

A REVIEW ON PHARMACOLOGICAL ACTIVITY AND INTRACTION OF *BALANITES ROXBURGHII* (DESERT DATE)

ADITYA R. CHHANVAL, AMOL L. JADHAV, AJINKYA P. JARHAD, VISHNU G. GAVHANE, KRUSHNA J. DUDHMAL

RAOSAHEB PATIL DANVE COLLEGE OF PHARMACY, BADNAPUR

❖ ABSTRACT :-

Balanites roxburghii (Zygophyllaceae/caltrop family), known as 'desert date/ingoriyo'. The tree up to 8- 10 m tall. widely distributed in dryland areas of Maharashtra, Panjab, West Bengal, Rajasthan and Peninsular in India. And also major quantity of dryland areas of Africa and South Asia. It is medicinal used in treatment of various diseases i.e. jaundice, malaria, syphilis, epilepsy, wounds, constipation, hemorrhoid, intestinal worm infection, stomach aches, yellow fever and appendix. It contains carbohydrate, protein, lipid, nutrient sources & these saponin glycosides have a isolated in pure state and their partial structures have been assigned by various hydrolysis, methylation, periodate oxidation.

❖ KEYWORDS :-

Balanites roxburghii, Oil source, Nutritional element, Uses, Harvesting & Cultivation.

❖ INTRODUCTION :-

Balanites roxburghii also common name as 'Desert date/ingoriyo' in English, The family of Zygophyllaceae (caltrop family), is one of the most common wild plant species of the dry land areas of Africa. This tree is found to Africa and parts of the Middle East. In India, it is found in Madhya Pradesh, Rajasthan, Gujarat, and Deccan, Aranya Van and Indroda Park. This is a common tree in Senegal. The tree up to 7- 10 m tall. It contains carbohydrate, protein, lipid, nutrient sources & these saponin glycosides have a isolated in pure state and their partial structures have been various methylation, periodate oxidation. In India, Popular common names of the plants are desert Date, ingorio, hingan, inguja, delil, hegli.



Fig no.1: *Balanites Roxburghii*

❖ TAXONOMICAL PROFILE:-

Kingdom : Plantae

Division : Magnoliophyta

Class : Magnoliopsida

Order : Sapindales

Family : Zygophyllaceae

Genus : *Balanites Delile*

Species : *Balanites aegyptiaca* (L.) Delile

Synonyms: *Ximenia aegyptiaca* L. (excl. *Balanites roxburghii* Planch)

❖ PART USED:-

Seeds,Leaves,fruit & Bark

❖ HISTORY :

The specific one of them roxburghii refers to the Scottish botanist William roxburgh. *Balanites roxburghii* (also known as the Egyptian balsam) is a species of tree, classified as a member of either the zygophyllaceae (caltrop family) or the Balanitaceae. This tree is native to much of south Africa and parts of the Middle East. The generic part of the binomial *Balanites* derives from the Greek word for an acorn and introduced to the fruit, this name was invented by Alire Delile in 1813. in *Descr. Egypte, Hist. Nat.* 221 1813.

❖ BOTANICAL DESCRIPTION:-

It is having consisting of or involving more than two branches, spiny shrub or tree up to 8-10m tall. Trunk short and often branching from

near the lower of base. Branches armed with stout yellow or green thorns up to 7-8cm long.

1.FRUIT AND SEED:-

Fruit is along, narrow drupe, 2 to 7cm long, 1 to 4cm in diameter. Mature fruits are green and tomentose, turning yellow and glabrous. Seed is the pyrene (stone), 1.5 to 3cm long, light brown in colour, fibrous, and many more extremely hard. It makes up 50 to 60% of the fruit part. There are 500 to 1500 dry, washed seeds per kg.

2.FLOWERING AND FRUITING:-

Flowers are tiny in size, hermaphroditic, and pollinated by insects. Seeds are distributed by ingestion by birds and animals. The tree started to flower and fruit at 4 to 7 years of age and highest seed production is when the trees are 15 to 25 years old.

❖ DISTRIBUTION AND HABITAT:-

Natural distribution is obscured by harvesting, cultivation and naturalization. It is believed indigenous to all dry lands south Africa, widely distributed in dry land areas Maharashtra, Panjab, West Bengal Rajasthan and Peninsular in India introduced into cultivation in Latin America and India. It has extensive ecological distribution. After the seedling stage, it is narrow minded to shade and prefers open woodland for natural regeneration. It is a wet lands species, growing up to 1000m elevation and height in areas with mean temperature of 20 to 30°C and mean rainfall of 250 to 400mm

❖ CHEMICAL

CONSTITUENTS:-

Balanites roxburghii produces a group of secondary metabolites, such as polyphenols (phenolic acids, coumarins, flavonoids and), alkaloids, steroids, saponins (open-chain steroidal saponins and spirostanol saponins, furostanol saponins) and pregnane glycosides, isolated from plant tissues, such as leaves, fruit, bark, seeds, balls and stem

roots.

1. FLAVONOIDS:-

Flavonoids exhibit a diphenyl propane–flavone skeleton with a three-carbon overpass between phenyl groups and generally cyclized with oxygen. Epicatechin O-glucoside, hyperoside, isorhamnetin-3-O-glucoside, isorhamnetin 3,7-diglucoside, isorhamnetin 3-O-galactoside, isorhamnetin 3-O-robinobioside, isorhamnetin 3-rutinoside, kaempferol, myricetin, quercetin, quercetin 3-glucoside, quercetin 3-rutinoside and quercitrin are extracted from different tissues such as leaves, fruit, bark, seeds, balls and stem roots of *balanites roxburghii*.

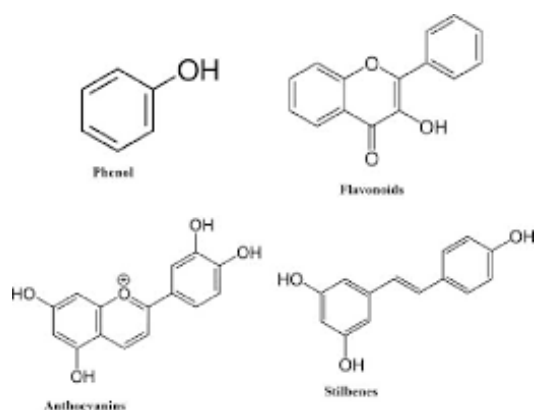


Fig no.2:ChemicalContituentsof desert date

2.COUMARINS:-

Coumarins are phenolic compounds exhibit mix benzene and α -pyrone rings and are known for anticoagulant, anti-inflammatory, antioxidant, antimicrobial, anticancer, and antitumor properties. Coumarins isolated from stem bark .

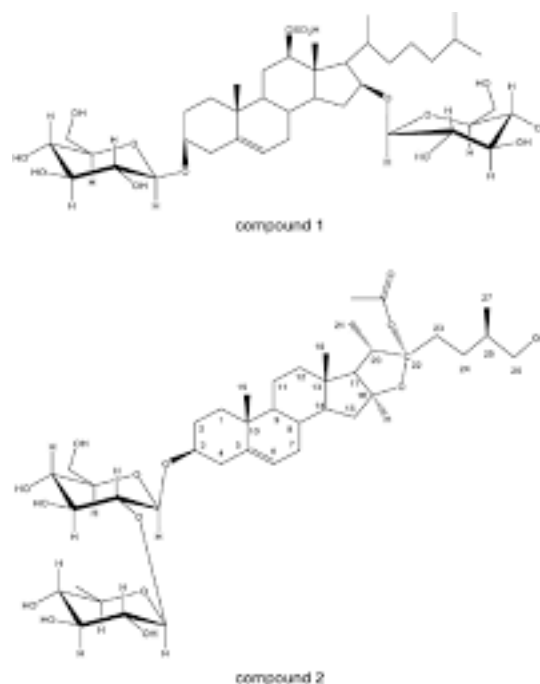


Fig no.3:ChemicalContituentsof desert date

2. SAPONINS:-

Saponins are bio-organic compounds that show triterpenoid or steroidal skeletons that are glycosylated by various numbers of sugar moieties attached at different arrangement. Steroidal saponins are further types into spirostanol, furostanol and open-chain steroidal saponins .Saponins show range of biological properties, including hemolytic element sand antimicrobial, anticancer, anti-inflammatory, insecticidal,. Different spirostanol, furostanol and open-chain steroidal saponins, which are extracted from fruits, seeds, roots and stem bark are presented in desert date.

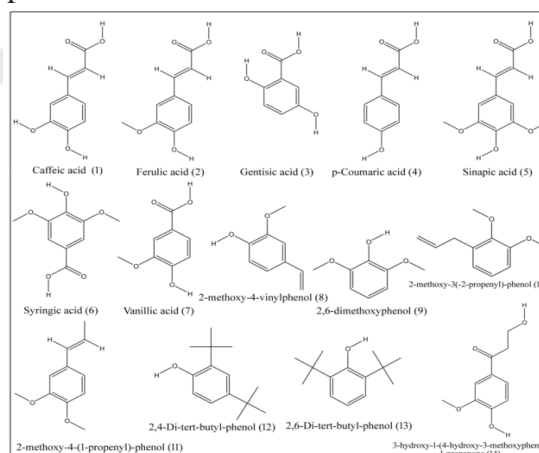


Fig no.4:ChemicalContituentsof desert date

4. ALKALOIDS:-

Alkaloids are compounds that accommodate simple nitrogen atoms and show varied biological actions. They are specific useful for cancer treatment. N-cis-feruloyltyramine, N-trans-feruloyltyramine and trigonelline are some of the alkaloids isolated from stem bark and fruits.

5. POLYPHENOLS:-

Polyphenols show phenolic structural features with two or more aromatic rings, each with two or more hydroxyl groups. Polyphenols are grouped within phenolic acids, lignans flavonoids, stilbenes, and tannins. These compounds are necessary as natural therapeutic agents involved in the treatment of degenerative diseases, particularly cancers, cardiovascular diseases and neurodegenerative diseases.

Phenolic acids are non-flavonoid polyphenolic compounds. Major phenolic acids, which are isolated from tissues of *Balanites roxburghii*, include caffeic acid, ferulic acid, gentisic acid, p-coumaric acid, sinapic acid, syringic acid, vanillic acid, 2-methoxy-4-vinylphenol, 2,6-dimethoxyphenol, 2-methoxy-3-(2-propenyl)-phenol, 2-methoxy-4-(1-propenyl)-phenol, 2,4-di-tert-butyl-phenol, 2,6-di-tert-butyl-phenol and 3-hydroxy-1-(4-hydroxy-3-methoxyphenyl)-1-propanone.

❖ HARVESTING, CULTIVATION AND COLLECTION :-

Fruits are harvested when they turn yellow and the flesh. Fruit can be collected under the trees, component are often prone to insect (seed borer) attack. usually only a portion of the fruits can be collected. Due to the prolonged fruiting period of time collections may be necessary.

A mature tree may yield up to 8000-10,000 fruits per year which equals about 100-150 kg, or 60-80kg of seed. generally a smaller amount is harvestable due to the period of time fruiting season. Seeds may also be obtained from fruits that are starting processed for other purposes.

❖ PROCESSING AND HANDLING :-

The outer fruit must be removed as soon as possible to avoid leavening. If educe is not possible in the field, the fruits should be kept dry in a thin layer during temporary clearing storage. The fruit can be removed after startling the fruits with water. Other the fruits may be fed to live-stock and the stones picked from the excrement. The latter method will kill possible insects in the seeds. After extraction the stones are dried in the sun before storage.

❖ PHARMACOLOGICAL ACTIVITY:-

1) ANTI-INFLAMMATORY ACTIVITY:-

Inflammation is a response to injury, which involves the more of cells, which permission protection from damage. A multiplicity of in vitro and in vivo experiments has exhibited that certain flavonoids and saponins possess anti-inflammatory activity. The mechanism by which flavonoids and saponins exert their anti-inflammatory effects involves the inhibition of cyclooxygenase and lipoxygenase activities

2) Anticancer Activity:-

Cancer is a major health problem. irradiation, chemotherapy and surgical removal are the current prevention methods. However, these methods have varied side effect such as drug resistance and harmful on nontargeted tissues. Therefore, observers are searching for naturally available plant-based nanoparticulate compounds for cancer therapy. Among the plant-based metal containing compounds, saponins and phytosterols have significant importance in decrease the risk of cancer. Various steroidal saponins extracted from various tissues of *Balanites roxburghii* are to display anticancer activities.

3)Antimicrobial Activity :-

Plants made up several antimicrobial mixture, involve phenolics known as simple phenolic acids, flavonoids, , quinones, flavones, flavonols, terpenoids,tannins, coumarins, vital oils and alkaloids. The mechanism of action of these mixture ranges from membrane disorder, substrate deprivation, intercalation into the cell wall/ DNA and enzyme deterrent. Desert date is rich in all these chemicals and show potent antimicrobial activity.

- dysentery
- constipation
- diarrhea
- hemorrhoid
- stomach aches
- asthma, and fever.

❖ SIDE EFFECT:-

This has not been specific side effect determinant.

4)Antioxidant Activity :-

Different kinds of physical and physiological anxiety lead to the overproduction of oxidants in the human body, which can cause oxidative damage of proteins, DNA and lipids. This damage is liable for some disorders in the human body such as cardiovascular diseases, cancer and ancient. It was expressed that minor fruits and nuts possess ample antioxidant chemicals, and the utilization of minor fruits and nuts is benefit to the human body.

❖ CONCLUSION:-

Balanites leaves are a medicinal dry time period green among the Iteso people in north eastern Uganda. Leaf collection involvescutting the young branches and twigs and plucking the young succulent leaves under a tree. Leaves must be evaporating within 22-24 h after collection. The boiled leaves have a short shelf life of only 2 days and this limits their storage and marketing.It has been study proved that balanitesroxburghii possess antimicrobial, anticancer, diuretic, hypocholesterolemic, antioxidant, , antiviral, antidiabetic, anti-inflammatory, hepatoprotective, and anthelmintic, analgesic,protect the heart, antioxidant activity,using Bark, fruits, seeds, seed oil, and leaves of this plant are widely used in medicine.

❖ DOSING:-

The sustainable dose of balanites roxburghii is depends on particular elements such as the patient age, patienthealth, and particular other situations. At that time it is not sufficient biological information to establish an applicable scale of doses for desert date. Keep in mind that natural products are not always defiantly all are safe and dosages can be important. Be sure to follow applicable of directions on product labels and turn to your pharmacist, physician or other healthcare professional before using.

❖ REFERENCES:-

❖ USES:-

It is traditionally used in the treatment of various disease, such as

- jaundice
- intestinal worm infection
- Syphilis,epilepsy

1. Hall JB, Waljer DH, *Balanitesaegyptiaca*Del. A monograph.SchoolofAgriculturalandForestScience.Banger:UniversityofWales;1991.p.1-12.
2. *Balanitesaegyptiacus*(L.)Delile".Germ plasmResourcesInformation Network. United States Department of Agriculture.2008. Available from:

- <http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?6322>. [retrieved on 2009 Oct 2].
3. Hall, J.B. Ecology of a key African multipurpose tree species *Balanites aegyptiaca* Del. (Balaniaceae): The state of knowledge. *Forest Ecol Manag* 1992;50:1-30.
 4. National Plant Data Center, NRCS, USDA. Baton Rouge, LA 70874-4490 USA. <http://plants.usda.gov>. *Balanites aegyptiaca*.
 5. Arora, A.; Tak, L. *Balanites roxburghii*: Physico-chemical properties and composition of fatty acid from the arid zone of Rajasthan. *Int. J. Basic Appl. Chem. Sci.* 2013, 3, 1-5.
 6. Elfeel, A.A. Variability in *Balanites aegyptiaca* var. *aegyptiaca* seed kernel oil, protein and minerals contents between and within locations. *Agric. Biol. N. Am.* 2010, 1, 170-174.
 7. Sadashivam, S.; Manickam, A. *Biochemical Methods*, 3rd ed.; New Age International (P) Limited Publishers: New Delhi, India, 2008.
 8. Khare CP. *Indian medicinal plants: An illustrated dictionary*. Springer; 2007. p. 77-8.
 9. Doughari JM, Pukuma MS, De N. Antibacterial effects of *Balanites aegyptiaca* L. Del. and *Moringa oleifera* Lam. on *Salmonella typhi*. *Afr J Biotechnol* 2007;6:2212-5.
 10. Nkonya MH, Weenen H, Bray DH. Chemical Evaluation of Tanzanian medicinal plants for the active constituents as a basis for the medicinal usefulness of the plants. In: Mshigeni KE, Nkonya MH, Fupi V, Mahunnah RL, Mshiu EN, editors. *Proceedings of International Conference on Traditional Medicinal Plants*. Arusha: 1990. p. 101-11.
 11. Charlemagne, *et al.* Balanitin-6 and -7: Diosgenyl saponins isolated from *Balanites aegyptiaca* Del. display significant anti-tumor activity *in vitro* and *in vivo*. *Int J Oncol* 2008;32:5-15.
 12. Hardman R, Wood CN, Sofowora EA. Isolation and characterization of seed hydrocarbons from *Balanites aegyptiaca* (*B. roxburghii*) and *B. pedicellaris*. *Phytochemistry* 1970;9:1087-92.
 13. Pettit GR, Doubek DL, Herald DL. Isolation and structure of cytostatic steroidal saponins from the African Medicinal plant *Balanites aegyptiaca*. *J Nat Prod* 1991;54:1491-502.
 14. Wiesman Z, Chapagain BP. Laboratory evaluation of natural saponin as a bioactive agent against *Aedes aegypti* and *Culex pipiens*. *Dengue Bull* 2003;27:168-73.
 15. Wani NS, Kabade JB, Kabade MV, Joshi SM and Patil AD. Diuretic activity of leaves of *Balanites roxburghii* Linn. *Int J Pharma Res Dev* 2010;2:4. Available from: <http://ijprd.com/> June%2012.pdf.