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## Abstract

**Background:** This article reports the preliminary findings of an ethno-botanical survey that was carried out in the Thal Desert, Punjab, Pakistan during 2010 to 2013. The aim of this study was to document the traditional use of medicinal plants from the study area.

**Materials and Methods:** The whole area was surveyed for inventorying medicinal flora by using a semi-structured questionnaire.

**Results:** The people of the study area are extremely knowledgeable, hence reported 120 plants which are being used in treating various human diseases. The detailed inventory including botanical name, parts used, method of preparation and diseases treated is provided in this paper.

**Conclusion:** This study revealed that the inhabitants possessed empirical knowledge of medicinal plants which would be useful in developing health care products and preserving traditional cultures as well as phyto-diversity.

**Keywords:** Ethno-botanical survey, Semi-structured questionnaire, Inventory, Medicinal flora, Thal Desert, Phyto-diversity.

## Introduction

Scientists are interested in ethno-botanical works for the development of natural products due to increasing demand for plant origin medicaments in developing countries. Such information lies with the indigenous communities who by virtue of practice possess centuries-old traditional use of plants, in meeting their healthcare needs. Various ethno-botanical surveys revealed that elder persons have also considerable knowledge about the uses of plants. Such traditional information is transferred from generation to generation (Qureshi and Shaheen, 2013). The ethno-botanists are naturally interested in obtaining data/information/know how about the likely use of plants and their products from remote areas (Bhatti *et al.*, 1998).

In Pakistan, ethno-botany is now well established discipline and various researchers reported good work across the country (Abbas *et al.*, 2013; Ahmed *et al.*, 2013; Ilyas *et al.*, 2013; Qureshi and Shaheen, 2013; Ahmad *et al.*, 2012; Qureshi *et al.*, 2012a,b; Rauf *et al.*, 2012; Shaheen *et al.*, 2012; Iqbal *et al.*, (2011), Rahim *et al.*, 2012; Khan *et al.*, 2011; Abbasi *et al.*, 2010; Ahmad *et al.*, 2009; Ali and Qaiser, 2009; Qureshi and Bhatti, 2007; Qureshi *et al.*, 2006a,b; 2003; 2002; Hamayun *et al.*, 2003 and Qureshi 2002; Goodman and Ghafoor, 1992; Malik *et al.*, 1990; Shinwari and Malik, 1989; Hocking, 1958-62).

Although 88% of the total area of Pakistan is classified as arid and semi-arid, however, less attention is being paid to carry out research on desert habitats. Only a few papers have also been published (Bhatti *et al.*, 1998; 2001; 2002; Qureshi, 2012a; Qureshi *et al.*, 2011; 2010; Qureshi and Bhatti, 2009; 2008; 2007; 2006; 2001). The Thal Desert is not yet fully known with reference to ethno-botanical research. So this study was carried out to explore this region for extraction of ethno-botanical information pertaining to medicinal plants.

## Materials and Methods

The whole study area was surveyed during January, 2010 to September, 2010 for inventorying ethnomedicinal flora. The local inhabitants including herbalists (*Hakeem*), ethno-veterinarian and midwives (Daai) were interviewed to record medicinal uses of native species by using semi-structured questionnaire (Qureshi and Bhatti, 2008). During the survey, plant specimens were also collected from the study area. The same were identified with the help of floristic material (Nasir and Ali 1970-1989; Ali and Nasir 1990-1991; Ali and Qaiser, 1993-2007; Boulos, 1991; Qureshi, 2012b). The correctly identified specimens are deposited in the Herbarium of Pir Mehr Ali Shah Arid Agriculture University for record.

## Results

The people of the study area are extremely knowledgeable which reported 120 plants belonged to 87 genera and 44 families in treating various human diseases. The detailed inventory including botanical name, parts used, method of preparation and diseases treat is provided in **Table 1**. Some of the important medicinal plants depicting their habits are provided under **Plate-1**.

## Discussion

Such type of ethno-botanical enumerations are carried out from various desert habitats such as Bhatti *et al.* (2001), Qureshi (2012), Qureshi *et al.* (2011, 2010), Qureshi and Bhatti (2009, 2008, 2007, 2006, 2001), and the findings of present study is in agreement with these studies. Usually *Hakeems* and elder persons especially women were aware of different uses of plants but this knowledge was rarely found in younger generation. Based on the results it can be concluded that the flora of Thal Desert possesses remarkable medicinal values only known to indigenous communities of

**Table 1:** The inventory of medicinal plants along with family, parts used, method of preparation and diseases treated

Sr.#	Family/Plant species	Parts used	Method of preparation	Disease treated
	<b>Agavaceae</b>			
1	<i>Agave sislana</i> Perr. Ex Engelm.	Pulp	Potherb, paste	Jaundice, acidity, constipation, piles, boils, pimples, skin problems
	<b>Aizoaceae</b>			
2	<i>Limeum indicum</i> Stocks ex T. Anders.	Leaves	Paste	Wounds
3	<i>Gisekia pharnaceoides</i> L.	Whole plant	Juice	Abdominal/stomach problem
4	<i>Trianthema portulacastrum</i> L.	Roots	Decoction	Jaundice
5	<i>Zaleya pentandra</i> (L.) Jeffrey	Whole plant	Juice	Kidney stones
	<b>Alloaceae</b>			
6	<i>Aloe vera</i> L.	Pulp	Potherb, Pulp	Jaundice, pimples
	<b>Amaranthaceae</b>			
7	<i>Achyranthes aspera</i> L.	Whole plant	Decoction, ash, powder	Asthma, cough, pain
8	<i>Aerva javanica</i> (Burm. f.) Juss ex J. A. Shultes.	Leaves, Whole plant, inflorescence	Paste, decoction	constipation, boils, pimples
9	<i>Alternanthera pungens</i> Kunth in H.B.K.	Roots	Decoction	Jaundice
10	<i>Amaranthus graecizans</i> L.	Leaves	Potherb	Constipation
11	<i>Amaranthus ovalifolius</i> L.	Leaves	Potherb	Constipation
12	<i>Amaranthus viridis</i> L.	Leaves	Potherb	Constipation
13	<i>Celosia argentea</i> L.	Seeds, Flowers	Powder, Poultice	Boils, dysentery, leucorrhoea, diarrhea
14	<i>Digera muricata</i> (L.) Mart.	Leaves	Potherb	Constipation
	<b>Apiaceae</b>			
15	<i>Anethum graveolens</i> L.	Seeds	Powder	Constipation, abdominal/stomach problem
	<b>Apocynaceae</b>			
16	<i>Rhazya stricta</i> Decne.	Leaves, Aerial parts	Powder	Piles, abdominal/stomach problem
	<b>Arecaceae</b>			
17	<i>Phoenix sylvestris</i> L.	Fruits	Raw fruits	Tonic
	<b>Asclepiadaceae</b>			
18	<i>Calotropis procera</i> (Willd.) R. Br.	Leaves, Whole plant, Fruits, Latex	Powder, Extract, Latex, Flowers	Jaundice, boils, wounds, abdominal/stomach problem, asthma, pain, inflammation
	<b>Asteraceae</b>			
19	<i>Amberboa ramosa</i> (Roxb.) Jafri	Whole plant	Juice	Blood purifier, boils, pimples, skin problems
20	<i>Carthamus oxycantha</i> M.B.	Leaves, Whole plant, Seeds	Rosted seeds	Cancer
21	<i>Centaurea iberica</i> Trev.	Roots, Aerial parts	Extract	Kidney stones
22	<i>Echinops echinatus</i> Roxb.	roots, Aerial parts	Powder, extract	Pain, fever
23	<i>Iphiona grantioides</i> (Boiss.) Anderb.	Leaves, Aerial parts	Paste	Boils
24	<i>Launaea residifolia</i> (L.) O. Kuntze.	Latex	Paste	Boils, pimples

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Sr.#	Family/Plant species	Parts used	Method of preparation	Disease treated
	<b>Bombacaceae</b>			
25	<i>Bombax malabaricum</i> DC.	Roots	Decoction, powder	Abdominal/stomach problem, sexual problems
	<b>Boraginaceae</b>			
26	<i>Cordia gharaf</i> (Forssk.) Ehren. ex Asch.	Pulp, Fruits	Raw fruits	Pain
27	<i>Cordia myxa</i> L.	Fruits	Raw fruits	Pain
28	<i>Heliotropium europeum</i> L.	Leaves	Juice, ash	Boils, pimples, skin problems, wounds
29	<i>Heliotropium strigosum</i> Willd.	Whole plant	Juice, powder, extract	Jaundice, liver disease
30	<i>Nonea edgeworthii</i> A. DC.	Leaves	Juice, extract	Cough
31	<i>Trichodesma indicum</i> (L.) R. Br.	Leaves, whole plant, root	Juice, extract, decoction	Wounds, pain, vomiting, urinary, joint pain, cough, cold, fever and dysentery
	<b>Brassicaceae</b>			
32	<i>Brasica compestris</i> L.	Leaves, oil	Potherb, Oil	Jaundice, constipation, abdominal/stomach problem, anti-lice, athlete foot
33	<i>Eruca sativa</i> Miller	Seeds, oil	Rosted seeds, oil	Jaundice, piles, skin problems, abdominal/stomach problem, anti-lice, earache
34	<i>Farsetia hamiltonii</i> Royle	Whole plant	Powder	Constipation, piles, abdominal/stomach problem, pain
35	<i>Farsetia jacquemontii</i> Hook.f. & Thomson	Whole plant	Powder	Constipation, piles, abdominal/stomach problem, pain
36	<i>Sisymbrium irio</i> L.	Seeds	Powder	Fever
37	<i>Sisymbrium orientale</i> L.	Seeds	Powder	Fever
	<b>Caesalpiniaceae</b>			
38	<i>Cassia fistula</i> L.	Pulp	Pulp	Constipation
39	<i>Cassia italica</i> (Mill.) F.W.Andr.	Leaves, roots, seeds, flowers	Potherb, juice, decoction, extract, raw fruits, raw seeds	Jaundice, constipation, piles
	<b>Capparidaceae</b>			
40	<i>Capparis decidua</i> (Forssk.) Edgew.	Seeds, aerial parts, flowers, fruits	Paste, poultice, raw fruits, tooth stick	Constipation, athlete foot, toothache, earache
	<b>Chenopodiaceae</b>			
41	<i>Chenopodium album</i> L.	Leaves, Aerial parts	Potherb	Constipation
42	<i>Chenopodium murale</i> L.	Leaves, Aerial parts	Potherb	Constipation
43	<i>Spinacia oleracea</i> L.	Leaves	Potherb	Constipation
	<b>Convolvulaceae</b>			
44	<i>Convolvulus arvensis</i> L.	Whole plant leaves,	Potherb, powder	Abdominal/stomach problem
45	<i>Convolvulus microphyllus</i> Sieb. ex Spreng.	Whole plant	Powder	Leucorrhoea
46	<i>Ipomoea cornea</i> ssp. <i>fistulosa</i> (Mart. ex	Leaves	Paste	Boils

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Sr.#	Family/Plant species	Parts used	Method of preparation	Disease treated
	Choisy) D. Austin			
	<b>Cucurbitaceae</b>			
47	<i>Citrullus colocynthis</i> (L.) Schrad.	Roots, pulp, Fruits	Powder, Pickled	Constipation, skin problems, abdominal/stomach problem, pain, digestive problems, toothache, diarrhea
48	<i>Momordica balsamica</i> L.	Fruits	Potherb, juice, powder, extract	Constipation, blood purifier, boils, pimples, abdominal/stomach problem, asthma, diabetes, obesity
	<b>Cuscutaceae</b>			
49	<i>Cuscuta reflexa</i> Roxb.	Whole plant	Paste, extract	Skin problems, antidandruff
50	<i>Cuscuta monogyna</i> Vahl, Sym.	Whole plant	Paste, extract	Skin problems, antidandruff
	<b>Euphorbiaceae</b>			
51	<i>Chrozophora tinctoria</i> (L.) Juss.	Leaves	Juice	Acidity
52	<i>Euphorbia granulata</i> Forssk.	Whole plant	Powder	Diabetes
53	<i>Euphorbia prostrata</i> Ait.	Whole plant	Powder	Diabetes
54	<i>Euphorbia thymifolia</i> L.	Whole plant	Powder, extract	Dysentery, diabetes, diarrhea
55	<i>Ricinus communis</i> L.	Leaves, oil	Poultice, oil	Constipation, pain, inflammation
	<b>Fabaceae</b>			
56	<i>Alhagi maurorum</i> Medic.	Whole plant	Decoction, powder, extract	Blood purifier, pimples, skin problems, abdominal/stomach problem
57	<i>Alysicarpus longifolius</i> (Rottler ex Spreng.) Wight & Arn.	Leaves	Potherb	Constipation
58	<i>Cicer arietinum</i> L.	Seeds	Powder	Diabetes
59	<i>Dalbergia sissoo</i> Roxb.	Stem	Ash	Ringworm, athlete foot
60	<i>Indigofera hochstetteri</i> Baker	Fruits	Powder	Sexual tonic
61	<i>Pongamia pinnata</i> (L.) Merrill.	Leaves, Fruits	Decoction	Abdominal/stomach problem
62	<i>Tephrosia purpurea</i> (L.) Pers.	Roots	Extract, tooth stick	Toothache, diarrhea
63	<i>Tephrosia uniflora</i> Pers.	Roots	Extract, tooth stick	Toothache, diarrhea
64	<i>Tephrosia uniflora</i> var. <i>petrosa</i>	Roots	Extract, tooth stick	toothache, diarrhea
	<b>Lamiaceae</b>			
65	<i>Mentha longifolia</i> (L.) L.	Leaves	Potherb, powder, extract	Piles, abdominal/stomach problem, pain, digestive problems, nausea
	<b>Lathyraceae</b>			
66	<i>Lawsonia inermis</i> L.	Leaves	Paste, decoction, powder	Pain, cooling effect, athlete foot, antidandruff
	<b>Malvaceae</b>			
67	<i>Abutilon pakistanicum</i> Jafri & Ali	Seeds	Mucilage	Cooling effect
	<b>Meliaceae</b>			
68	<i>Azadirachta indica</i> (L.) A. Juss.	Leaves, seeds, fruits	Juice, paste, ash, extract, raw fruits, infusion	Piles, boils, pimples, skin problems, wounds, abdominal/stomach problem, anti-lice, cooling effect
69	<i>Melia azadirach</i> L.	Leaves, fruits	Juice, paste, extract, infusion	Jaundice, blood purifier, boils, pimples, skin problems, anti-lice, cooling effect

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Sr.#	Family/Plant species	Parts used	Method of preparation	Disease treated
	<b>Mimosaceae</b>			
70	<i>Acacia jacquemontii</i> Benth.	Leaves	Powder	Uterine problems
71	<i>Acacia nilotica</i> subsp. <i>cupressiformis</i> (T.L. Stewart) Ali	Gum	Potherb	Sexual problems
72	<i>Acacia nilotica</i> (L.) DeL. subsp. <i>indica</i> (Benth.) Brenan	Leaves, roots, flowers, stem, fruits, gum	Juice, powder, extract, tooth stick	Jaundice, uterine problems, toothache, sexual problems
73	<i>Albizia lebbek</i> (L.) Bth.	Seeds, stem	Powder, tooth stick, infusion	Toothache, headache, influenza
74	<i>Prosopis cineraria</i> (L.) Druce.	Gum	Potherb, ash	Wounds, sexual problems
75	<i>Prosopis glandulosa</i> Torr.	Leaves	Decoction	Uterine problems
76	<i>Prosopis juliflora</i> (Swartz) DC.	Leaves	Paste	Sexual problems
	<b>Moraceae</b>			
77	<i>Ficus bengalensis</i> L.	Leaves, roots, flowers	Powder, extract, infusion	Ringworm, leucorrhoea, flue, diarrhea
78	<i>Ficus carica</i> L.	Fruits	Poultice, raw fruits	Constipation, piles
79	<i>Ficus religiosa</i> L.	Leaves, Stem, Fruits	Juice, paste, ash, powder, infusion	Asthma, inflammation, cooling effect, nausea, diarrhea
80	<i>Morus alba</i> L.	Leaves, Fruits, roots	Decoction, infusion, extract, raw fruits	Intestinal/stomach problem, abdominal/stomach problem, cough, fever
81	<i>Morus nigra</i> L.	Leaves, roots, fruits	Decoction, extract, raw fruits, infusion	Sore throat, Abdominal/stomach problem, cough, fever
	<b>Moringaceae</b>			
82	<i>Moringa oleifera</i> Lamk.	Leaves, roots, seeds, flowers	Potherb, paste, powder, extract, infusion	Sore throat, boils, pimples, skin problems, pain, digestive problems, inflammation, cooling effect, sexual problems
	<b>Myrtaceae</b>			
83	<i>Eucalyptus camaldulensis</i> Dehnh.	Leaves	Pickled, infusion, raw leaves	Digestive problems, flue
84	<i>Psidium guajava</i> L.	Leaves, fruits	Powder, raw fruits	Constipation, abdominal/stomach problem, cough, digestive problems, flue
85	<i>Syzygium cumini</i> (L.) Skeels	Leaves, stem	Decoction, powder, raw leaves	Pain, leucorrhoea, fever, sexual problems, diarrhea
	<b>Nyctaginaceae</b>			
86	<i>Boerhavia diffusa</i> L.	Roots	Powder	Jaundice, Kidney stones
87	<i>Boerhavia procumbens</i> Banks ex Roxb.	Roots	Paste, Infusion, Raw root	Jaundice, paralysis
	<b>Papaveraceae</b>			
88	<i>Argemone mexicana</i> L.	Roots	Paste, raw seeds	Piles, boils, skin problems
	<b>Plantaginaceae</b>			
89	<i>Plantago lanceolata</i> L.	Seeds	Raw seeds	Cooling effect
90	<i>Plantago major</i> L.	Seeds/husk	Mucilage	Cooling agent
	<b>Poaceae</b>			
91	<i>Cymbopogon jwarancusa</i> (Jones)	Roots, whole	Potherb, powder,	Measles, cough, chicken pox,

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Sr.#	Family/Plant species	Parts used	Method of preparation	Disease treated
	Schult.	plant, seeds	smoke	fever
92	<i>Cynodon dactylon</i> (L.) Pers.	Roots, whole plant	Decoction	Pimples, fever
93	<i>Saccharum spontaneum</i> L.	Leaves	Infusion	Uterine problems
	<b>Punicaceae</b>			
94	<i>Punica granatum</i> L.	Roots, Stem, Fruits	Decoction, raw fruits, infusion	Abdominal/stomach problem, digestive problems, toothache
	<b>Polygonaceae</b>			
95	<i>Rumex dentatus</i> subsp. <i>klotzschianus</i> (Meisn.) Rech. f.	Leaves	Potherb	Constipation
	<b>Rhamnaceae</b>			
96	<i>Ziziphus mauritiana</i> Lam.	Leaves, fruits	Powder, poultice, raw fruits, infusion	Pain, inflammation, diabetes, antidandruff, sexual problems
97	<i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn.	Leaves, fruits	Poultice, extract, raw fruits	Blood purifier, Pain, Antidandruff
98	<i>Ziziphus spina-christi</i> (L.) Willd.	Leaves, fruits	Poultice, extract, raw fruits	Blood purifier, pain, antidandruff
	<b>Rutaceae</b>			
99	<i>Citrus grandis</i> (L.) Osbeck	Fruits	Raw fruits	Constipation, nausea
100	<i>Citrus medica</i> var. <i>acida</i> Brandis	Fruits	Raw fruits, raw leaves	Digestive problems, diabetes
101	<i>Citrus sinensis</i> (L.) Osbeck	Fruits	Raw fruits, raw leaves	Constipation, nausea
	<b>Salvadoraceae</b>			
102	<i>Salvadora oleoides</i> Decne.	Fruits, roots, oil	Oil, tooth stick, pickled	Constipation, athlete foot, toothache
	<b>Scrophulariaceae</b>			
103	<i>Bacopa monirii</i> L.	Leaves, aerial parts, fruits	Potherb, juice, ash, infusion	Boils, pimples, skin problems
	<b>Solanaceae</b>			
104	<i>Datura fastuosa</i> L.	Leaves	Paste, ash, raw leaves, smoke	Boils, asthma
105	<i>Solanum amricanum</i> Miller	Leaves	Potherb, decoction, extract, infusion	Jaundice, abdominal/stomach problem, inflammation
106	<i>Solanum incanum</i> L.	Fruits	Raw fruits	Digestive problems
107	<i>Solanum nigrum</i> L.	Leaves, roots, fruits	Juice, Raw fruits, infusion	Jaundice, uterine problems, leucorrhoea, obesity
108	<i>Solanum surattense</i> Burm.f.	Leaves, whole plant, flowers, fruits	Juice, ash, powder, extract, raw fruits	Asthma, cough, pain, digestive problems, sexual problems, headache
109	<i>Solanum villosum</i> (L.) Mill.	Fruits	Juice, raw fruits	Jaundice, obesity
110	<i>Withania coagulans</i> (Stocks.) Dunal	Leaves, fruits	Paste, powder, raw fruits	Constipation, boils, pimples, skin problems, abdominal/stomach problem, pain, digestive problems, cooling effect
111	<i>Withania somnifera</i> (L.) Dunal	Leaves, fruits, roots	Paste, powder, poultice	Digestive problems, inflammation, diabetes, sexual problems
	<b>Tamaricaceae</b>			
112	<i>Tamarix aphylla</i> (L.) Karst.	Leaves	Powder, Smoke	Wounds, measles



Sr.#	Family/Plant species	Parts used	Method of preparation	Disease treated
	<b>Tiliaceae</b>			
113	<i>Corchorus depressus</i> (L.) Stocks	Whole plant	Powder, extract	Jaundice, abdominal/stomach problem, cooling effect, sexual problems
114	<i>Corchorus tridens</i> L.	Fruits	Juice	Jaundice, sexual problems
	<b>Typhaceae</b>			
115	<i>Typha elephantina</i> Roxb.	Whole plant	Paste	Skin problems
	<b>Verbenaceae</b>			
116	<i>Phyla nodiflora</i> (L.) Greene	Whole plant	Juice	Piles
	<b>Zygophyllaceae</b>			
117	<i>Fagonia bruguieri</i> DC.	Whole plant	Poultice, extract, infusion	Hepatitis, boils, pimples, skin problems, digestive problems, cancer, cooling effect
118	<i>Fagonia indica</i> var. <i>schweinfuthii</i> Hadidi.	Whole plant	Poultice, extract, infusion	Hepatitis, boils, pimples, skin problems, digestive problems, cancer, cooling effect
119	<i>Peganum harmala</i> L.	Whole plant, seeds	Powder, extract, raw seeds, smoke	Boils, pimples, abdominal/stomach problem, asthma, digestive problems
120	<i>Tribulus terrestris</i> L.	Seeds, Fruits	Potherb, powder, extract	Cooling effect, sexual problems

Plate-1: Some important medicinal flora of the Thal Desert.



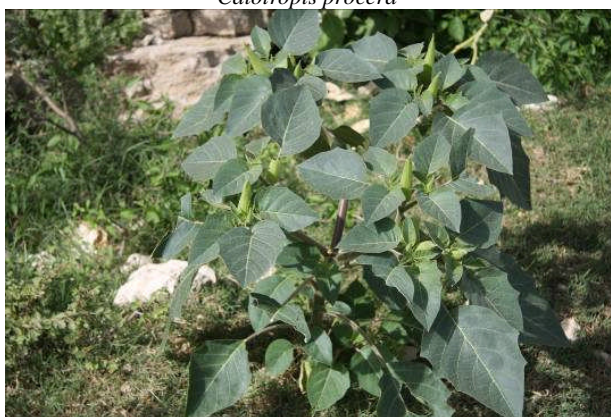
*Citrullus colocynthis*



*Calotropis procera*



*Capparis decidua*



*Datura fastuosa*



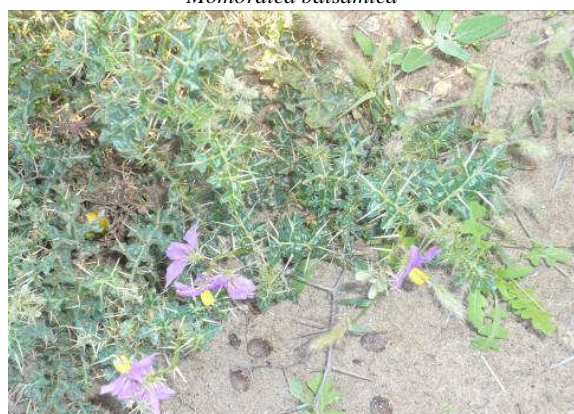
<http://dx.doi.org/10.4314/ajtcam.v11i3.39>



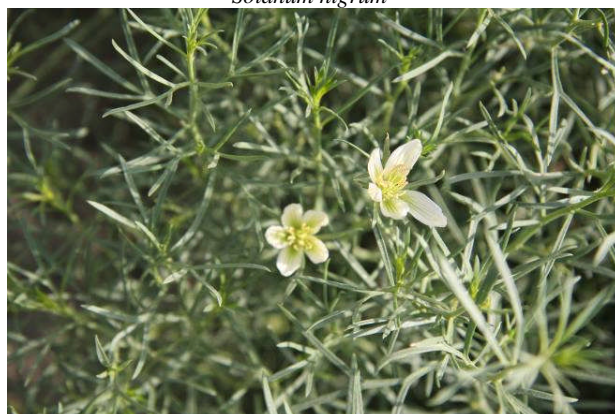
*Momordica balsamica*



*Solanum nigrum*



*Solanum surattense*



*Peganum harmala*



*Tribulus terrestris*



*Withania somnifera*

## Conclusion

Due to far flung area, the inhabitants are forced to exploit wild flora to meet their healthcare needs. Furthermore, deserts being hostile climate and inaccessible are less paid attention by the scientific community to document flora and their potential use across the country. Unfortunately, due to expansion of human settlements the native flora along with their natives and their cultural use is under huge pressure and at the verge of extinction. The present enumeration provides specific information about medicinal plants that can be utilized for future drug development programme by various stakeholders. Some important plants especially with reference to medicinal point of view are declining due to overexploitation and if not preserved would vanish, so there is need to protect these valuable plant species. One way to protect these plants is to arrange comprehensive surveys and aware people about importance of plants which they are exploiting just as fuel but they have novel properties for sake of mankind. Research centers should be developed to conduct experiments with plants in this vegetation rich area.

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