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A REVIEW ON *Carthamus oxycantha*

Mansoor Ahmad[1]*, Imran Waheed[1], Muhammad Khalil-ur-Rehman[2], Uzma Niaz[2] and Syed Saeed-ul-Hassan[2]

[1]Faculty of Pharmacy, University of Karachi, Karachi, Pakistan
[2]College of Pharmacy, University of the Punjab, Allama Iqbal campus, Lahore-54000, Pakistan

ABSTRACT

South Asian Regions including India, Pakistan and Bangladesh are very rich in medicinal plants and have about 10% of world's plant diversity. The traditional systems of medicine have deep penetration in this region. A large proportion of the society here, purely or largely have to depend on these systems. The reason behind is the effectiveness of these traditional healing systems or is the socioeconomic status. These systems mainly rely on the natural sources or on the plants, herbs or the weeds. Among these medicinally important plants is *Carthamus oxycantha*, of Asteraceae family, a common weed and has demonstrated beneficial biological activities like wound healing and others.

Keywords: *Carthamus oxycantha*, *Asteraceae*, Linoleic acid

INTRODUCTION

Traditional use of medicines is recognized as a way to learn about potential future medicines. About 122 compounds currently used in medicine, are derived from "ethnomedical" plant sources. About 80% of these compounds are used in medicine as such as were used traditionally. Plants play vital role in the world economy. Whatever the field is the role of plant is worthwhile. Utilization of plants in alternative medicine is also a stance of plant role (Rehman *et al.,* 2001; Fabricant and Farnsworth 2001). Many plant families yield medicinally important plants, Asteraceae is one of them. Many locally occurring species of Asteraceae are used as medicinal plants by various tribal and ethnic communities in Pakistan. *Carthamus oxycantha* is often occurring as weed in cultivated fields. Folk medicines indicate its use as antiinflammatory and wound healing properties. Its healing and/or counter irritant activity is also evident from studies conducted on the *albino* rabbits (Waheed, 2009).

Plant Family Asteraceae

Asteraceae is the largest family of dicotyledon Angiosperm**.** It includes more than 1000 genera and about 10**,**000 species distributed over all parts of the world. It mostly contain herbs or under – shrubs**,** rarely trees or climbers**,** with leaves usually alternate or opposite and exstipulate**.** Flowers are crowded into heads (capitula)**,** surrounded at the base by one or more whorls of free or united bracts (involucre)**,** sometime the heads are compound and the partial heads few or one flowered**;** floral bracts entirely absent or reduced to scales or bristles on the flat**,** conical or rarely elongated or concave receptacle (Parker, 1918; Kashyap and Joshi, 1936).

Flowers all tubular (heads discoid)**,** or the inner tubular and outer ringulate (head radiate)**,** or all ligulate (head ligulate)**,** all bisexual**.** Calyx – tube adnate to the ovary**;** limb are absent**,** or of scales**,** bristles or hairs**.** Corolla gamopetalous**,** epigynous**,** regular**,** either tubular**,** 4-5-lobed and actinomorphic**,** or ligulate**,** or rarely bilabiate and zygomorphic**;** stamens 5**,** rarely 4**,** epipetalous**,** filaments free**;** anthers generally connate into a tube sheathing the style**,** rarely free**,** 2-celled**,** opening lengthwise**,** base of the cells often tailed or prolonged downwards**;** ovary inferior**,** one celled**,** ovule solitary**,** erect from the base**,** anatropous**;** style usually divided at the top into stigmatic arms**.** Fruit is an achene naked or

***Corresponding author's Address:** Prof. Dr. Mansoor Ahmad, Faculty of Pharmacy, University of Karachi, Karachi, Pakistan. E-mail: herbalist53@yahoo.com

crowned by the persistent sessile or stipitate papus, sometime beaked. Seeds often ex-albuminous, cotyledons straight, plano-convex. It is the biggest plant family in subcontinental region. It is a source of a number of medicinal plants which are used in allopathic as well as in traditional system of medicine, practiced in different part of the world. However, many plants of the family are used as medicines by various tribal and ethnic communities in subcontinent. It is interesting to note that these people are using some of the species for the ailments which are not mentioned in any of the traditional systems of medicines (Parker, 1918; Kashyap and Joshi, 1936).

As regard the chemical constituents present in the members of this family, many authors have investigated a large number of species of the family. The chemotaxonomy of the family was outlined by Herout (Herout, 1966; Herout, 1970). Bacon and Edelman (1951) isolated carbohydrates, Quillet and Bourdu (1952) separated glucoside and Politis (1950) investigated chlogrogenic acid present in the subterranean organs of various species of this family. Large number of sesquiterpene lactones and their isomers from a number of species of this family have been isolated and characterized by many workers (Richard, 1965; Rybalko *et al.,* 1965; Kery *et al.,* 1987; Milosavljevic, 1995; Milosavljeric *et al.,* 1999; DaCosta *et al.,* 2005).

Flavones and flavonoid compounds have been isolated from many species of this family (Bandyukova, 1968; Kaneta *et al.,* 1978). The terpenes and their derivatives were isolated and characterized (Pyrek and Baranowska, 1973; Pyrek, 1977; Bader *et al.*, 1990; Alvarenga *et al.,* 1995). Aromatic polyacetylenes, thiophenes, coumarins derivatives and pyrrolizidine alkaloids have also been isolated and characterized (Bauthrope and Brown, 1989; Paiz *et al.,* 1989; Balz *et al.,* 1993; Konovalov, 1996; Liddell, 1998). A number of trace elements present in aqueous extract of different species of Asteraceae were detected and isolated (Yin *et al.,* 1994).

The polysaccharides isolated from medicinal plants of this family stimulate the healing process of gastric ulcer in rats. Anticancer, cytotoxic, anti-microbial and toxicity of terpenoids and thiophenes present in a number of species of this family were investigated. Inhibitors of α-glucosidase for treatment of obesity and diabetes and as antiaging cosmetics, bath cosmetic compounds and health food components for blood circulation disorders were also isolated from different species of this family. Further the anti-tumor extract from different plants was also evaluated (Lavrenova, and Chernov, 1983; Hudson *et al.,* 1993; Villarreal *et al.,* 1994; Pogrebnyak *et al.,* 1998; Jahodar, and Klecakova, 1999). The plant induced contact dermatitis, contact hypersensitivity to a perfume material, photosensitivity due to sesquiterpene lactones and the applications of hypo-irritativte and hypo-allergic material obtained from a number of Asteraceae plants were evaluated by many works. Large number of natural insecticides, synergistic herbicides and nematocidal principles from different plants of Asteraceae have been isolated, characterized and are used in agriculture practices (Gommer, 1973; Mitchell *et al.,* 1974; Thune and Solberg, 1980; Okabe, 1994; Gonzalez-Coloma *et al.,* 2002; Iwata, 2002).

Genus – Carthamus Bieb.

General botanical description

Puberulous, stem and braches while – leaves oblong or oblong lanceolate, lower shortly spinulose-toothed, upper half-amplexicaul very spinous-outer involucral bracts exceeding the head white below the contracted portion green above it with yellow spines – Flowers orange yellow – Achenes abouoid 4 – angled smooth shining truncate at the top with 4 bosses (Kirtikar and Basu, 1985).

***Carthamus oxycantha* Bieb.**

Vernacular Names

Arabic : Qartam
Enlish : Jeweled Distaff thistle, wild safflower
Punajabi : Kandiari
Pushto : Kunzalay
Urdu. : Pholi

Classification

Kingdom	Plantae – Plants
Subkingdom	Tracheobionta – Vascular Plants
Superdivision	Spermatophyta – Seed Plants
Division	Magnoliopsida – Flowering Plants
Class	Magnoliopsida – Dicotyledons
Subclass	Asteridae
Order	Asterales
Family	Asteraceae – Aster Family
Genus	*Carthamus* L.
Species	*Carthamus oxycantha* Bieb.

Distribution

The plant is mostly found in dry, open places, plains and mountains. It is distributed in Afghanistan, Azerbaijan, India, Iran, Iraq, Kyrgyzstan, Pakistan, Tajikistan and Turkmenistan. It is a common weed along the boundaries of wheat field (Kashyap and Joshi, 1936; Nadkarni, 1976; Chopra *et al.,* 1982).

Description

Plant is a stout, strongly armed, generally much branched, puberulous herb, 1- 1 ½ feet tall, stem and branches white. Leaves sessile, 1-5 inches long, oblong or oblong-lanceolate; lower often pinnatified, shortly

spinulose-toothed; upper ½ - amplexicaul, very spinous. Heads ¾ - ½ inche in diameter; outer involucral bracts exceeding the head, white below the contracted portion, green above it, with yellow spines. Flowers are orange yellow. Achenes obovoid 4- angled smooth shinning truncate at the top with 4 bosses, pappus 0 (Kirtikar and Basu, 1985). Found abundantly in the fields after the crops have been harvested. It flowers in March – June (Kashyap and Joshi, 1936).

Chemical constituents

Carthamus oxycantha seeds yields two types of oils: oleic oil and linoleic oil. Fatty acid oil composition of oleic oil is, palmitic acid 5-6%, stearic acid 1.5 -2%, oleic acid 74-80%, linoleic acid 13-18% and traces of linoleic acid and longer chain fatty acids. The fatty acid composition of linoleic oil, palmitic acid 5-8%, stearic acid 2-3%, oleic acid 8-30%, linoleic acid 67-89% and also traces of linoleic acid and longer chain fatty acids. *Carthamus oxycantha* fruit also contains proteins 20-25%, hull 60%, residual fat 2-15%. Flowers of *Carthamus oxycantha* contain two major pigments, the water soluble, yellow carthamidin and the formally important dye carthamin, flavonone which is orange red (Fernandez-Martinez *et al.,* 1993; Anjani, 2005). Flowers also contain 0.3-0.6% carthamin. Flavonoids, glycosides, sterols and serotonin derivatives have been identified from flowers and seeds (Firestone, 1999). Two new glycosides, 2-O-methylglucopyranosyl-carthamoside and beta-D-fructofuranosyl carthamoside, along with the known compound 3', 4', 5, 7-tetrahydroxyflavanone have been isolated from *Carthamus oxyacantha* using recycling preparative HPLC. The structures of these compounds were established by mass spectrometric and extensive spectroscopic analysis (Hassan *et al.,* 2010). Structures of the important chemical constitutes of the plant are shown in Figure I.

Pharmacological actions and medicinal uses

Young leaves of *Carthamus oxycantha* are used as a vegetable, whereas seeds are used in cooking. The fruit is used as bird feed. *Carthamus oxycantha* herbage is valuable as green fodder in many countries. The straw is also used as fodder. Flowers are used to treat cerebral thrombosis, male infertility, rheumatism and bronchitis (Fernandez-Martinez *et al.,* 1993; Anjani, 2005). It also induces labour and is used as a tonic tea to invigorate heart and blood circulation. *Carthamus oxycantha* based medicines also show beneficial effect on pain and swelling associated with trauma. Flowers of this species are also used to treat jaundice, while the seeds are considered as laxative. The sap is believed to reduce salivation. The oil is applied to treat scabies. The edible oil extracted from the seed is now the main product of *Carthamus oxycantha*. The oil is suitable for paint production. It is used mainly in cooking and for making salad dressings and margarine.

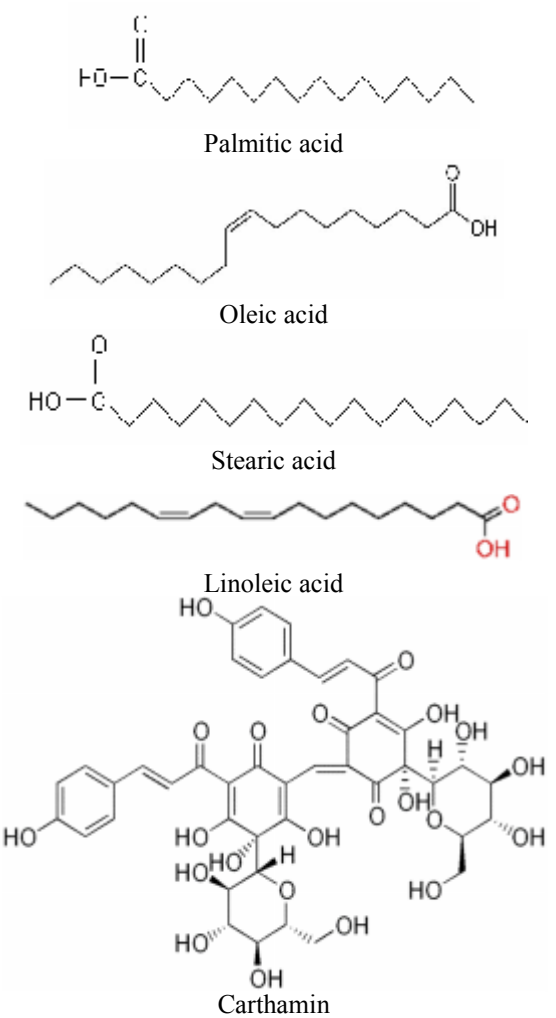

Figure I Structure of compounds in *Carthamus oxycantha*

Carthamus oxycantha had been used traditionally to make roghan wax used in the batik industry (Firestone, 1999). *Carthamus oxycantha* had long been grown for the dye extracted from the flowers. Depending on the dyeing procedure and the addition of other colourants and mordants, it imparts a yellow, red, brown or purple colour to cloth. However, dyes were still produced on a small scale for traditional and religious purposes. *Carthamus oxycantha* was a substitute or adulterant for true saffron as a natural food colourant. Flowers of this species were commonly mixed with rice, bread, pickles and other food to give them an attractive orange colour.

The seed cake was used as animal feed. The cake from undecorticated seeds containing matairesinol-glucoside was only suitable for ruminants. *Carthamus oxycantha* meal and flour from decorticate seed were used in the production of high-protein human diet supplements (Anjani, 2005).

CONCLUSION

Plants provide enormous reservoir of medicinal candidates. Though it is difficult to precisely study the potential natural candidates or active biomolecules due to variability and ecological issues but it helps to utilize the medicinal benefits of these plants. Screening of these agents from such plants as *Carthamus oxycantha* can lead to achieve such benefits and at national level can contribute in revenue generation Valuable plant constituents can be a modern medicinal products or their key biosynthetic precursor.

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