A PHARMACOGNOSTIC EVALUATION OF *SUAEDA ACUMINATA* (C. A. MEYER) MOQUIN-TANDON (CHENOPODIACEAE) LEAF

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ABSTRACT

Suaeda acuminata (C.A. Meyer) Moquin-Tondon is an annual halophyte belonging to the family Chenopodiaceae. Other species of the genus *Suaeda* have been extensively used in traditional medicine. However, *Suaeda acuminata* is medicinally not well reviewed. There is no report available on pharmacognostical characterization of this plant. Therefore, present research was carried out to establish detailed pharmacognosy of *Suaeda acuminata*, which involves macroscopy, microscopy, physico-chemical parameters and qualitative phytochemical screening of leaf sample. Macroscopical characteristics (color of leaf sample before drying and character of leaf apex) could be served as diagnostic features. Preliminary phytochemical analysis showed the presence of various bioactive constituentsin *Suaeda acuminata* like anthraquinones, alkaloids, carbohydrates, cardiac glycosides, flavonoids, saponins, phenolic compounds and terpenoids,whichcould be used against many diseases. Physico-chemical parameters revealed that in investigated plant species; methanol extractive values were found to be higher than chloroform. Current investigation will be contributed towards establishment of pharmacognostic standardization of *Suaeda acuminata*.

Key-words: Halophyte, Pharmacognosy, Phytochemical, *Suaeda acuminata*.

INTRODUCTION

The use of plants for the medicinal purpose is possibly as old as human civilization (Noman *et al*., 2013). Plants have been used as a remedy against many diseases because of the presence of therapeutically active and health promoting compounds having less side effects (Cohen, 2002; WHO, 2001). Authentication and quality assurance of crude drug is prerequisite to be used as medicine (Mahendra and Nityanand, 2009).

Suaeda is an important halophytic genus that belongs to the family Chenopodiaceae. In Pakistan the genus *Suaeda* is represented by 35 genera and 106 species. Species of the genus *Suaeda* are widely distributed in desert, semi-desert and along sea-shores (Freitag *et al.,* 2001). *Suaeda monoica* Forssk ex J. Gmelin has been reported for the treatment of hepatitis because of the occurrence of bioactive tri-terpenoids and sterols and has also been used as an ointment for wounds (Ravikumar*et al*., 2010). The leaf extract of *Suaeda fruticosa* Forssk ex J. Gmelin is reported for antibacterial, antioxidant and anti-cancerous properties (Sami-Ullah *et al*., 2012). However, *Suaeda acuminata* (C.A. Meyer) Moquin-Tondon is not medicinally well studied and their medicinal properties need to be explored.

Few reports are available on pharmacognosy of *Suaeda* species, such as *Suaeda maritima* (L.) Dumort was examined by using stem and root parts of the plant (Singh *et al.,* 2012; 2013; Patra *et al*., 2011). *Suaeda aegyptiaca* (Hasselq.) Zohary was studied for its antimicrobial activity (Al-Ani *et al*., 2011). Likewise, pharmacognostical characterization of *Suaeda monoica* was also carried out (Lincy *et al.,* 2013).However, no literature is available on pharmacognosy of *Suaeda acuminata.* Therefore, in present research, standardization of *Suaeda acuminata* leaf is carried out for the first time. This research would be helpful in developing standard profile for authentication, purification and quantification of *Suaeda acuminata*.

MATERIALS AND METHODS

Plant material

Fresh plant sample of *Suaeda acuminata* (C.A. Meyer) Moquin-Tondon was collected and authenticated with the help of Flora of Pakistan (Freitag *et al.,* 2001). Herbarium sheet was deposited in the Karachi University Herbarium (KUH), Centre for Plant Conservation for voucher number (G. H. No: 86482).

Macroscopy and microscopy

Macro morphological characters of leaf samples such as the (leaf apex, base, color, margin, phyllotaxy, size and shape) were studied and recorded. Microscopical characters such as type of stomata, number of stomata, stomatal index, vein islet and vein termination numbers were estimated (Kokate, 1997; Khandelwal, 2005).

Physio-chemical parameters

Physico-chemical parameters were also determined such as moisture content (loss of weight on drying), ash values (total ash, acid insoluble ash, water soluble ash) and fluorescence analysis of powdered sample as per standard methods described by Charles *et al*. (1958).

Qualitative phytochemical screening

Powdered leaf material (05g) was weighed and mixed in 50 mL of solvents methanol and chloroform separately and placed in a shaker for one week at 25°C. The mixture obtained was filtered and evaporated. Qualitative screening of phyto chemical constituents (anthraquinones, carbohydrates, cardiac glycosides, flavonoids, fixed oil, glycosides, phenolic compounds, protein and amino acids, saponins, tannins and terpenoids) were performed according to the standard methods out lined by Trease and Evans (2002).

RESULTS AND DISCUSSION

Macroscopy

Out of all macroscopic characters, color of leaf sample before drying and character of leaf apex were distinguishable and found to be useful for the identification of *Suaeda acuminata*. These characteristics are listed in Table 1.

Table 1. Leaf macro morphological characters of *Suaeda acuminata.*

Color of fresh leaf sample	Color of leaf sample after drying	Apex	Base	Margin	Phyllotaxy	Shape	Size (mm)
Greyish green	Yellowish green	Acuminate (light yellow mucor)	Attenuate	Entire to Ciliate	Alternate	Linear	5-15 X 0.5-1.5

Microscopy

Quantitative microscopy

Present research also indicated that *Suaeda acuminata* have anomocytic type of stomata (Fig. 1). Previously anomocytic stomata were reported for other species of *Suaeda* by Perveen *et al*. (2007). Although, *Suaeda acuminate* was not included by them. All the observed quantitative microscopical characters for this species are given in Table 2.

Table 2. Quantitative Microscopy of leaf of *Suaeda acuminata.*

Parameters	Values
Type of stomata	Anomocytic
Number of stomata on upper surface	07-08
Number of stomata on lower surface	09-10
Stomata index of upper surface	9.20
Stomata index of lower surface	11.11
Vein islet number	08-10
Vein termination number	03-04

Physico-chemical parameters

Determination of ash values is helpful to judge the purity and cleanliness of the crude drug. For *Suaeda acuminata* total ash value, acid insoluble and water soluble ash values were recorded 8.73, 1.5 and 2.9% respectively. These observed values are slightly deviating from the previous studies (Singh *et al*., 2010; 2011; Lincy *et al*., 2013), in which other species of the genus *Suaeda* are used. During storage excess moisture may enhance the

growth of yeast and fungi, resulting breakdown of important constituents. For crude drug making, moisture content should not be more than 14% w/w (Llanchezhian *et al*., 2011). In present study, observed moister content is within the standard range, therefore extra precautions would not be required to use *Suaeda acuminata* in herbal drug manufacturing. Extractive values of both solvents showed that chloroform is inefficient for the extraction of phytochemical constituents from *Suaeda acuminata*. Results of Physico-chemical analysis are presented in Table 3. The fluorescence colors emitted under normal and U.V light were recorded and are summarized in Table 4.

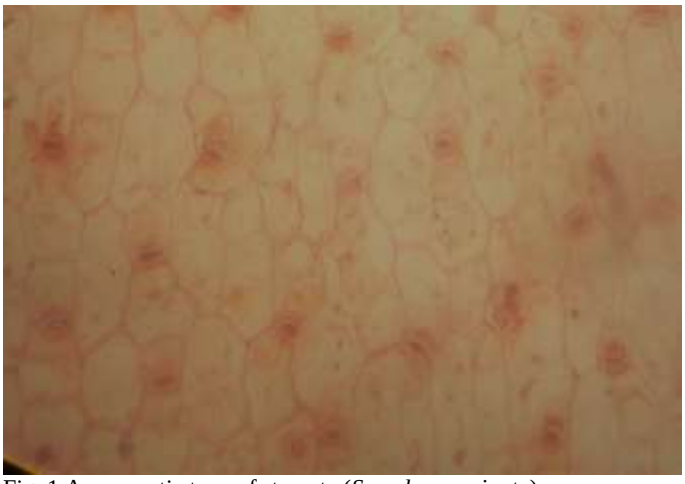

Fig. 1.Anomocytic type of stomata (*Suaeda acuminata*).

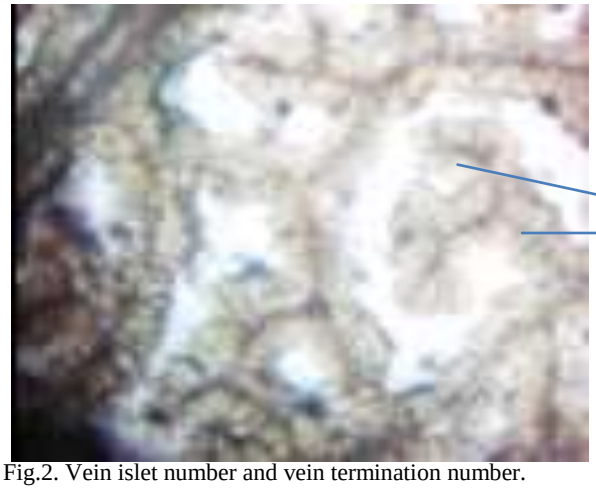

Fig.2. Vein islet number and vein termination number.

Table 3.Physico-chemical parameters.

Parameters	%w/w
Total ash	8.73±0.06
Acid insoluble ash	1.5±0.02
Water soluble ash	2.9±0.03
Moisture content	13.8±0.01
Methanol extractive values	17.3±0.04
Chloroform extractive values	10.2±0.03

Qualitative phytochemical analysis

Preliminary phytochemical screening revealed the presence of anthraquinones, carbohydrates, flavonoids, saponins, phenolic compounds and terpenoids in *Suaeda acuminata* leaf sample. While glycosides, fixed oils, proteins and amino acids were failed to extract by both solvents (Table 5).Phenolic compounds are known to possess

antioxidant activities (Robards *et al*., 1999). Flavonoids and polyphenols found to be very effective against tumor cells development (Ren *et al*., 2003). Anthraquinones, saponins and terpenoids are well reviewed in breast and liver cancer treatments (Beslija, 2003; Thoppil and Bishayee, 2011; Man *et al*., 2012). Cardiac glycosides are reported as novel cancer therapeutic agent and also used to increase cardiac contractile force in heart failure patients (Page, 1964; Newman *et al*., 2008).

Table 4.Fluorescence analysis of leaf powder.

Powder treatment	Normal light	U.V 366 nm
Powder as such	Greyish green	Brown
Powder + HCl	Brown	Dark brown
Powder + H_2SO_4	Greyish green	Violet
Powder + 5% iodine solution	Yellowish	Blackish brown
Powder + 1N NaOH	Brown	Dark brown
Powder + 5% $FeCl_3$	Light brown	Blackish
Powder + glacial acetic acid	Light brown	Dark brown

Table 5.Qualitative phytochemical screening.

Phyto chemical constituents	Tests	Methanol	Chloroform
Alkaloids	Mayer's test Wagner's test	+ +	- -
Carbohydrates	Benedict's test	-	-
Phenolic Compound	Gelatin test Lead acetate test	+ +	- +
Flavonoids	alkaline reagent test	+	-
Glycosides	Borntrager's test	-	-
Cardiac Glycosides	Keller Kiliani test	+	-
Proteins and Amino Acids	Biuret test (Gahan 1984)	-	-
Anthraquinones		+	+
Terpenoids		+	+
Fixed oil	Spot test	-	-
Saponins	Foam test	+	-

(+) present and (-) absent

Conclusion

Based on the present study it may be concluded that *Suaeda acuminata* could serve as important medicinal plant drug. Present research should also serve as a standard profile for the authentication and purification of investigated species.

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