

A Short Review On: Parkinsonia Aculeate

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ABSTRACT:

Since the ancient period plants have been utilized by human beings as medicinal agents on the basis of ethno medical background. Parkinsonia aculeata is a species of perennial flowering tree in the pea family, Fabaceae. This chapter contains the descriptions and photographs of cones, flowers, fruits and seeds of woody taxa, belonging to genera. Cancer is the term which indicates the uncontrollable programmed growth of the abnormal cell in the body. It can occur in any part of the body which disturbs the normal mechanism of a working cell. Effect of extracts of Calotropis procera and Parkinsonia aculeata in the treatment of Trypanosoma brucei infected rats was studied. The present study was designed to evaluate the Reno-and hepatotoxicity effects of aqueous extract of Parkinsonia Aculeate leaves in wistar albino rats. Bioactive fractions of the medicinal and food plants have been used by varied human cultures since primitive times. The phytochemicals including phenylpropanoids, isoprenoids, phenolic compounds, flavonoids, carotenoids, alkaloids, sulphated compounds, peptides and polysaccharides that are responsible for various biological activities such as anticancer, antioxidant, antifungal, antibacterial, anti-dysenteric, anti-inflammatory, antiulcer, anti-hypertensive and anticoagulant properties. Medicinal plants have been a major source in the Maintenance of health, as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness. Parkinsonia aculeata may be a spiny shrub or a small tree. It can reach up to 10 m tall, but usually grows 2-6 m in height. The branches are green in colour, hairless (glabrous), and are often drooping (pendulous) or have a zigzag appearance. **KEYWORD:** Parkinsonia aculeata, perennial, photographs, Trypanosoma, phenylpropanoids, glabrous.

I. INTRODUCTION

The genus name Parkinsonia honors the English botanist John Parkinson (1567–1650), while the species Latin name aculeata refers to the

thorny stem of this plant. The name "Jerusalem thorn" stems from a mistranslation of the Spanish/Portuguese word girasol ('turning toward the sun')¹. This is one of the most widespread and well-known woody weeds in hot regions, and has become naturalized and shown weedy tendencies in all countries where it exists, whether native or introduced. It is disliked for its thorns, forming dense impenetrable thickets that degrade pasture, choke waterways and prevent cattle reaching water. It was often introduced as a fodder, hedging or ornamental tree, with an ability to tolerate the driest and most saline sites and waterlogging, but prolific seeding led to rapid spread. It is a prohibited weed in Australia and a serious pest in many other countries.²

Parkinsonia aculeata may be a spiny shrub or a small tree. It grows 2 to 8 m (6.6 to 26.2 ft) high, with a maximum height of 10 metres (33 ft). Palo verde may have single or multiple stems and many branches with pendulous leaves. The leaves and stems are hairless. The leaves are alternate and pennate (15 to 20 cm long). The flattened petiole is edged by two rows of 25–30 tiny oval leaflets; the leaflets are soon deciduous in dry weather (and during the winter in some areas) leaving the green petioles and branches to photosynthesize. The branches grow double or triple sharp spines 7–12 mm (0.28–0.47 in) long at the axils of the leaves.

The flowers are yellow- orange and fragrant, 20 mm (0.79 in) in diameter, growing from a long slender stalk in groups of eight to ten. They have five sepals and five petals, four of them clearer and rhomboid ovate, the fifth elongated, with a warmer yellow and purple spots at the base. The flowering period is in the middle months of spring (March–April or September–October). The flowers are pollinated by bees. The fruit is a seedpod, leathery in appearance, light brown when mature.¹ Jerusalem thorn is a small tree growing to 25 ft tall with a short trunk and a graceful, spreading, sometimes weeping, crown to 20 ft wide. Jerusalem thorn has peculiar straplike, twice compound leaves that look like long, feathery streamers. The leaves appear shortly after rain, they

fold up at night, and usually within a few days the tiny leaflets drop off, leaving the persistent rachises (midribs) to flutter like streamers in the wind. Flowers are yellow and fragrant, 2 cm in diameter, growing from a long slender stalk in groups of 8-10. Though the plant can flower all year round the main flowering period is October.³

Younger plants have compound (pinnate) leaves, but as the plant grows they become twice-compound (bi-pinnate) in nature. These leaves are alternately arranged along the stems, shortly stalked or almost (petiolate or sub-sessile), and drooping (pendulous) in nature.

Each of the twice-compound (bi-pinnatesessile) leaves is divided into one to three pairs of long (20-40 cm), flattened, strap-like branchlets (pinnae). Numerous small, hairless (glabrous), leaflets (pinnules) are borne along these branchlets (pinnae). These leaflets (1-10 mm long and 1-2 mm wide, but mostly only 1-4 mm long) are oblong in shape and are readily shed (caducous) leaving only the long, green, drooping branchlets remaining on the plant. The fruit is an elongated pod that is swollen around each of the seeds (they are torulose). These pods (3-13 cm long and 5-10 mm wide) turn a light brown or straw colour when mature and usually contain 1-6 seeds (occasionally up to eight seeds). The relatively large seeds (9-15 mm long and 3-6 mm wide) are olive green to brownish in colour and are sometimes mottled. They are hard, smooth in texture, and somewhat oval (ellipsoid-ovoid) or oblong in shape.⁴

P. aculeata is a major invasive species in Australia, as it is listed as a Weed of National Significance and is ranked as Australia's worst weed. It is also a major problem in parts of tropical Africa, Hawaii, and other Islands in the Pacific Ocean. It was introduced to Australia as an ornamental tree and for shade around 1900. It is now a serious weed widespread through Western Australia, the Northern Territory and Queensland, covering about 8,000 km² (3,100 sq mi) of land, and has the potential to spread through most of the semi-arid to subhumid tropical area in Australia. It forms dense thickets, preventing access for humans, native animals and livestock to waterways. The fruits (seedpods) float, and the plant spreads by dropping pods into water, or pods are washed downstream by seasonal flooding.

Without the scarifying received by tumbling in streambeds, the seeds are slow to germinate. Several control methods are used to reduce the existing population and the spread of *P. aculeata* in Australia. Three insects have

been introduced to Australia for biological control; the parkinsonia bean weevils, *Penthobruchus germaini* and *Mimosestes ulkei*, both have larvae that specifically eat the seeds from parkinsonia pods and are proving to be a useful management tool, and the parkinsonia leaf bug, *Rhinacloa callicrates*, which destroys photosynthetic tissues but has had little overall impact on the plant. Fire is effective for young trees; mechanical removal and herbicides are also used.¹

The purpose of this paper is to present records of the ten species of Tortricidae that have been reared from *Parkinsonia aculeata*, along with comments on their host range, damage, and geographic distribution. The results of host specificity trials for *Platynota stultana* Walsingham and *Rudenia leguminana* (Busck) are also presented. All of the material listed in the "Specimens Examined" sections was reared from *Parkinsonia aculeata* (unless stated otherwise) during the most recent ongoing study (1995–2009); other records of host-use and geographic distribution are from the literature and/or museum collections.⁵

Parkinsonia aculeata has a high tolerance to drought, simply attaining shorter stature. In moist and humus-rich environments it becomes a taller, spreading shade tree. This plant prefers a full sun exposure, but can grow on a wide range of dry soils (sand dunes, clay, alkaline and chalky soils, etc.), at an altitude of 0–1,500 metres (0–4,921 ft) above sea level.¹



Fig no 1.parkinsonia aculeate⁶

PHYTOCHEMICAL CONSTITUENTS

Phytochemical screening were performed to assess the qualitative chemical composition of different crude extracts using commonly employed precipitation and coloration reactions to identify the major secondary metabolites like alkaloids, terpenes, flavonoids, saponins, steroids, phenolic compounds, tannins and amino acids. The phytochemical analyses were carried out using standard procedures.⁷

The other constituents reported in leaves of *P. aculeata* are C-glycosides; Epi-orientin, a C-glycoside of luteolin which resembles orientin in composition; Parkinsonia-A, a C-glycoside of 5-O-methyl-luteolin which is closely related to orientin and Parkinsonin-B, a C-glycoside of 5,7-di-O-methyl luteolin which has stereochemistry related to epi-orientin (Bhatia et al., 1966). Flavone C-glycoside luteolin which is structurally elucidated as 7, 4'-dimethyl ether 6-C-glucoside has also been isolated from the leaf extract of *P. aculeata* collected from Egypt. From the same extract few of the known compounds (Fig. 2) Orientin, iso-orientin, vitexin, iso-vitexin, lucenin-II, vicenin-II, diosmetin 6-C-β-glucoside, apigenin, luteolin, kaempferol and chrysoeriol were identified by standard procedures and were reported by El-Sayed et al. (1991).⁸

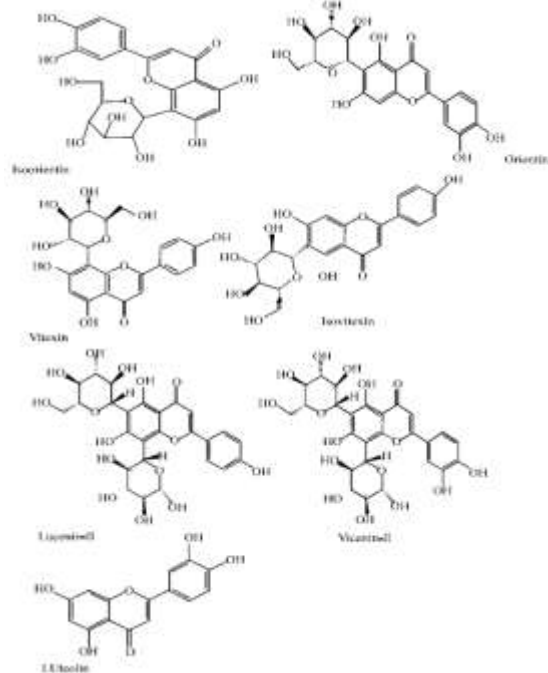


FIGURE NO.2 CHEMICAL CONSTITUTENT OF P.ACULEATA9

BIOLOGICAL ACTIVITIES OF PARKINSONIA ACULEATA

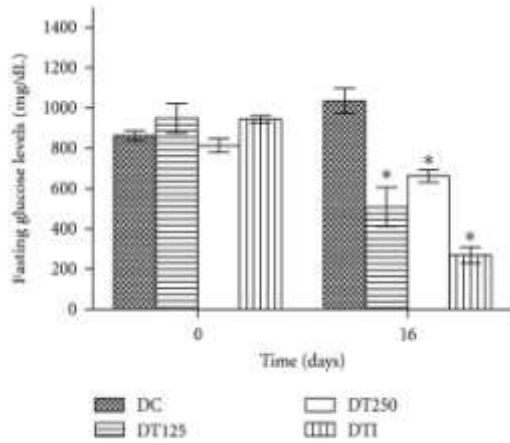
P. aculeata has a wide range of pharmacological and biological activities, including **antibacterial, antidiabetic, antioxidant, antirabies, amoebicidal, hepatoprotective, antispermatogenic, and antimalarial properties.**

1. ANTIBACTERIAL ACTIVITIES.

Then the wells were filled with 50ml of crude extract. The four different concentrations (50%;25%;75;100%ml) of leaves extracted were prepared and were tested for antibacterial activity. The experiment was done three times and mean values were presented. Distilled water was used as standard.¹⁰ The strains of microorganisms obtained were inoculated in conical flasks containing 100 ml of nutrient broth. These conical flasks were incubated at 37 °C for 24 h and were referred to as seeded broth. Media were prepared using Muller Hinton Agar (Himedia), poured on Petri dishes and inoculated with the test organisms from the seeded broth using cotton swabs. Sterile discs of six millimeter width had been impregnated with 20 μl of test extract and introduced onto the upper layer of the seeded agar plate. The plates were incubated overnight at 37 °C. Antibacterial activity was assigned by measuring the inhibition zone formed around the discs.¹¹

2. ANTIDIABETIC ACTIVITIES.

Schematic representation of the proposed effects of the HEPA treatment in alloxan-induced diabetic rats. The group of diabetic rats which were treated with the HEPA showed a significant reduction in serum and urinary glucose, urinary urea, and triglyceride levels. Also, an improvement in hepatic glycogen was observed as well as a decrease in liquid intake and urinary volume, and an enhancement in the weight of skeletal muscles, kidneys, liver, and adipose tissue. Indeed, oral glucose tolerance was higher in diabetic animals treated with HEPA. Together, all observed changes in some of the measured parameters, suggest a reduction on the gluconeogenesis process.¹²



FASTING GLUCOSE LEVEL.13

3. ANTIOXIDANT ACTIVITIES.

The antioxidant activity of the total hydroalcoholic extract, dichloromethane, \ acetate fractions of *P. aculeata* L. were determined at the Regional Center for Mycology and Biotechnology (RCMB) at Al- Azhar University using the free radical 2,2- diphenyl-picrylhydrazyl (DPPH)

$$\%DPPH\text{radical scavenging} = \left[\frac{AC-AS}{AC} \right] * 100$$

Where AC = Absorbance of the control solution and AS = absorbance Of the sample in DPPH solution.

4. ANTI-INFLAMMATORY ACTIVITIES.

It is negative to semi desert vegetation, specially desert valleys and desert grassland zone.



BARK OF PARKINSONIA ACULEATE¹⁶

parkinsonia aculeata a small spiny tree, 4 10 m in height, with a short and often crooked trunk up to 40 cm in diameter, often branching near the ground with a very open crown of branches.

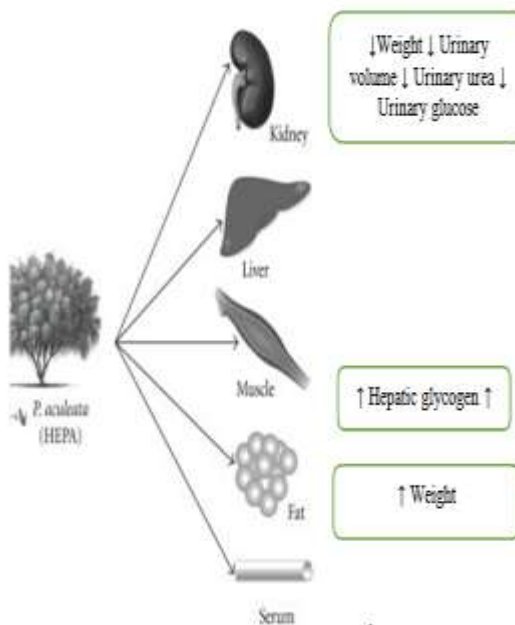
BOTANICAL DESCRIPTION.

Tree.

Jerusalem thorn is a small tree growing to 25 ft tall with a short trunk and a graceful, spreading, sometimes weeping, crown to 20 ft. wide. Jerusalem thorn has peculiar strap like, twice compound leaves that look like long, feathery streamers.¹⁷ Grow up to 4-10 m height with a very short and often corked trunk up to 40 cm in diameter. It remain green throughout the year and appears leafless after leaflets fall.¹⁸



Parkinsonia Aculeata.¹⁹



P.ACULEATA (HEPA)¹⁴(Anti-Diabetic)

Scavenging assay in triplicate, and average values were considered as described by. All the determinations were carried out in three replicates and averaged. The percentage inhibition of the DPPH radical was calculated according to the following formula:¹⁵

BARK:

It is the smooth and yellow-green or blue-green and the branches and twigs are often the same colour.¹⁸ bark of trunk, branches and twigs smooth, yellow-green or blue-green and slightly bitter; twigs slender, slightly zigzag, finely hairy when young, often with spines, 3 or 1 remaining at nodes, including 2 short spines.²⁰

**PARKINSONIA ACULEATA BARK.**²¹**LEAVES:**

Leaves specialized, alternate, bipinnately compound, consisting of very short axis ending in spine 1-2 cm long, and 1 or 2 pairs of long, yellow green drooping side axes, strips or streamers 20-30 cm long and 3 mm broad, flat and slightly thickened; each strip with 20-30 pairs of thin, oblong, green, small leaflets 3-5 mm long, which shed early; strips resembling a blade of grass continue functioning as leaves after leaflets fall.²⁰ They consist of 1 or 2 pairs of 1-2 cm long spiny ended axis. They resemble a blade of grass and continue functioning as leaves after leafletfall.¹⁸

**LEAVES OF PACULETA.**²²**FLOWER.**

Flower Showiness: True Flower, Size Range: 7 - 10 , Flower Type: Solitary ,Flower Sexuality: Monoecious (Bisexual), Flower Scent: Pleasant, Flower Colour: Yellow Seasons: Spring,

Summer.²³ Flower clusters 7.5-20 cm long at leaf bases, unbranched; flowers several on long, slender stalks, irregular and slightly pea shaped, fragrant, showy, golden yellow, 2 cm or more across; calyx a short tube with 5 narrow yellow-brown lobes turned back; corolla of 5 nearly round petals 10-13 mm long, yellow tinged with orange and hairy at base.²⁰

**FLOWER OF P. ACULETA.**²⁴**II. CONCLUSION:**

From The above review we conclude that, The P.aculeata in addition to the highest MOE and MOR as well as the maximum crushing strength, and in comparison with the well-known hardwood species, P. aculeata wood could be considered as a good timber with good strength properties which are preferred by interior designers and make them consider it as a suitable wood species for inter-design works, and indoor furniture. The plant P. aculeata has been widely used in various traditional system of medicine. The plant is also an important source of various types of compounds with diverse chemical structures.

Some morphological character of P.aculeata are given below:

- Scientific: Parkinsonia aculeata
- Common: Jerusalem thorn or Mexican Palo Verde
- Family: Fabaceae(Leguminosae)
- Origin: Mexico

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