S, Vargas-Torres G A, Tovar J, Ascencio-Otero TE, Bello-Pérez L A, Slowly digestible cookies prepared from resistant starch-rich lintnerized banana starch. J Food Compos Anal, 2007, 20, 175-181.

[11]. Arabbi PR, Genovese MI, Lajolo, FM. Flavonoids in Vegetable Foods Commonly Consumed in Brazil and Estimated Ingestion by the Brazilian Population. J Agri & Food Chem, 2004, 52, 1124-1131.

[12]. Archibald JG. Nutrient composition of banana skins. J Dairy Sci, 1949, 32, 969-971.

[13]. Argent GCG. The wild bananas of Papua New Guinea. Notes from the Royal Bot. Gard, Edinburgh, 35, 1976, 77-114.

[14]. Atmani D, Chaher N, Berboucha M, Debbache N, Boudaoud H. Flavonoids in Human Health: From Structure to Biological Biological Activity. Curr Nut & Food Sci, 2009, 5, 225-237.

[15]. Aurore G, Parfait B, Fahrasmane L. Bananas-raw materials for making processed food products. Trends in Food Sci Technol, 2009, 20, 78-91.

[16]. Baig MMV, Baig MLB, Baig MIA, Yasmeen M. Saccharification of banana agro-waste by cellulolytic enzymes. Afr J Biotechnol, 2004, 3, 447-450.

[17]. Baree A, Peumans WJ, Menu-Bouaouiche L, Van-Damme EJK, May GD, Herrera A F, Leuven FV, Rouge P. Purification and structural analysis of an abundant thaumatin- like protein from ripe banana fruit, Planta, 2000, 211, 791- 799.

[18]. Benitez MA, Navarro E, Feria M, Trujillo J, Boada J. Pharmacological study of the muscle paralyzing activity of the juice of the banana trunk. Toxicon, 1991, 29, 511-515.

[19]. Best R, Lewis DA, Nasser N. The antiulcerogenic activity of the unripe plantain banana (Musa species). Br J Pharmacol, 1984, 82,107-116.

[20]. Blomme G, Ortiz R. Preliminary assessment of root systems morphology in Musa. In: Craenen, K, Ortiz, R, Karamura, E.B, & Vuylsteke (Eds.) Proceedings of the International Conference on Banana and Plantain for Africa. Acta Horticurae No. 540. 2000, Pp.259-266, International Society for Horticultural Science (ISHS), Leuven, Belgium

[21]. Botting KJ, Young MM, Pearson AE, Harris PJ, Ferguson LR. Antimutagens in food plants eaten by Polynesians: micronutrients, phytochemicals and protection against bacterial mutagenicity of the heterocyclic amine 2-amino-3-methylimidazo[4,5-f]quinoline. Food Chem. Toxicol, 1999, 37, 95-103.

[22]. Burda S, Oleszek W, Lee CY. Phenolic compounds and their changes in apples

© Eureka Journals 2017. All Rights Reserved.

during maturation and cold storage. J Agri & Food Chem, 1990, 38, 945–948.

[23]. Castro-Gomez RJH, Tamburini ER, Cal-Vidal J. Alcohol from tropical crop residues. Pesquisa Agro Brasil, 1998, 23, 1151-1159.

[24]. Chan E. Tropical Plants of Southeast Asia, Periplus Editions, Singapore, 1998, 12-13.

[25]. Chandler S. The nutritional value of bananas. In: Bananas and Plantains. Gowen, S. (ed). Chapman & Hall, London, 1995, pp 468-480.

[26]. Cheirsilp B, Umsakul K. Processing of banana-based wine product using pectinase and alpha-amylase, J Food Process Engg, 2008, 31, 78-90.

[27]. Chopra RN, Nayer SL, Chopra IC, Glossary of Indian medicinal plants: NISCAIR, 1952,142.

[28]. Clarke W P, Radnidge P, Lai T E, Jensen PD, Hardin MT. Digestion of waste bananas to generate energy in Australia, Waste Manage, 2008, 28, 527-533.

[29]. Cordeiro N, Belgacem MN, Torres IC, Moura JCVP. Chemical composition and pulping of banana pseudo-stems, Ind Crops Prod, 2004, 19, 147-154.

[30]. Craig W, Beck L. Phytochemicals: health protective effects. Canadian J Diet Prac & Res 1999, 60, 78-84.

[31]. Dae-Ok K, Seung WJ, Chang YL. Antioxidant capacity of phenolic phytochemicals from various cultivars of plums. Food Chem, 2003, 81, 321-326.

[32]. Daniells,J, Jenny C, Karamura D, Tomekpe K. Musalogue: A catalogue of Musa germplasm. Diversity in the genus Musa. Arnaud, E, & Sharrock, S. (Eds.) International Network for the Improvement of Banana and Plantain, Montpellier, France, 2001.

[33]. Davey M W, Van-den Bergh I, Markham R, Swennen R, Keulemans J. Genetic variability in musa fruit provitaminA. Chem, 2009, 115, 806-813.

[34]. De Freitas VAP, Glories Y. Concentration and compositional changes of procyanidins in grape seeds and skin of white Vitis vinifera varieties. J Sci Food & Agri, 1999, 79, 1601–1606.

[35]. De Langhe EA, Karamura D, Mbwana A. Tanzania Musa Expedition 2001. INIBAP, Montpellier, France.

[36]. Deneo-Pellegrini H, De Stefani E, Ronco A. Vegetables, fruits, and risk of colorectal cancer: a case-control study from Uruguay. Nutr Cancer, 1998, 25, 297-304.

[37]. Diaz-Perales A, Blanco C, Sánchez-Monge R, Varela J, Carrillo T, Salcedo G. Analysis of avocado allergen (Prs a 1) IgE-binding peptides generated by simulated gastric fluid digestion. J Allergy Clin Immunol, 2003, 112, 1002-1007.

[38]. Dickinson A. Recommended Intakes of Vitamins and Essential minerals. In: CRN (Council for responsible Nutrition). The benefits of Nutritional Supplements, 2000.

[39]. Donovan JL, Meyer AS, Waterhouse AL. Phenolic composition and antioxidant activity of prunes and prune juice (Prunus domestica). J Agri & Food Chem, 1998, 46, 1247–1252.

[40]. Dormond H, Boschini C, Rojas A. Effect of two levels of ripe banana peel on milk production by dairy cattle, Agron Costarricense, 1998a, 22, 43-49.

[41]. Dormond H, Boschini C, Zuniga AM. Effect of four levels of ripe banana peel on rumen degradability of dry matters from Kikuyo grass (Pennnisetum clandestinum) and African Star grass (Cynodon nlemfluensis) in Jersey cows, Agron Costarricense, 1998b, 22, 163-172.

[42]. Drury R, Donnison I, Bird CR, Seymour GB. Chlorophyll catabolism and gene expression in the peel of ripening banana fruits, Physiol Plantar, 1999, 107, 32-38.

[43]. Duke JA, Bogenschutz MJ, Cellier GJD. Hand book of Medicinal Herbs: 2006, 2, 54-55.

© Eureka Journals 2017. All Rights Reserved.

[44]. Dunjic BS, Svensson I, Axelson J, Adlercreutz P, Ar'Rajab A, Larrson K, Bengmark S. Green banana protection of gastric mucosa against experimentally induced injuries in rats. A multicomponent multicomponent mechanism? Scand. J. Gastroenterol, 1993, 28, 894-898.

[45]. ED informatics, Education for the information age. July 12 2006, Pp.4.

[46]. Eddy NO, Ebenso EE. Adsorption and inhibitive properties of ethanol extracts of Musa sapientum peels as a green corrosion inhibitor for mild steel in H. Afric J Pure Appl Chem, 2008, 2, 46-54.

[47]. Emaga TH, Andrianaivo RH, Wathelet B, Tchango JT, Paquot M. Effects of the stage of maturation and varieties on the chemical composition of banana and plantain peels. Food Chem, 2007, 103, 590-600.

[48]. Emaga TH, Robert C, Ronkart SN, Wathelet B, Paquot M. Dietary fibre components and pectin chemical features of peels during ripening in banana and plantain varieties, Biores Technol, 2008, 99, 4346-4354.

[49]. Emery EA, Ahmad S, Koethe JD, Skipper A, Perlmutter S, Paskin DL. Banana flakes control diarrhea in enterally fed patients. Nutr. Clin. Pract, 1997, 12, 72-75.

[50]. Englberger L, Darnton-Hill I, Coyne T, Fitzgerald MH, Marks GC. Carotenoid-rich bananas: a potential food source for alleviating vitamin A deficiency. Food Nutr Bull, 2003, 24, 303-318.

[51]. Ercan N, Nuttall FQ, Gannon MC, Lane JT, Burmesiter LA, Westphal SA. Plasma glucose and insulin responses to bananas of varying ripeness in persons with noninsulin dependent diabetes mellitus. J Am Coll Nutr, 1993, 12, 703-709.

[52]. Faturoti BO, Emah GN, Isife BI, Tenkouano Tenkouano A, Lemchi J. Prospects and determinants of adoption of IITA plantain and banana based technologies in three Niger Delta States of Nigeria, Afric J Biotechnol, 2006, 5, 1319-1323.

[53]. Forsyth WGC. Banana and Plantain. In Nagy, S. and Shaw, P.E, (Eds). Tropical and Subtropical Fruits, pp. 258-278, AVI Publishing, Westport, 1980CT.

[54]. Fortescue JA, Turner DW. Pollen fertility in Musa: Viability in cultivars grown in Southern Australia. Aust J Ag Res. 2004, 55, 1085-1091.

[55]. Frison E, Sharrock S. 1999, The economic, social and nutritional importance of banana in the world. In: Picq C, Foure, E, Frison E.A (Eds). Banana and Food Security International Symposium, Douala, Cameroon, 10-14 November, 1998.

[56]. Fullerton A, Stover RH. 1990 Sigatoka leaf spot diseases of bananas. INIBAP, Montpellier, France, 1990.

[57]. Goel RK, Chakrabarti A, Sanyal AK. The effect of biological variables on the antiulcerogenic effect of vegetable plantain banana. Planta Med, 1985, 2, 85-88.

[58]. Goel RK, Gupta S, Shankar R, Sanyal AK. Antiulcerogenic effect of banana powder (Musa sapientum var. paradisiaca) and its effect on mucosal resistance. J Ethnopharmacol, 1986, 18, 33-44.

[59]. Goel RK, Tavares IA, Bennett A. Stimulation of gastric and colonic mucosal eicosanoid synthesis by plantain banana. J Pharm Pharmacol, 1989, 41,747-750.

[60]. Gold CS, Speijer PR, Karamura EB. Rukazambuga ND. Assessment of banana weevils in East African highland banana systems and strategies for control. In: Valmayor, R.V. et al (eds.), Proc. Banana Nematode /Borer Weevil Conference. Kuala Lumpur, 18-22 April 1994. INIBAP, Los Banos, pp. 170-190.

[61]. Gonza´lez-Gallego J, Garcı´a-Mediavilla MV, Sa´nchez-Campos S, Tunon, MJ. Fruit

© Eureka Journals 2017. All Rights Reserved.

polyphenols, immunity and inflammation. British J Nut, 2010, 104, 15–27.

[62]. González-Montelongo R, Gloria Lobo M, Mónica G. The effect of extraction temperature, time and number of steps on the antioxidant capacity of methanolic banana peel extracts. Separation and Purification Tech, 2010, 71, 347–355.

[63]. Guariso G, Bertoli S, Cernetti R, Battistella P.A, Setari, M, Zacchello, F. Migraine and food intolerance: a controlled study in pediatric patients Pediatr. Med. Chir, 1993, 15,57-61.

[64]. Guylene Aurorea, Berthe P, Louis F. Bananas, raw materials for making processed food products. Trends in Food Sci & Techn, 2009, 20, 78-91.

[65]. Halliwell B. The biological toxicity of free radicals and other reactive oxygen species. In:Aruoma OI, Halliwell B (eds). Free radicals and food additives. Taylor and Francis Ltd, London, 1991, pp. 33- 57.

[66]. Handa SS. Plants as drugs, The Eastern Pharmacist, 1991, 34(397), 79-85.

[67]. Hassan N M, Banana industry and R&D in Malaysia, Advancing banana and plantain R & D in Asia and the Pacific, in Proc1 BAPNET Steering Committee Meeting (BAPNET, Los Banos, Laguna, Philippines) 2002.

[68]. Hermansen, K, Rasmussen, O, Gregersen, S, Larsen, S. Influence of ripeness of banana on the blood glucose and insulin response in type-2 diabetic subjects. Diabet Med, 1992, 9,739-743.

[69]. Hills BA, Kirwood CA. Surfactant approach to the gastric mucosal barrier: protection of rats by banana even when acidified. Gastroenterology, 1989. 97, 294-303.

[70]. Holt GA, Chandra A. Herbs in the modern headline environment- An overview of uses, legalities and the role of the healthcare professional, Clinc. Res. Regulatory Affairs, 2002, 19, 83-107.

[71]. Hoover-Plow J, Savesky J, Dailey G. The glycaemic response to meals with six different fruits in insulin-dependent diabetics using a home blood glucose monitoring system. Am. J. Clin. Nutr, 1987, 1987, 45, 92-97.

[72]. Horigome T, Sakaguchi E, Kishimoto C. Hypocholesterolaemic effect of banana (Musa sapientum L. var. cavendishii) pulp in the rat fed on a cholesterol-containing diet Br. J. Nutr, 1992, 68,231-244.

[73]. Hui-Yin C, Gow-Chin Y. Antioxidant activity and free radical-scavenging capacity of extracts from guava (Psidium guajava L.) leaves. Food Chem, 2007, 101, 686–694.

[74]. Hyeonji K, Hana K, Ashik M, Rajendra G, Kwang SA, Somi KC. Induction of apoptosis by ethanolic extract of mango peel and comparative analysis of the chemical constitutes of mango peel and flesh. Food Chem, 2012, 133, 416–422.

[75]. IITA. Plantain and Banana Improvement Program-Annual Report for 1997. International Institute of Tropical Agriculture, Onne, Nigeria 1998.

[76]. Ilori MO, Adebusoye SA, Lawal AK, Awotiwon OA. Production of biogas from banana and plantain peels, Adv Environ Biol, 2007, 1, 33-38.

[77]. INIBAP. Conservation through utilization of bananas and plantains in the Great Lakes region of East Africa-Final Report. INIBAP, Montpellier, France, 2003.

[78]. Jarald E E, Jarald S E, Colour Atlas of Medicinal Plants: Common names and classification, CBS Publishers and Distributors, 2006, 185-186.

[79]. Jeger MJ, Eden-Green S, Thresh JM, Johanson A, Waller JM, Brown AE. Banana Banana diseases. In: Gowen, S.R. (ed.) Bananas and Plantains, pp. 317-381. Chapman and Hall, London, 1995.

[80]. Jimaima L, Craige TV, Mark W, Naiyana W, Subramanium S, Robert P. Phytochemical

© Eureka Journals 2017. All Rights Reserved.

flavonols, carotenoids and the antioxidant properties of a wide selection of Fijian fruit, vegetables and other readily available foods. Food Chem, 2007, 101, 1727–1741.

[81]. Jittawan K, Sirithon S. Phytochemicals and antioxidant activity of different fruit fractions (peel, pulp, aril and seed) of Thai gac (Momordica cochinchinensis Spreng). Food Chem, 2011, 127, 1138–1145.

[82]. Johanson A, Tushemereirwe W, Karamura EB. Distribution of Sigatoka leaf spots in Uganda as determined by species-specific polymerase chain reaction (PCR). In: Craenen, K, Ortiz, R, Karamura, E.B, & Vuylsteke (Eds.) Proceedings of the International Conference on Banana and Plantain for Africa. Acta Horticurae No. 540. Pg. 319-334, International Society for Horticultural Science (ISHS), Leuven, Belgium, 2000.

[83]. Joshi SG. Medicinal Plants: Oxford and IBH Publishing, 2000, 286-287.

[84]. Justesen U, Knuthsen P, Leth, T. (1998). Quantitative analysis of flavonols, flavones, and flavanones in fruits, vegetables and beverages by high-performance liquid chromatography with photo-diode array and mass spectrometric detection. J Chromatography A, 1998, 799, 101-110.

[85]. Kailash P, Varalakshmi P. Effect of banana stem juice on biochemical changes in liver of normal and hyperoxaluric rats. Indian J. Exp. Biol, 1992, 30, 440-442.

[86]. Kambuou RN. Status of banana R & D, production and consumption in Papua New New Guinea, report published in advancing advancing banana and plantain R & D in Asia and the Pacific, in Proc 1BAPNET Steering Committee Meeting (BAPNET, Los Banos, Laguna, Philippines) 2002, 125-138.

[87]. Kanazawa K, Sakakibara H, High content of dopamine, a strong antioxidant, in 'Cavendish' banana. J Agric Food Chem, 2000, 48, 844-848.

[88]. Karamura DA. Numerical Taxonomic Studies of the East African Highland Bananas (Musa AAA-East Africa) in Uganda. A thesis submitted for the degree of Doctor of Philosophy, Department of Agricultural Botany, the University of Reading. January, 1999.

[89]. Karamura E, Frison E, Karamura DA, Sharrock S. Banana Production systems in Eastern and Southern Africa. In: Banana and Food Security by Picq, C, Foure, E, Frison, E.A (Eds.) International Symposium, Douala, Cameroon, 10-14 November, 1999.

[90]. Karugaba A, Kimaru G. Banana production in Uganda. An essential food and cash crop. Technical Hand book No.18. RELMA, Nairobi, Kenya, 1999.

[91]. Kashaija IN, Speijer PR, Gold CS, Gowen SR. Occurrence, distribution and abundance of plant parasitic nematodes on bananas in Uganda. Afr. Crop Sci. J. 1994, 2:99-104.

[92]. Katongole CB, Bareeba FB, Sabiiti EN, Ledin I. Nutritional characterization of some tropical urban market crops wastes, Anim Feed Sci Technol, 2008, 142, 275-291.

[93]. Khanum F, Swamy MS, Sudarshana Krishna KR, Santhanam K, Viswanathan KR. Dietary fibre content of commonly fresh and cooked vegetables consumed in India, Pl Foods Hum Nutr, 2000, 55, 207-218.

[94]. Kim YC, Koh KS, Koh JS. Changes of flavonoids in the peel of Jeju native citrus fruits during maturation. Food Science and Biotechnology, 2001, 10, 483–487.

[95]. Kochhar S L. Economic Botany in the tropics, Published by Macmillan India Ltd, 1998.

© Eureka Journals 2017. All Rights Reserved.

[96]. Kokate CK, Purohit AP, Gokhale SB, Text book of pharmacognosy: Nirali Prakashan, Prakashan, Pune, 1996, 1-2.

[97]. Lee SK, Ng LL, Lee SI. Experiments with banana trunk juice as a neuromuscular blocker Aust. J. Exp. Biol. Med. Sci, 1980, 58,591-594.

[98]. Lee SK, Ng LL, Lee, Si I. Experiments with banana trunk juice as a neuromuscular blocker Med. J. Malaysia, 1980, 34,423-425.

[99]. Lehmann U, Robin F. Slowly digestible starch-its structure and health implications: a review, Trends in Food Sci Technol, 2007, 18, 346-355.

[100]. Lewis DA, Fields WN, Shaw GP. A natural flavonoid present in unripe plantain banana pulp (Musa sapientum var. paradisiaca) protects the gastric mucosa from aspirininduced erosions J. Ethnopharmacol, 1999, 65,283-288.

[101]. Li F, Bo-Tao X, Xiang-Rong X, Ren-You G, Yuan Z, En-Qin X, Hua-Bin L. Antioxidant capacities and total phenolic contents of 62 fruits. Food Chem, 2011, 129, 345–350.

[102]. Lim YY, Lim TT, Tee JJ. Antioxidant properties of several tropical fruits: A comparative study. Food Chem, 2007, 103, 1003–1008.

[103]. Lockhart BEL, Olszewski NE, Hull R. Genus Badnavirus. Arch. Virol. Supp. 1995, 10. Pp.185-188

[104]. Loeseck HW. Chemical changes during ripening bananas: chemistry physiology and technology, Interscience, 1950, 4, 67-118.

[105]. Lohsoonthorn, P, Danvivat, D. Colorectal cancer risk factors: a case-control study in Bangkok Asia Pac. J. Public. Health, 1995, 8,118-122.

[106]. Lustre AO, Sorano MS, Morga NS, Balagot A H, Tunac MM. Physico-chemical changes in 'Saba' bananas during normal and acetylene-induced ripening, Food Chem, 1976, 1, 125-137.

[107]. Lyte M. Induction of gram-negative bacterial growth by neurochemical containing banana (Musa paradisiaca) extracts FEMS Microbiol. Lett, 1997, 154, 245-250.

[108]. Malik LA, Azim S, Good MJ, Iqbal M, Nawaz M, Ashraf L, Bukhtiari N. Feeding practices for young Pakistani children: usual diet and diet during diarrhea J. Diarrhoeal Dis. Res, 1991, 9, 213-218.

[109]. Maria GA, Sonia PT, Celestino SB, Julian CRG. Evaluation of the antioxidant properties of fruits. Food Chem, 2004, 84, 13–18.

[110]. Marinova D, Ribarova F, Atanassova M. Total phenolics and total flavonoids in bulgarian fruits and vegetables. J University of Chem Techn & Metallurgy, 2005, 40, 255-260.

[111]. Marriott J, Robinson M, Karikari SK. Starch and sugar transformation during the ripening of plantains and bananas, J Sci Food Agric, 1981, 32, 1021-1026.

[112]. Meda A, Lamien CE, Romito M, Millogo J, Nacoulma OG. Determination of the total phenolic, flavonoid and proline contents in burkina fasan honey, as well as their radical scavenging activity, Food Chem, 2005, 91, 571–577.

[113]. Memon JR, Memon SQ, Bhangar MI, Memon GZ, El-Turki A, Allen GC. Characterization of banana peel by scanning electron microscopy and FT-IR and its use for cadmium removal, Colloids Surfaces B: Biointerfaces, 2008, 66, 260-265.

[114]. Miean KH, Mohamed S. Flavonoid (Myricetin, Quercetin, Kaempferol, Luteolin, and Apigenin) Content of Edible Tropical Plants. J Agri & Food Chem, 2001, 49, 3106–3112.

[115]. Mitchel, G.A. Banana Entomology in the Windward Islands: Final report, 1974-1978.

© Eureka Journals 2017. All Rights Reserved.

London, Centre for Overseas Pest Research. 1980, Pp. 216.

[116]. Mohammad ZI, Saleha A. Musa paradisiaca L. and Musa sapientum L.: A Phytochemical and Pharmacological Review. J of Appl Pharm Sci, 2011, 01, 14-20.

[117]. Mohapatra D, Mishra S, Sutar N. Banana and its by-product utilisation: an overview. J Sci & Indust Res, 2010; 69: 323-329.

[118]. Morton J. Banana. In: Fruits of warm climates. Julia F. Morton, Miami, FL. 1987, pp. 29-46.

[119]. Mukherjee PK, Sahu M, Suresh B, Indian Herbal Medicines, The Eastern Pharmacist, 1998, XLI (490), 21-30.

[120]. Mukhopadhyaya K, Bhattacharya D, Chakraborty A, Goel RK, Sanyal AK. Effect of banana powder (Musa sapientum var. paradisiaca) on gastric mucosal shedding J. Ethnopharmacol, 1987, 21, 11-19.

[121]. Murakami A, Morita H, Safitri R, Ramlan A, Koshimizu K, Ohigashi H. Screening for in vitro antitumor-promoting activities of edible plants from Indonesia Cancer Detect. Prev, 1998, 22, 516-525.

[122]. Mustaffa MM, Sathiamoorthy S. Status of banana industry in India, report published in Advancing banana and plantain R & D in Asia and the Pacific, in Proc 1BAPNET Steering Committee Meeting (BAPNET, Los Banos, Laguna, Philippines) 2002, 81-92.

[123]. Nakanishi K. An historical perspective of natural products chemistry: In S. Ushino (Edn.), Comprehensive, 1999, 1, 23-40.

[124]. Namaganda JM, Karamura E, Namanya P, Gowen SR, Bridge, J. Studies on host range range of the banana lesion nematode, Pratylenchus goodeyi. In: Craenen, K, Ortiz, Ortiz, R, Karamura, E.B, & Vuylsteke (Eds.) Proceedings of the International Conference on Banana and Plantain for Africa. Acta Horticurae No. 540. pp 419-425. International Society for Horticultural Science (ISHS), Leuven, Belgium, 2000.

[125]. Namasivayam C, Kanchana N. Waste banana pith as adsorbent for color removal from wastewaters, Chemosphere, 1992, 25, 1691-1705.

[126]. Namasivayam C, Prabha D, Kumutha M. Removal of direct red and acid brilliant blue by adsorption on to banana pith, Biores Technol, 1998, 64, 77-79.

[127]. Ndowora TCR, Lockhart BEL. Development of a serological assay for detecting serologically diverse banana streak virus isolates. In: Craenen, K, Ortiz, R, Karamura, E. B, & Vuylsteke. Proceedings of the International Conference on Banana and Plantain for Africa. Acta Horticurae No. 540. Pg. 285-292, International Society for Horticultural Science (ISHS), Leuven, Belgium, 2000.

[128]. Nyine M, Pillay M. Banana nectar as a medium for testing pollen viability and germination in Musa. African J Biotechnol, 2007, 6 (10), 1175-1180.

[129]. O'Hara M, Kiefer D, Farrell K, Kemper K. A review of 12 commonly used medicinal plants Arch. Fam. Med, 1998, 7, 523-536.

[130]. Oliveira L, Cordeiro N, Evtuguin DV, Torres IC, Silvestre AJD. Chemical composition of different morphological parts from 'Dwarf Cavendish' banana plant and their potential as a non-wood renewable source of natural products, Ind Crops Prod, 2007, 26, 163-172.

[131]. Ono H, Tesaki S, Tanabe S, Watanebe M. 6-6-Methylsulfinylhexyl isothiocyanate and its homologues as food-originated compounds with antibacterial activity against Escherichia coli and Staphylococcus aureus Biosci. Biotechnol. Biochem, 1998, 62, 363-365.

[132]. Orhan I. Biological activities of Musa species. J Fac Pharm, Ankara, 2001, 30(1) 39-50.

© Eureka Journals 2017. All Rights Reserved.

[133]. Ortiz R, Ferris RSB, Vuylsteke DR. Banana and plantain breeding. In: Gowen, S.R. (ed.) (ed.) Bananas and Plantains, 1995, pp. 110-110-146. Chapman and Hall, London.

[134]. Ortiz R, Vuylsteke D. Quantitative variation and phenotypic correlations in banana and plantain, Sci Hortic, 1998, 72, 239-253.

[135]. Ortiz R, Vuylsteke DR. Future strategy of Musa improvement. In: Banana and plantain breeding: Priorities and strategies. INIBAP, Montpellier, France, 1994, pp. 40-42.

[136]. Pari L, Maheswari JU. Hypoglycaemic effect of Musa sapientum L. in alloxaninduced diabetic rats. J. Ethnopharmacol, 1999, 68, 321-325.

[137]. Pari L, Umamaheswari J. Antihyperglycaemic activity of Musa sapientum flowers: effect on lipid peroxidation in alloxan diabetic rats. Phytother. Res, 2000, 14, 136-138.

[138]. Peumans WJ, Zhang WL, Barre A, Astoul CH, Balint- Kurti PJ, Rovira P, Roue P, May GD, Van-Leven F, Truffa- Bachi P, Van-Damme EJM. Fruit-specific lectins from banana and plantain, Planta, 2000, 211, 546-554.

[139]. Phirke NV, Patil RP, Chincholkar SB, Kothari RM. Recycling of banana pseudostem waste for economical production of quality banana, Resour Conserv Recycl, 2001, 31, 347-353.

[140]. Poonguzhali PK, Chegu H. The influence of banana stem extract on urinary risk factors for stones in normal and hyperoxaluric rats. Br J Urol, 1994, 74, 23-25.

[141]. Prasanna V, Prabha TN, Tharanathan RN. Fruit ripening phenomena—an overview, Critical Rev Food Sci Nutr, 2007, 47, 1-19.

[142]. Ramarao AV, Gurjar MK. Drugs from plant resources an overview. Pharma Times, 1990, 22(5), 19-21.

[143]. Rao NM. Protease inhibitors from ripened and unripened bananas. Biochem Int, 1991, 1991, 24, 13- 22.

[144]. Rawal RD. Fungal disease of banana: Current scenario in India. In: Singh, H.P. and Chadha, K.L. (Eds.) Banana, Improvement, Production and Utilization. AIPUB, NHB, Gurgaon, 1996, India

[145]. Robinson J C, Bananas and Plantains, Crop Production Science in Horticulture (CAB International, UK) 1996.

[146]. Roongpisuthipong C, Banphotkasem S, Komindr S, Tanphaichitr V. Postprandial glucose and insulin responses to various tropical fruits of equivalent carbohydrate content in non-insulin-dependent diabetes mellitus. Diabetes Res Clin Pract, 1991, 14, 123-131.

[147]. Ruales J, Pólit P, Nair BM. Evaluation of the nutritional quality of flakes made of banana pulp and full-fat soya flour, Food Chem, 1990, 36, 31-43.

[148]. Rüdiger H, Gabius HJ. Plant lectins: Occurrence, biochemistry, functions and applications, Glycoconjugate J, 2001, 18, 589-613.

[149]. Sarkar C, Bairy KL, Rao, NM, Udupa EG. Effect of banana on cold stress test & peak expiratory flow rate in healthy volunteers. Indian J Med Res, 1999, 110, 27-29.

[150]. Schoental R, Toxicology of Natural products, Foods Cosmetics Toxicol, 1956 3(4), 609-620.

[151]. Sengooba T. Survey of banana pest problem complex in Rakai and Masaka districts: preliminary trip report. Uganda Ministry of Agriculture, Kawanda Research Station, 1986, 10pp.

[152]. Shaida FS, Nor AMY, Ibrahim ME, Eng MS, Azliana ABS, Supriatno, Kheng LO. Correlation between total phenolic and mineral contents with antioxidant activity of eight Malaysian bananas (Musa sp.). J

© Eureka Journals 2017. All Rights Reserved.

Food Composition and Analysis, 2011, 24, 1–10.

[153]. Sharma R, Medicinal Plants of India: An Encyclopedia, Daya publishing house, 2003, 164-165. Jarald E E, Jarald S E, Colour Atlas of Medicinal Plants: Common names and classification, CBS Publishers and Distributors, 2006, 185-186.

[154]. Sharrock S, Lustry C. Nutritive value of banana, in INIBAP Annual Report (INIBAP, Montpellier, France) 2000, 28-31.

[155]. Sharrock SL, Horry J-P, Frison EA. The state of the use of Musa diversity. In: Cooper, H.D, Spillane, C. and Hodgkin, T. (Eds.) Broadening the genetic base of crop production. Pp. 223-244. CABI, UK, 2001.

[156]. Shixin D, Brett J, West C, Jarakae J. A quantitative comparison of phytochemical components in global noni fruits and their commercial products. Food Chem, 2010, 122, 267–270.

[157]. Simmonds NW, Weatherup STC. Numerical taxonomy of the wild bananas (Musa). New Phytol. 1960, 115, 567-571.

[158]. Simmonds NW. Bananas 2nd Edition. Longmans, London, 1966.

[159]. Simmonds NW. The evolution of bananas, tropical science Series (Longmans, London) 1962.

[160]. Simmonds NW. The Evolution of the Bananas. Longmans, London, 1962.

[161]. Singh YJM, Dryden WF. The augmenting action of banana tree juice on skeletal muscle contraction Toxicon, 1990, 28, 1229-1236.

[162]. Singh YN, Inman WD, Johnson A, Linnell EJ. EJ. Studies on the muscle-paralyzing components of the juice of the banana plant. Arch Int Pharmacodyn Ther, 1993, 324, 105-113.

[163]. Smale M, De Groote H, Falck-Zepeda. 2006, Biosafety and biodiversity risks. In: Melinda, S, Edmeades, S, and De Groote (Eds.). Promising Crop biotechnologies for smallholder farmers in East Africa: Bananas Bananas and Maize. Genetic Resources Policies Briefs 26-2006

[164]. Smith MK, Hamill SD, Becker DK, Dale JL. Musa spp. Banana and Plantian: In: RE litz, ed. Biotechnology of fruit and nut crops CAB International , Wallingford U.K , 2005, 13.1, 366-394.

[165]. Smith NJ, Tucker GA, Jeger MJ. Softening and cell wall changes in bananas and plantains, tropical fruit: technical aspects of marketing, Aspects of Appl Biol, 1989, 20, 57-65.

[166]. Southon S. Increased fruit and vegetable consumption within the EU: potential health benefits. Food Res Inter, 2000, 33, 211-217.

[167]. Ssebuliba R. Fertility in East African Bananas. PhD Thesis submitted to the Department of Crop Science, Makerere University, Uganda, 2002.

[168]. Stover RH, Simmonds NW. Bananas, 3, edn (Longman, London, UK) 1987.

[169]. Subramanian PR, Kadirvel R, Viswanathan K, Chandrasekaran D. In vitro studies and short-term feeding trial in lambs to evaluate plantain sheath (Musa sapientum) as a feed for ruminants, Anim Feed Sci Technol, 1988, 20, 343-348.

[170]. Sumathy V, Jothy Lachumy S, Zakaria Z, Sasidharan S , Pharmacologyonline, 2011, 2, 118-127.

[171]. Tewari HK, Marwaha SS, Rupal K, Ethanol from banana peels, Agric Wastes, 1986, 16, 135-146.

[172]. Tewari HK, Marwaha SS, Rupal K, Singh L. Production of ethyl alcohol from banana peels. J Res Punjab Agric Univ, 1985, 22,703-711.

[173]. Torunn S, Siv FR, Kare AL. Total antioxidant activity in 35 Ugandan fruits and vegetables. Food Chem, 2009, 113, 85–91.

[174]. Tushemereirwe WK, Kangire A, Smith J, Ssekiwoko F, Nakyanzi M, Kataama D,

© Eureka Journals 2017. All Rights Reserved.

Musiitwa C, Karyaija R. An outbreak of bacterial wilt on banana in Uganda. Infomusa. 2003, Vol. 12 No. 2 pp 6-8.

[175]. Udosen EO, Enang MI. Chemical composition and soaping characteristics of peels from plantain (Musa paradisiaca) and banana (Musa sapientum), Global J Pure Appl Sci, 2000, 6, 79-81.

[176]. Ultra VU, Mendoza DM, Briones AM. Chemical changes under aerobic composting and nutrient supplying potential of banana residue compost, Renewable Agric Food Syst, 2005, 20, 113-125.

[177]. Uma S, Kalpana S, Sathiamoorthy S, Kumar V. Evaluation of commercial cultivars of banana (Musa spp.) for their suitability for the fibre industry, Pl Genetic Resour Newslett, 2005, 142, 29-35.

[178]. Usha V, Vijayammal PL, Kurup PA. Aortic glycosaminoglycans in antiatherogenic action of dietary fiber from unripe banana (Musa paradisiaca). Indian J. Med. Res, 1991, 94, 143-146.

[179]. Usha V, Vijayammal PL, Kurup PA. Effect of dietary fiber from banana (Musa paradisiaca) on metabolism of carbohydrates in rats fed cholesterol-free diet. Indian J. Exp. Biol, 1989, 27, 445-449.

[180]. Usha V, Vijayammal PL, Kurup PA. Effect of dietary fiber from banana (Musa paradisiaca) on cholesterol metabolism. Indian J Exp Biol, 1984, 22, 550-554.

[181]. Vaaler S, Wiseth R, Aagenaes O. Increase in blood glucose in insulin-dependent diabetics after intake of various fruits. Acta Med. Scand, 1982, 212, 281-283.

[182]. Valmayor RV, Jamaluddin SH, Silayoi B, Kusumo S, Danh LD, Pascua OC, Espino RRC. Banana cultivar names and synonyms in Southeast Asia, in Advancing Banana and Plantain R & D in Asia and the Pacific, 1999.

[183]. Verma S, Singh SP. Current and Future Status of Herbal Medicines: Veterinary World, 2006. 1(11), 347-350.

[184]. Vijayakumar S, Presannakumar G, Vijayalakshmi NR. Antioxidant activity of banana flavonoids. Fitoterapia, 2008, 79, 279–282.

[185]. Vogel HG. Similarities between various systems of traditional medicine: Considerations for the future of ethnopharmacology. J. Ethnopharmacol, 1991, 35: 179-190.

[186]. Volmayor RV, Jamaluddin S, Silayoi B, Kusumo S, Danh LD, Pascua OC, Espino RRC. Banana Cultivar Names and Synonyms in Southeast Asia. International Network for the improvement of Banana and Plantain- Asia and the Pacific Office, Laguna, Phillipines, 2002, available online at http:/bananas.biodiversity international.org.

[187]. Vuylsteke D, Ortiz R, Shaun BF, Crouch, J.H. Plantain Improvement. Plant breeding reviews, 1997, 14; pp. 267-320

[188]. Wainwright H, Hughes P. Changes in banana pulp colour during ripening, Fruits, 1989, 45; 25-28.

[189]. Wall MM. Ascorbic acid, vitamin A, and mineral composition of banana (Musa sp.) and papaya (Carica papaya) cultivars grown in Hawaii. J Food Comp Anal, 2006, 19, 434-445.

[190]. Wong C, Kiew R, Argent G, Set O, Lee , SK, Gan YY. Assesment of the validity of the sections in Musa (Musaceae) using AFLP, Annals of Botany , 2002, 231-238.

[191]. Wuyts N, De Waele D, Swennen R.

© Eureka Journals 2017. All Rights Reserved.

Extraction and partial characterization of polyphenol oxidase from banana (Musa acuminata Grande naine) roots, Plant Physiol Biochem, 2006, 44; 308-314.

[192]. Yang X T, Zhang Z Q, Joyce D, Huang X M, Xu L Y, Pang X Q. Characterization of chlorophyll degradation in banana and plantain during ripening at high temperature, Food Chem, 2009, 114, 383-390.

[193]. Yavuz Ö, Audin AH. Removal of direct dyes from aqueous solution using various adsorbents, Polish J Environ Stud, 2006, 15; 155-161.

[194]. Zake YK, Bwaniki DP, Nkwiine C. Soil management requirements for banana production on the heavy soils around Lake Victoria in Uganda. In: Craenen, K, Ortiz, R, Karamura, E. B, & Vuylsteke. Proceedings of the International Conference on Banana and Plantain for Africa. Acta Horticurae No. 540. Pg. 285-292, 2000, International Society for Horticultural Science (ISHS), Leuven, Belgium.

[195]. Zarina Z, Tan SY. Determination of Flavonoids in Citrus grandis: Inter Food Res J, 2013, 20(1), 313-317.

[196]. Zhan-Wu sheng , Wei-Hong Ma, Jin-He Gao , Yang Bi, Wei-Min Zhang , Hua-Ting Dou, Zhi Qiang Jin: African J of Biotechnol, 2011,10(21),4470-4477.

© Eureka Journals 2017. All Rights Reserved.