Medicinal Properties, Phytochemistry and Pharmacology of *Acacia modesta* (Wall.) Hurter

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DOI 10.28941/pjwsr.v28i3.1058

**ABSTRACT**

The use of medicinal plants is as ancient as human civilization. *Acacia modesta* is an important medicinal plant belonging to the family *Fabaceae* (sub family *Mimosaceae*). This review aims to provide adequate and latest summary of the traditional usage, phytochemistry, pharmacological and ethnobotanical profile of *A. modesta*. The important phyto-constituents of *A. modesta* comprising flavonoids, tannins, alkaloids, fatty acids and polysaccharides (gums) are also highlighted. Pharmacological data on *A. modesta* shows significant haemagglutination, phytotoxic, insecticidal, anti-diabetic, analgesic, anti-inflammatory, antiplatelet aggregatory, antibacterial and acetyl cholinesterase inhibitory characteristics. Furthermore, *A. modesta* is also widely used as fodder, fuel wood, timber, household and furniture materials. Ecological importance of the plant is also worth mentioning for its scented and colorful flowers and it serves as one of the desired plant for honey bee raring and honey production. *A. modesta* is an important, eco-friendly and renewable source of pharmaceuticals with a well-known therapeutic directory. Many researchers have examined its therapeutic potential and common usage through the course of this review.

**Keywords:** *Acacia modesta*, Chemical composition, Gum, Ethnobotanical study, Medicinal plant.


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INTRODUCTION

Natural products have been used by human for a long time to meet their needs for food, shelter, clothing and medicine. According to the World Health Organization (WHO), over 21,000 plants are used for medicinal and other purposes worldwide (Dwivedi and Daspaul, 2013). Currently, around 74% of pharmaceutical products are obtained from plants. It is further estimated that four billion people of the world population (~50%) nowadays use plant derived medicines as primary health remedies (Malviya et al., 2011). Herbal medicines are derived from the organic matter and minerals of the medicinal plants and it has become more popular in developed and developing countries (Sekar et al., 2010). Herb contains therapeutic activities because it is having different bioactive compounds likes resins, glycosides, phenols, steroids, oleoresins, volatile essential oils and terpenes, tannins and alkaloids (Anees, 2010; Seigler, 2003). In the recent years there is a rapid growth in herbal medicine field because of their easy availability, natural origin, no or less side effects, efficacy, and safety with capable to treat immune disorders, memory pasting, and osteoporosis for which presently no medicines are accessible (Grover, 2002; Kambij, 2000).

The word Acacia is derived from Greek word ‘akis’ mean sharp point, majority of Acacia are trees and shrubs while rarely herbs (Muhammad et al., 2015). It is an important genus of family Leguminosae, subfamily Mimosoideae. It was first time described by Swedish botanist Carl Linnaeus in 1773. There are approximately 1380 Acacia species globally, about two-thirds of them are native to Australia, with the rest occurring in tropical and subtropical regions of the world. However, the genus Acacia is relatively large and common in the warm sub arid and arid regions of the world (Seigler, 2003). They are pod-bearing plants with sap and leaves contains large amount of tannins and thick tannins that historically being used as preservatives and pharmaceuticals (Farzana et al., 2014). Complex phenolic compounds (condensed tannins) and polysaccharides (gums) are the most prominent constituents in many Acacia species. It is complicated to explain the structure and the overall toxicity of these compounds due to the lack of biochemical assays of these plants. The situation becomes more complicated because identification and taxonomic relationship of Acacia species is difficult and not clear (Seigler, 2003). Acacia modesta is a member of the Mimosaceae family. The gums produced by the Acacia genus are well known. Furthermore, A. auriculiformis, A. arabica, A. catechu, A. churnea, A. farnesiana, A. jacquemonti, A. leucophloae, A. modesta, A. senegal and A. churnea are famous acacia trees in Pakistan for making gum (National Research Council, 1979). A. modesta is a small or medium sized deciduous tree used mostly as fuel and fodder in different parts of Pakistan. The gum is used in medicines and the tender twigs are regularly used as miswak (tooth brush) for cleaning teeth (Asghar et al., 2003). It is also used as remedy for mouth ulcers, bark is used in gastric pains, skin diseases and has anti-microbial potential (Bashir et al., 2012). A. modesta root extracts have potent antifungal and bactericidal properties against a variety of Gram +ve and Gram -ve bacteria (Rashid and Hashmi (1999). In a similar study Asghar et al. (2003) found anti-bacterial properties of A. modesta twig extracts against Gram positive bacterium Lactobacillus (dental pathogens). Ecological importance of the plant is also interestingly mentioned, due to its scented, attractive and colorful flowers, which serves as one of the favorite honey bee plant. A. modesta has good quality gum, and has potential uses as binder, file, in bakery, and in pharmaceutical industries (Ali, 2015).

Taxonomic classification

Kingdom: \text{Plantae}
Subkingdom: \text{Tracheobionta}
Super division: \text{Spermatophyta}
Division: \text{Magnoliophyta}
Class: \text{Magnoliopsida}
Subclass: \text{Rosidae}
Order: \text{Fabales}
Family: \text{Fabaceae}
Genus: \text{Acacia}
Species: \text{Modesta}

Vernacular names:

- English: Hook thorn
- Urdu: Phulai
- Punjabi: Phalahi
- Pashto: Palosa

Plant description

*A. modesta*, commonly known as Phulai, is a deciduous and slow-growth small tree, dark brown or black wood in color with prickly branches. The tree reaches to a maximum height of 7 m with 20 cm diameter in natural habitat (Azim et al., 2011). The average life span of tree is about 60 years and 30 years felling cycle. The plant starts flowering and the fruiting after two to three years after its germination time. From July to December, the trees produce pods. Dense leaves fall during June, November while, pods are dropped from mid-October to mid-January (Malviya et al., 2011).

**Fig. 1. Acacia modesta** tree at blooming time.

Botanical description

Twigs and Leaf

*A. modesta* have persistent spines, dark brown, shining, 4-5 mm long, sometimes lacking spines. Leaves are compound (pinnate) generally 2-3 pairs rarely one, leaflets (3-5 pairs) 1.2 to 2.5 cm long, broadly oblong or obovate, petiolulate 1 mm long, lamina 4-10 mm long and 3-7 mm broad, oblique, glaucous with conspicuous veins (Sheikh, 1993; Sushila, 2011; Sher et al., 2012).

Flower

Flower of *A. modesta* occurs in auxiliary spikes. The blooming seasons occur twice in a year, one in June and the second one in August. The flowers may be light white or light yellow in color, fragrant and rising in bunches and appears between March and May. The pods are very small about 5 to 7.5 cm long, and mature between May and November (Sheikh, 1993). Inflorescence is spike about 3.7-7.5 cm long, peduncle nearly 1.3-2.5 cm long. Pedicel is about 1 mm long while calyx is about 11.5 mm long, broadly campanulated and glabrous. Corolla is about 2-2.5 mm long. Stamens are indefinite; filamented and about 5 mm long (Ali, 1978).
Fruit
Fruit is Legume or Lomentum (Sher et al., 2012; Sushila, 2011). Fruit pods are about 5 to 7 cm long and 8 to 10 mm broad, and it is also late dehiscing, apex deltoid, flat, thin, straight, glabrous and mucronate (flora of Pakistan).

Seed
Seeds are exalbuminous (Sher et al., 2012; Sushila, 2011). Seeds per pods are 3-5 (flora of Pakistan).

Root
*A. modesta* is deep rooted tree. The roots penetrate far into the soil to find deep moisture.

Stem
Stem is erect, branched and woody having brownish-green or grey bark. The stem bark is rough with irregular cracks (Sheikh, 1993). The wood is hard and sturdy. It is used for cane crushers, agricultural implements and Persian wheels. It is also used as fuel (Flora of Pakistan). Pairs of thorns found on stem and branches below the leaf-stalk, dark brown in colour, shining, recurved, 4-5 mm long and compressed while sometimes thorns absent (Chandigarh Forest Flora).

Pollination
Pollination typically involves insects (Entomophily) (Sher et al., 2012; Sushila, 2011).

Reproduction
It is easily reproduced from seed and by vegetative means. Seed remains viable for 1 year (Sheikh, 1993).

Productivity
It is moderately a slow growing tree, but gives yield 4 to 6 m3 per ha per year in fifty years. For fifty year old trees the average height is 6 m and diameter is 23 cm (Sheikh, 1993).
Occurrence

The *A. modesta* plant is native to Koh-e-Himalayas, Koh-e-Sulaiman Hills, Balochistan; foothill ranges of the Salt Range and the Kirthar Range (Pakistan, India and Afghanistan) below 1200 meter elevation. It is widely dispersed throughout the world's tropical and subtropical climates (Sher *et al.*, 2012; Sushila, 2011; Sheikh, 1993).

Distribution

*A. modesta* is widely distributed in Afghanistan, Pakistan (Khyber Pakhtunkhwa, Punjab, and Baluchistan) and India (Ali, 2014). The plant can grow in areas which receive rainfall 250 mm to 1300 mm yearly. The plant is well adapted to semi-arid and sub-humid regions (Muhammad *et al.*, 2015). It is distributed in the foothills ranges of Himalayas below 1200 meter elevation, Baluchistan, Salt Range, Kirthar Range, Sulaiman Hills, and plains areas which adjacent to these mountains range in Pakistan (Muhammad *et al.*, 2015). *A. modesta* prefers environment having temperatures between -5°C to 40 °C. *A. modesta* occurrence and distribution was reported by Shah *et al.* (2012) in District Kohistan and District Battagram of Khyber Pakhtunkhwa (KP), Pakistan. *A. modesta* is found at an altitude range of 1000-1800m elevation along with some other vegetation like *Adhatoda vesica*, *Monotheca buxfolia*, *Dodonaea viscosae*, *Quercus spp* and *Zyzyphus sativa*.

Ecological habitat

*A. modesta* is a moderately intolerant, drought resistant tree that can grow in all type of soil form. According to ecological research on the plant, *A. modesta* trees may grow on a variety of soil types, including acidic soils, dry to moist soils, and sandy to calcareous soils (Sher *et al.*, 2012; Sheikh, 1993). It grows well under the precipitation range of 250 to 1300 mm per year and mostly prefers semi-arid, sub-humid climatic condition with a temperature range of -5 to 40 °C (Sheikh, 1993). A future 2.3 °C warming could be ecologically significant to induce shifts in the structure and function of the Hayat-ul-Mir forest with reference to *Acacia modesta* and *Olea ferruginea* (Ghafoor *et al.*, 2021). Dense vegetation of *A. modesta* is mostly found in Hindu-Kush Himalayan Mountains lying in Swat Valley (Ali *et al.*, 2015; Ali, 2015).

*A. modesta* have significantly higher plant density, expanded toward the central and southern parts of the Swat Valley, i.e. the lower basin of Himalayas. In light of the literature, it is concluded that the *A. modesta*’s population mass density in the Swat district will be positively affected by the climate change, which means that in 2080, the Himalayas and Swat valley will have more space for *A. modesta*. Phytosociological investigations of *A. modesta* were carried out by Ahmad (2013) at Salt Range of Pakistan at three forests reserved (i.e. Hahatul Mir, Khura West and Khura North). At each location, *Olea ferruginea* – *Acacia modesta* community and *Acacia modesta* pure stand were recognized.

![Fig. 4. (A) Olea ferruginea tree, (B) Acacia modesta tree.](image-url)
Trends In Phenology

The phenological behavior of *A. modesta* demonstrates that the development of new foliar branches, their senescence, fruit formation and subsequent maturation occur at various times throughout the year. On dated branches, young foliar begin to form in March, and young shoot tips begin to form in April. In May and June, foliar leaves cover the most surface area, and maturity occurs in July. Senescence of mature foliage begins in August and intensifies in September, while dropping of leaves occurs in October and November when there is the least amount of leaf cover and the most exposed branches (Muhammad et al., 2015). The blossoming and development of *A. modesta* takes place over multiple seasons and continue until the time of maximum seed output. The commencement of bloom production on ageing branches begins in early May, with the majority of blooms failing to ripen into fruits due to falling debris from heavy storms or torrential rain. Flowering formation varies depending on the geographic distribution and environment of the region. Around 80% of the pods produced during the second blooming stage, which is quite prolific, result from flower emergence on newly formed shoots and older branches. With maturity, seeds and pods are also formed along with flowers, majority of seeds are found in pods that have developed in blooming stages later than pre-flowering stages. The size of the pods varied, ranging from 5 to 8 cm, and ripening starts during November (Muhammad et al., 2015).

Chemical composition of *A. modesta*

A numbers of secondary metabolites are listed by many researchers that are found in different *Acacia* species are named; cyclitols, alkaloids, gums, amines, condensed tannins, hydrolyzable tannins, fluoroacetate, cyanogenic seed oils, glycosides, amino acids, nonprotein terpenes, flavonoids and fatty acids. The most evident and best known chemical compounds are complex phenolic substances (that are condensed tannins) and polysaccharides (that is gums) (Malviya et al., 2011; Seigler, 2003).

![Chemical compounds](image-url)

**Fig. 5.** Some important chemical compounds of *A. modesta.*
In terms of nutritional value of A. modesta, the digestibility values sort from 60% and 70%, depending on the age of the plant as well as type of soil. Results have shown that 22.8% crude fiber, 16.2% crude protein, 8.1% ash, 50.7% nitrogen free extract and 2.1% ether extract (A. modesta fact sheet). The chemical components of A. modesta consists α-amino-β-oxalylaminopropionic acid (neurolathyrogen), hentriacontanol betulin, α-amanirin, pinitol, octacosanol ε-sitosterol, and γ-sitosterol (Jawla et al., 2011).

**PHARMACOLOGICAL ACTIVITY**

**Modesta Gum**

The utmost significant part of A. modesta is the gum having high medicinal value (Glicksman and Sand, 1973). The average yield of the gum is about 250 g per tree per year and the total per year production is almost 60 thousand tons. It is water soluble with high concentration up to 50% by weight, produced a patent mucilaginous low viscosity solution. Gums are intricate carbohydrates that build up in response to stress condition, injury, or any pathogenic attack on the plant like bacteria, fungus and insects (Seigler, 2003). Gums vary widely in structures and have backbones of d-galactopyranose units and also consist of 4-sugars that are d-glucuronic acid, l arabinoose, d-galactose and l-rhamnose, and contains the three cations K+, Ca++ and Mg++ (Glicksman and Sand, 1973).

The gum from A. modesta is highly valued in traditional medicine. The powder gum is frequently used for backaches, diarrhea, dysentery and for treating wounds (Khan et al., 2013). It is used as general health tonic and used in medicines (Ghani et al., 2014; Sher et al., 2011). The local people of Pakistan, mostly the people of mountainous areas, cook the powder gum with Desi ghee (local made ghee from cow and buffalo milk), dates, citrus seeds, water mallon seeds, almonds, walnuts, coconuts, Nashasta (a white powder get from wheat) and poppy seeds, which is locally called Pinjree Halva eaten by women after child birth (Ahmad et al., 2011; Murad et al., 2011). Gum is used by Hazar Nao Forest tribal tribes as a bone and muscular ailment treatment (Murad et al., 2011). The gum was combined with wheat flour and cooked in ghee to relieve lumbar pain. For one month, this food is eaten with a glass of milk or warm water in the morning on an empty stomach (Amjad and Arshad, 2014; Rashid et al., 2011). Gum is restorative. It was also reported that the gum is sex tonic used to develop the man semen quality and to cure uterine wounds in female (Qureshi et al., 2007; Mahmood et al., 2004). Gums and dough are mixed and used for skeletal-muscular ailments (Ahmad et al., 2015). Recently, anti-proliferative and apoptosis-inducing activity of Acacia modesta and Opuntia monacantha extracts on HeLa cells was reported (Abid et al., 2020).

**Acacia modesta twigs**

The plant twigs have antibacterial activity and used as a tooth-brush called Miswak to treat gum diseases and cleansing of teeth (Amjad and Arshad, 2014; Ghani et al., 2014). A. modesta extracts are a rich source of calcium and fluorides which are being utilized commercially in the synthesis of toothpastes which is officially approved by the Pakistan dental association.

**Leaves**

The leaves of A. modesta have cooling effect (Murad et al., 2013). Leaf extract is used to treat ear ache and pamper the ears (Khan et al., 2013). Diluted leaves are used to treat female menstruation irregularities (Qaisar et al., 2013).

**Stem**

When A. modesta stem is burnt, it releases oil. This oil is used to treat pain, particularly muscular pain in the feet (Khan et al., 2013; Sher et al., 2012). Stem bark is used in skin diseases, gastric pains and it also has anti-bacterial and anti-microbial activities (Bashir et al., 2012). Stem bark is used in skin diseases, gastric pains and it also has anti-bacterial and anti-microbial activities (Bashir et al., 2012). Stem is dried and grinded and used for soul’s bruise (Roohani bimare). Ash of wood and bark is used in the preparation of snuff (Qaisar et al., 2013). Bark decoction act as a pain killer (Murad et al., 2013).
Analgesic activity

*A. modesta* leaves and seeds show analgesic activity (Bukhari et al., 2010; Singh et al., 1975). The analgesic effect of *A. modesta* fresh leaves extract was assessed in rodents using formalin-induced nociception and acetic acid, carrageenan and hot plate-induced rat oedema tests. The intraperitoneal direction of the methanolic extract produced significant inhibition of the acetic acid-induced and suppressed formalin-induced licking response of animals in test. The plant extracts increased pain of mice in the hot plate assay. The palliative effect of the extract moderately upturned by Naloxone in formalin and hot plate tests. The sedative effect of *A. modesta* in barbiturate-induced hypnosis test is related to that results produced by diazepam (Bukhari et al., 2010).

Anti-inflammatory activity

*A. modesta* bark and seeds have anti-inflammatory activity (Ghani et al., 2014; Singh et al., 1975). The plant extract produced noticeable anti-inflammatory results similar to diclofenac and produced arachidonic acid inhibitory effects which stimulant platelet aggregation. It was concluded that *A. modesta* possesses anti-inflammatory property (Bukhari et al., 2010).

Anti-platelets activity

*A. modesta* bark and leaves have significant anti-platelets activity (Ghani et al., 2014; Asad et al., 2013; Singh et al., 1975). The inhibitory potential of fresh leaves extract against platelet aggregation was analyzed *in vitro* using arachidonic acid as a control aggregative agent. Before each experiment, the beginning test was carried out to check the platelet response against aggregation induced by arachidonic acid. PRP was first incubated with *A. modesta* methanolic extract for one minute and the platelet aggregation was repressed by dose-dependent method. *A. modesta* create the inhibition of arachidonic acid induced platelet aggregation by 82% (Bukhari et al., 2010).

Antibacterial activity

Antibacterial activity of hot water, cold water and methanolic extracts of *A. modesta* (leaf and stem) was evaluated in opposed to three Gram +ive (*Bacillus subtilis*, *Enterococcus faecalis* and *Staphylococcus aureus*) and two Gram -ive (*Pseudomonas aeruginosa* and *Salmonella typhi*) microorganisms using agar discs diffusion method. The antibacterial action was compared with the standard drugs effects of ciprofloxacin, tranexamic acid, ceftriaxone, cefuroxine, gentamycin, metronidazole, ceftriaxone sodium, and levofloxacine. It was concluded that plant extracts have high antimicrobial potential against many food borne bacteria (Khalid et al., 2011). *A. modesta* extract has significant antibacterial efficacy against dental pathogen *Lactobacillus* (Asghar et al., 2003). The methanolic crude extract and a variety of fractions of *A. modesta* were tested to find out antibacterial activity against *Escherichia coli*, *Klebsiella pneumoniae*, *Streptococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus pumilus*, *Staphylococcus epidermidis*, *Enterobacter aerogenes*, *Streptococcus pneumoniae* and *Salmonella typhi* using agar well diffusion method. All the results were significant (Ahmad et al., 2011). *A. modesta* roots ethanolic and hot extracts also showed strong anti-bacterial activity against *S. aureus*, *E. coli*, *Staphylococcus* and *K. pneumoniae* (Rashid and Hashmi, 1999). Petroleum ether, ethanol and ethanol: water (one each ratio) extracts of *A. modesta* leaves were investigated for antibacterial activity against standard strains of *Proteus mirabilis*, *P. aeruginosa*, *Bacillus cereus*, *S. pneumonia*, *E. coli*, *Bacillus subtilis*, *S. aureus*, *Klebsiella pneumonia* and *Salmonella typhimurium* compared to standards amikacin and clotrimazole, respectively (Jawla et al., 2011).

Antifungal activity

Ethanolic and hot water extracts of *A. modesta* root possess significant antifungal activity against *Rhizoctonia solani*, *Saccharomyces cerevisiae* and *Fusarium* spp. Results show that yeast shows maximum sensitivity action towards...
the extracts (Rashid and Hashmi, 1999). Petroleum ether, ethanol and ethanol: water (one each ratio) extracts of A. modesta leaves were analyzed for antifungal activity against Candida albicans, Cryptococcus albidus (Jawla et al., 2011).

Anti-diabetic activity

Both gum and bark of Acacia modesta is traditionally used as anti-diabetic (Ullah et al., 2010). In normal rats which fed on a diet containing seeds powdered of A. modesta and other Acacia species, the blood sugar level was lower than in rats which fed with a standard semi-purified casein-glucose-starch food, no such variation were noted in alloxan diabetic animals (Singh et al., 1975). Petroleum ether, ethanol and ethanol: water (one each ratio) extracts of A. modesta leaves were administered to both ordinary and alloxan induced diabetic rats. The blood glucose levels were measured regularly on each two days interval after oral application of extracts at doses of 100 and 300 mg kg⁻¹ day⁻¹. For a week application of diabetic rats with extracts reversed the permanent hyperglycemia. The EtOH and EtOH: water extract were found more effective hypoglycemic as compared to glibenclamide (Jawla et al., 2011). Antidiabetic activity of A. modesta leaves extract was also reported by Haq et al. (2012).

Haemagglutination

Haemagglutination potential of the methanolic crude extract and a variety of fractions of A. modesta aerial part were performed against the human erythrocytes. The amount of deposition revealed the strength of the favorable outcome against AB negative, AB positive, O negative and B positive. It was concluded that plant methanolic crude extract and all the fractions showed weak haemagglutination potential against tested samples. However in the experiment some encouraging findings suggested that the plant might contain lectins (Ahmad et al., 2011).

Phytotoxic and insecticidal activities

Effects of cold water, crude methanolic extract, and different fractions of A. modesta on studied insects in terms of phytotoxicity and insecticidal activity Tribolium castaneum Rhizopertha dominica and Callosbruchus analis and tested plant Lemma minor. The results shows that the plant having significant phytotoxic and insecticidal activities (Nazeefullah et al., 2014; Ahmad et al., 2011). Various dilutions of extracts of A. modesta caused significant mortality of Tribolium castaneum. This property of A. modesta is useful for insects’ control and pharmacognostic study. The insecticidal potential of the plant can use as alternative way for insects control through biodegradable plants materials (Nazeefullah et al., 2014).

Anti-acetylcholinesterase and butyrylcholinesterase activities

A. modesta possess anti-acetylcholinesterase and anti-butyrylcholinesterase inhibitory activity (Khan et al., 2006). A. modesta Wall. cultivated in Egypt had promising anti-diabetic agent and a hepato-protective agent against hepatocellular damage induced by hepatotoxins (Saleh et al., 2020).

Allelopathic potential

The preliminary study was done recently by authors to checked the allelopathic potential of A. modesta leaves and roots water extracts of two concentrations (50 and 100 g L⁻¹) using Lettuce plant as tested specie. The results were significant. Leaves show high allelopathic potential to inhibit the germination of tested plant. While minimum data of fresh weight, dry weight and plant height were also recorded (data unpublished).

Ethno-botanical study of A. modesta

Since long time ago, many A. modesta preparations have been used in local medicines to treat a wide range of illnesses, including skeletal-muscular ailsments, persistent stomach problems and back discomfort, especially in women after childbirth (Murad et al., 2011). A.
modesta's decoction of legume and gum resin is used to cure dysentery and as a tonic. Branches can be used to wash teeth. Additionally, people employ this plant as a secondary source of income, using it for wood fuel, lumber for construction, fencing, and as the well-known honey bee tree (Muhammad et al., 2015; Khan et al., 2013; Sher et al., 2012; Sher et al., 2011). Leaves and gum used as tonic, demulcent, dysentery, and stimulant (Ahmad et al., 2013). It can help to control soil erosion and serve as a wind breaker mostly in plan areas (Bee world, 2001).

**Fodder**

The majority of goats and sheep are fed on the leaves of the tree. According to reports, monkeys can be found in regions with thick growths of A. modesta, particularly in the Qaldara and Wartair region, as they eat the twigs of these trees (Amjad and Arshad, 2014; Sher et al., 2012; Sher et al., 2011). Leaves and twigs of A. modesta are excellent source of fodder for livestock. Seasonal differences in the chemical composition of A. modesta twigs and leaves were investigated by Chaudhry et al., 2010. The proximate analysis indicated that crude protein (CP) was ranged from 17.37 - 19.38 %, dry matter (30.72 - 47.48 %), crude fibre (35.5-39.95 %), ether extract (3.49-3.99 %), ash (7.35-10.32 %) and nitrogen-free extract (28.31-35.91 %). According to the nutritional perspective as fodder crop, A. modesta twigs and leaves can be used in the spring. Nutritional evaluation of A. modesta leaves was also determined by Azim et al. (2011) according to AOAC (1990). The results revealed that A. modesta leaves possess high dry matter content (53.43), Crude Protein (16.26), crude fiber (22.80), Ash (8.08), ether extract (2.13) and nitrogen-free extract (50.73). It is concluded that the plant is a good source of minerals, carbohydrates, proteins, fiber and fats and may be recommended to grazing livestock as supplements (Azim et al., 2011).

**Timber**

The wood of A. modesta is extremely hard, acrid, and tenacious. In the construction of agricultural instruments like the plough and others, it is frequently utilized. Plant stems were frequently utilized in door frames and as beams in roofs. Similar to this, the powdered stem wood from A. modesta is also used to create ply hardboard (Amjad and Arshad, 2014; Sher et al., 2012).

**Fuel-wood**

A. modesta has woody, sturdy and firm stem, therefore it burns for a longer period of time (Amjad and Arshad, 2014; Sher et al., 2012; Mushtaq et al., 2012). Brick-making businesses also use it improperly as fuel. For the aim of repining tobacco leaves throughout the winter, several tobacco companies use it as a fuel source inside of buildings. Additionally, locals use it to prepare food in their homes and in ovens to make bread (Sher et al., 2012; Sher et al., 2011).

**Fencing**

Local people cut the branches of A. modesta and use it extensively for fencing purpose in order to protect agricultural fields, home garden from domestic livestock and wild animals and regional grasslands (Sher et al., 2012; Sher et al., 2011).

**Construction and furniture:**

A. modesta is widely used for house building material and to prepare furniture like tables, doors, windows, bed poles etc.

**House hold items**

A. modesta wood is robust and resilient, where indigenous peoples use it to produce the handles for various cutters, axes, knives, saws, spades, sickles, and combs.

**Honey bee plant**

A. modesta flowers are very attractive to honey bees, the honey from A. modesta is very famous and many beekeepers use it (Sher et al., 2012; Sher et al., 2011). The branches of this well-known aromatic and therapeutic tree were used by the honey-bee keepers (Ali, 2015; Sher et al., 2012). The honey gathered from wild bees is a substantial source of food and cash to forest residents. Every year,
approximately 15000 people harvest between 55 and 65 tons of honey from wild bee colonies in Pakistan (Haider et al., 2011).

CONCLUSION

In recent years, plants have grown to be progressively more important source of natural bioactive compounds. About, 25% of all medications have a botanical origin from over 1350 species. However, Acacia is one of the most prolific genera in the Fabaceae family. The majority of Acacia species; A. nilotica, A. Arabica and A. modesta are abundant in secondary metabolites; tannins, alkaloids, flavonoids, seed oils, and gums. A. modesta is commonly distributed in foothill ranges of the Salt Range, Koh-e-Himalayas, Koh-e-Sulaiman Hills, Baluchistan and the Kirthar Range (Pakistan, India and Afghanistan).

Gum is very important product of A. modesta having highly medicinal value. The powder gum is used for healing wounds and most commonly used for backache, diarrhea and dysentery. This review reveals that A. modesta possess analgesic, anti-inflammatory, anti-platelets, anti-acetylcholinesterase, anti-microbiological, anti-diabetic, and antibutyrylcholinesterase properties. Additionally, people employ this plant as a secondary source of income and use it to make wood fuel, lumber for construction projects, fencing and a attractive honey bee tree. Future investigations on A. modesta should be focused on identification and isolation of byproducts in order to boost the recognition of this therapeutic plant in the prevailing consumer market.
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