

Review

Status and Potential Use of Medicinal and Aromatic Plants in Pamir Region of Tajik and Afghan Badakhshan

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Abstract

Lying at the junction of Asia's mightiest mountain ranges – the Himalayas, Karakoram, Hindu Kush, and Tine Shan – the individual valleys of the Pamir Mountains share a rich and common flora, fauna, and geography. The residents of the Pamirs, given their remoteness combined with high rates of poverty, have traditionally relied on local plants with purportedly medicinal value to treat sicknesses. Environmental, political, social, and economic developments over the past century, though, have had a negative impact on this traditional system of medicine. Thus, this study has sought to document indigenous knowledge of these medicinal plants – including their varying names, preparations, and usages – as well as the availability of these plants and the knowledge of residents in preparing the resultant medicines. To this end, over the past four years, information on the previous and current status of medicinal plants and their trends in natural habitat have been collected and documented through 248 individual interviews, informal group discussions, and personal observations in the field. The collected data suggests that local residents in the Tajik-Pamirs use 92 different species of plants belonging to 34 families and 60 genera, while 31 species of plants belonging to 20 families and 27 genera are used for medicinal purposes in the Afghan-Pamirs. The study further reveals that 68% of the plants have similar uses in both the Afghan- and Tajik-Pamirs for treating illnesses, though some variations in preparation and usage of these medicinal plants were also noted. Furthermore, individual interviews, community discussions, and field observations confirmed that, while medicinal plant resources were abundant in the region 15-20 years ago, these resources are quickly being depleted. This depletion can be attributed to natural and climatic factors such as prolonged drought and biotic pressure. Additionally, activities associated with the expansion of human settlements have similarly depleted these resources including decreased natural vegetation due to increased cultivation, usage of these plants as fuel and fodder, land degradation due to deforestation, and so forth. Finally, it was observed during this study that indigenous knowledge pertaining to medicinal plants is rapidly declining: local healers who produce these herbal remedies tend to pass along the descriptions orally to family members who are increasingly less likely to write down these remedies or pursue indigenous systems of healing and treating human ailments. Given the mentioned findings, the indigenous communities should be made aware of the potential importance of these plants as well as the effects of flora and resource depletion; this should help preserve these potentially medicinal plants from extinction and keep the practice of herbal medicine alive. Furthermore, the government should be encouraged to pass policies for conserving medicinal plants and other non-timber forest products from over-exploitation. Further research should also be conducted on the potential benefits of these medicinal plants, with the most marketable medicinal plants being identified, mapped, and then cultivated on farms. Finally, indigenous knowledge on the usage and preparation of these medicinal plants should be recorded to ensure this important aspect of the endemic culture is preserved.

Key words: Medicinal plant, ethno-botany, flora, natural habitat, drought, biotic pressure, degradation, deforestation, indigenous knowledge, healers, herbal remedies, conservation, livelihoods, sustainable management.

INTRODUCTION

Badakhshan, geographically located at the junctions of Asia's mightiest mountain ranges – the Himalaya, Karakoram, Hindu Kush and Tine Shan – harbors rich floral and faunal diversity. The affinities with different mountain ranges and high vertical relief of Pamir Badakhshan offer diverse habitats to different varieties of species, thus supporting rich and unique biodiversity.

Medicinal plants are an important natural resource in Badakhshan as they play a vital role in the maintenance of human health, especially in poor communities where even relatively low-priced modern medicines remain beyond the purchasing power of most people. Despite the long tradition of using these medicinal plants, their proven effectiveness and lack of affordable alternatives, the availability of many of these medicinal and aromatic plants is in jeopardy. Various factors are responsible for diminishing these valuable plant resources, though nearly all have human origins. Studying traditional herbal medicine, their status, and their usage in the Pamir region of Tajik- and Afghan-Badakhshan is therefore crucial as this region has a rich history of medical traditions which is in danger of being lost.

The study of medicinal and aromatic plants

There are numerous scientific research works done in Tajik Badakhshan (Fedchenko, 1902; Ikonnikov, 1979, 1991, 1997; Saboiev and Mastonshoeva, 1992; Saboiev and Musoev, 1994), but all of this research involves investigating general flora in the region. To date, only a handful of ethnobotanical studies on traditional medicines have been conducted in Tajikistan by local researchers (Dadabaeva, 1967; Saidov, 1988; Khaidarov, 1988; Nuraliyev, 1989; Khojimatov, 1989; Navruzshoev and Mirzobekov, 1998). However, there is no systematic study carried out by scientists in Afghan-Badakhshan. This is despite the high dependency of the community on traditional herbal remedies and the huge potential of medicinal and aromatic plants as a source for rural livelihoods and income generation for the local community.

Through this study, conscious efforts have been made to document the indigenous knowledge of medicinal plants, which has passed down from generation to generation as safe and natural remedies to a number of human ailments on both sides of the *Panj* and *Ammu* Rivers in the Pamir region of Tajik- and Afghan-Badakhshan. Moreover, information on the previous and current status of medicinal plants and their trends in natural habitat have been collected and documented through individual interviews, group

discussions, and personal observation in the field over a period of four years.

It is pertinent here to mention that this study covers the preliminary information on the current status and use of medicinal plants by local inhabitants of both Tajik- and Afghan-Badakhshans. The majority of information regarding the usage pattern of drug plants was collected from Roshan district, and Shughnan district, and Khorog town in Gorno-Badakhshan Autonomous Oblast (GBO), Tajikistan and Zebak, Ishkashim, and Wakhan districts in Badakhshan, Afghanistan.

Literature review showed that among medicinal plants of Rushan district 5 species (*Betula pamirica*, *B. schugnanica*, *Rosa huntica*, *R. korshinskiana*, *R. popovii*) belong to endemics of Pamir and Alai, one species is endemic to Pamir Alai and Tian-Shan (*Rosa achburensis*) and one species (*Juniperus shugnanica*) to East Tajikistan and neighboring districts of Kyrgyzstan (Flora of TSSR, 1957, 1968, 1975).

The paper details a comparative analysis of usage pattern of medicinal plants in Afghan- and Tajik-Badakhshans besides identifying and documenting commonly used herbal remedies and preparations of different recipes by local residents.

Data analysis and findings of the study

The field investigation with 248 individual respondents, 60 % of whom were women, revealed that in Gorno-Badakhshan, local residents use 92 different species of plants belonging to 34 families and 60 genera. Among this number, 25 species are included in the official Pharmacopeia of the former USSR (State Pharmacopeia of USSR, 1990). However, the situation is quite different in Afghan-Badakhshan; there, the number of medicinal plants and usage was comparatively lower: 31 species of plants belonging to 20 families and 27 genera were used against various human ailments. This may be because of a lack of information regarding the medicinal values of different species of plants or because of accessibility issues as much of the plant resources and vegetation covers in Afghan-Badakhshan have been removed by the local populace for fuel and fodder purposes. This needs to be further investigated in a separate study.

The study further reveals that there is a common understanding of herbal remedies among the people of both Tajik- and Afghan-Badakhshans around certain plant species on the use of these medicinal plants toward a number of human ailments. This is reflected in how the plants are collected, dried, and stored as well as how the recipes and medicines are prepared and administered.

Out of the plants identified in Badakhshan, 68% have similar uses in both Afghan- and Tajik-Badakhshan for treating illnesses, although some variations in usage of specific medicinal plants by Tajiks and Afghans were recorded during the field survey. The historical interconnectedness of the two populations juxtaposed with the more recent separation of these two populations into nation-states and the resultant varying trajectories may explain both similar as well as divergent usage patterns.

While there has been a fair deal of interconnectivity between the two Badakhshans prior to being divided into Afghanistan and Tajikistan, the individual mountain valleys were not as connected as, for example, non-mountainous communities. Thus, Afghan- and Tajik-Roshan might not have been as connected to Afghan- and Tajik-Ishkashim/Wakhan as it might have been to, for example, Shughnan. This might have helped fuel the divergence of usage described below just as much as the past 80+ years of nation-state separation might have.

Thus, it might be worth mentioning that, while there might have been historically similar evolutions of usage due to the interconnectivity of Badakhshan, the past few decades of separation likely have caused some divergence in practice due to physical separation. However, the influence of different sources of knowledge – be it from the Soviet Union and other parts of Tajikistan versus Western Badakhshan and the rest of Afghanistan – might also have caused the afore-mentioned divergence. Additionally, while the various valleys in the Pamirs have had some degree of connectivity and influence on the use and utilization of medicinal plants, their proximal distances and geographic divides have also led to divergent usages and preparation of recipes from medicinal plants.

During field survey and investigation it was observed that the vernacular names of plants often varied from district to district and village to village in both Badakhshans. The local and scientific names of the common medicinal plants used in both Tajik and Afghan Badakhshan are given in Annexure 1.

Total 77 plant species were identified and recorded during field surveys and interviews –Annex 1. All these plants and their parts are used to treat various human ailments. The primary purpose of these medicinal plants is to treat cardiovascular diseases (Akobirshoeva, 2005, 2006). As such, in both Badakhshans, 37% of plants are used for treatment of cardiovascular system, 30% for digestive systems, 22.8% for musculoskeletal problems, 16% for female diseases such as colpitis, vaginitis, menorrhagia (hypermenorrhoea), metrorrhagia (polymenorrhoea), 15% for skin diseases such as exema, quinque edema, erysipelas, furunculosis, carbuncle, and 14% for the urogenital system. Additionally, 16 species

are used in ethno-veterinary medicines such as injuries, tumor, menorrhagia, indisposition, sensory apparatus, and 28 species are used simultaneously as food.

Some variations in usage of medicinal plants by Tajiks and Afghans were also recorded during the field survey. For example, *Artemisia* sp. “*krishk*” is used in Afghan-Badakhshan for skin diseases, while in Gorno-Badakhshan, *Artemisia vulgaris* is used to treat musculoskeletal organs and the *krishk* is not used at all. *Daucus carota* L. is used by the surveyed Afghanistan residents for dysentery and by the residents of Roshan, Gorno-Badakhshan for hypertension and abdominal problems. The Afghan-Badakhshan inhabitants use the seeds of *Plantago major* L. for skin disease while the Roshan residents use its leaves for digestive disorders and wounds. Such differences are also reflected in the use of *Ribes yanczewskii* Pojark and *Rosa achburensis* Chrschan. The fruits of the first are used by the surveyed Afghan population for hepatitis, while the same part of the plants and leaves are used by Rushani residents for hypertension and sickness. Finally, the fruits of *Rosa achburensis* are used to treat coughs by the Afghan-Badakhshan residents surveyed but hypertension, cold, and anemia by the Rushani residents.

Moreover, the similarities and differences are seen not only in the treatment of certain human ailments and diseases but also in the method of preparation of recipes and administration of therapeutic preparations. For instance, the surveyed Afghans boil the stem, leaves, and flower of *Ziziphora pamiroalaica* in water and milk, while the Rushanis infuse it in boiled water. Similarly, whereas the Afghanistan residents surveyed consume the decoction of *Berberis* with milk, the Rushan residents surveyed consume the decoction with water. The different ways of using medicinal plants by local inhabitants in Rushan attests to the independent genesis of healing methods in this region.

Status and conservation issues of medicinal plants in the region

Historically, the greatest driver behind efforts to conserve medicinal plants has been the fear of losing species. The number of globally threatened species of medicinal plants has been calculated at about 15,000 species (Hamilton, 2008). As it pertains to the current status of medicinal plants in Badakhshan, individual interviews, group discussion with communities, and field observations in both Tajik and Afghan Badakhshans reveal that medicinal plant resources were abundant in the region 15-20 years back. However, over the years, these precious resources are depleting at an alarming rate because of natural and climatic factor such as prolong drought and biotic

pressure. Additionally, because of the increasing human population, more and more land is being brought under cultivation while natural vegetation is removed from the mountain slopes for fuel and fodder purposes, causing the fragile mountain slopes to become more prone to erosion and land degradation. Thus, the natural habitat of these plants deteriorates, putting the very survival of some of the most precious medicinal plants in this region in jeopardy.

Some medicinal plant species like *Ferulla sp*, *Glycyrrhiza glabra*, *Bunium persicum*, *Polygonum sp* and *Rheum sp*, are being over exploited on both sides of Badakhshan, as observed during the field visits. In many instances, school children were seen collecting and selling the plants along the roadside without knowing the time of collection, the parts that can be used as medicine, and the active ingredients in the plants. *Bunium persicum* (Zira), which was once a cash crop for the mountainous people of Afghan Badakhshan, is now very sparsely available; with the passage of time, its population is drastically decreasing in its natural habitat. The same is true with *Nepta glutinoza* and *Rosa species*, which are being ruthlessly over exploited in both Tajik and Afghan Badakhshans, particularly in Roshan (Akobirshoeva, 2006, 2007). Commercial collectors are also negatively affecting the status of medicinal plants. The latter generally harvest medicinal plants without any care for sustainability, as can be seen in case of the *Peganum harmala* population in the Bartang valley of Rushan as well as *Glycyrrhiza uralensis* in Afghan Badakhshan-Khash, Ishkashim and Wakhan districts. **Figures.**

Another threat to medicinal plant use is loss of indigenous/traditional knowledge of plant usage. The few local healers (Tabibs) use indigenous knowledge and practice therapeutics in great secrecy. This knowledge is passed down to select children or close relatives who may not be interested in practicing indigenous systems of healing and treating human ailments. Thus, this precious knowledge and practice is quickly disappearing, as written records are rarely kept by the Tabibs.

In sum, the major reasons of medicinal plant depletion in both Tajik- and Afghan-Badakhshan are as follows:

1. Lack of awareness among the communities regarding the importance of medicinal plants for their livelihoods and sustenance.
2. No clear government policy for the conservation and management of non timber forest products
3. Overexploitation and unsustainable harvesting of medicinal plants by the local dwellers from their natural habitat.
4. Removal of vegetative cover from the mountain slopes for fuel and fodder purposes.

5. Prolong drought coupled with desiccating winds in high altitude pastures and mountains
6. Over grazing of pastures and rangelands by local residents as well as nomads

Suggestions for conservation and sustainable management of Medicinal Plants in the Pamir Region of Tajik- and Afghan-Badakhshan

Due to rising health consciousness among people – especially in developed countries – many are turning to organic/natural products in their daily lives and to herbal remedies to treat a number of ailments. Promotion and processing of plant-based products have been given a fresh impetus in developed and developing countries. Thus, there is a niche for medicinal and aromatic plants and associated products in national and international markets. The existing market trend demands that important and marketable medicinal plants and their habitat should be conserved, promoted, and sustainably managed for the benefits of the mountain communities. A few suggestions in this regard have therefore been given hereunder:

- Community awareness regarding the importance of conservation of medicinal plants should be created through trainings/conferences and by developing promotional materials in local languages/dialects.
- There should be clear government policy regarding conservation and management of medicinal plants and other non timber forest products.
- Over exploitation of medicinal plants by the local residents as well as by nomads should be controlled, and there should be proper pre- and post-harvest management training for the people involved in medicinal plants collection and processing.
- Deforestation, ruthless cutting of trees, and uprooting of shrubs from mountains should be checked and on-farm cultivation of select, marketable, medicinal plants should be encouraged to reduce pressure on natural/wild medicinal plant resources.
- Further research is needed on the subject, especially in Afghan-Badakhshan, to explore the benefits medicinal and aromatic plants to the outside world.
- Chemical analyses of select medicinal and aromatic plants should be carried out, with the plants identified based on ethno-botanical surveys, to demonstrate the link between indigenous knowledge of plants and modern medicines in the market.

The indigenous knowledge of medicinal plants passed down between generations in both parts of Badakhshan should be documented and preserved. This will help to revive and record the diminishing traditional



Figure 1. (a.) *Ferula* sp. Species in Vishkharv ravine of Darwaz, Tajikistan; b. *Ferulla foetidissima* Regel et Schmalh. (revzak, kamul, uch, row) young plants uprooted and sold along the road side in Tajik Badakhshan.



Figure 2. Over exploitation of *Glycyrrhiza uralensis* from natural habitat- left *Glycyrrhiza* shop at Khash and a truck loaded with *Glycyrrhiza* moving towards market at Khash district Afghan Badakhshan.



Figure 3. (a.) *Polygonum* sp. (mest, toron) . b. *Rheum maximowiczii* Losinsk. (Rawash/Chokri, wadar) uprooted and being sold along the road side in Darwaz area of Tajik Badakhshan



Figure 4. 1. *Capparis herbacea* Willd. (Chiber, vuzak chiber, kawar) from Yazgulam valley of Vanj district, Tajikistan; 2. *Ribes janczewskii* Pojark (Qaraqot, ginood, arty) in Ishkashim Afghan Badakhshan; 3. Young boy collect *Glycyrrhiza uralensis* to sell in local market in Ishkashim Afghan Badakhshan.

indigenous knowledge about plants and recount it to the local communities. In this way, the orally transmitted knowledge can be conserved as part of the living cultural and ecological systems, thus helping to maintain a sense of pride in local cultural knowledge and practice and reinforcing links between communities and the environment which are essential for conservation (Ali, 2002).

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Annexure 1. List of Medicinal and Aromatic plants used for various human ailments in Pamir Region of Tajik and Afghan Badakhshans.

Sr. #	Scientific Name of Plants	Tajiki Name of Plants	Afghani Name of Plants
1	<i>Equisetum arvense</i> L.	Bandakwokh	Bandakkah
2	<i>Juglans regia</i> L.	Gooz, bojak	Chormagz
3	<i>Urtica dioica</i> L.	Caginc, chaginc	Pich-pichonak
4	<i>Crataegus korolkowii</i> L. Henry	Inzekh, gegn	Dulona
5	<i>Rosa canina</i> L.	Akhar	Gulkhor, kikek
6	<i>R. fedtschenkoana</i> Regel	Akhar	Gulkhor, kikek
7	<i>Glycyrrhiza glabra</i> L.	Muthq	Shirinbuya, malakhch,
8	<i>G. uralensis</i> Fisch.	Muthq	Shirinbuya, malakhch,
9	<i>Melilotus officinalis</i> (L.) Pall.	Shorgarj, shorgarjak	Zardrishqa
10	<i>Peganum harmala</i> L.	Sipandar, sipand, sipandona	Sipandona, hazorisband, isband
11	<i>Hippophae rhamnoides</i> L.	Chung, galagat, xinshuth	Gilgitak, siyohkhor
12	<i>Daucus carota</i> L.	Zardak	Zardak
13	<i>Carum carvi</i> L.	Bobak	Charmak
14	<i>Datura stramonium</i> L.	Bangi dewona	Bangi dewona
15	<i>Plantago major</i> L.	Ragakwokh, ragwokhak, ragwokh	Rishtakashak
16	<i>Artemisia absinthium</i> L.	Sadikhs	Kundikak
17	<i>A. vulgaris</i> L.	Sadikhs	Kundikak
18	<i>Cichorium intybus</i> L.	Kisnachkiznachkeznach chesnach, chukhniz, cikhnivc	Kosni
19	<i>Taraxicum officinale</i> Wigg.	Shorbobgulak, zarezugulak, shoburbur, chukhat -chakhak, cacawokhak, cavincgulak	Shirkahak
20	<i>Tussilago farfara</i> L.	Filgush	Khargush
21	<i>Juniperus semiglobosa</i> Regel	Imbawsambaws	Murpon
22	<i>J. seravshanica</i> Kom.	Imbawsambaws	Murpon
23	<i>J. sibirica</i> Burgsd.	Imbaws ambaws	Murpon
24	<i>J. schugnanica</i> Kom.	Imbaws ambaws	Murpon
24	<i>Ephedra intermedia</i> Schrenk et C. A. Mey.	Amojak zimojakzimoj	Modrag
26	<i>Salix excelsa</i> G. Gmel.	Vurut	Bed
27	<i>Betula pamirica</i> Litv.	Vawzn, vegzn, bruch, brugm	Bruch
28	<i>B. schugnanica</i> (Fedtsch.) Litv.	Vawzn, vegzn, bruch, brugm	Bruch
29	<i>Morus alba</i> L.	Tud, uslai tud	Tut
30	<i>Morus nigra</i> L.	Shatud	Tut
31	<i>Polygonum coriarium</i> (Grig.) Sojak.	Mest, kooz	Toron
32	<i>Rheum maximowiczii</i> Losinsk.	Wadar	Rawosh
33	<i>Rumex crispus</i> L.	Shalkha	Shalkha
34	<i>Amaranthus retroflexus</i> L.	Toji khurus	Tojkhurus
35	<i>Delphinium brunonianum</i> Royle	Buyambar, buyambarg, gulambar, gulambarg, gulubmar	Gulambar
36	<i>Berberis heterobotrys</i> E. Wolf.	Thirb, rithb, zirgul	Zargul

Annexure 1. Continued.

37	<i>B. integerima</i> Bunge	Analogous to above species	Zargul
38	<i>B. nummularia</i> Bunge	Analogous to above species	Zargul
39	<i>Capparis herbacea</i> Willd.	Chiber, vuzak chiber	Kawar
40	<i>Sisymbrium loeselii</i> L.	Zirdakwok, zirdwokhak, zirdgulak, atherich, cirawij	Charog
41	<i>Ribes janczewskii</i> Pojark.	Qaraqot, ginood	Orti
42	<i>R. meyeri</i> Maxim.	Qaraqotshirivd	Qaraqot
43	<i>Crataegus songarica</i> C.Koch.	Inzekh, gegn, shithirb	Dulona
44	<i>Rosa achburensis</i> Chrshan.	Akhar	Gulkhor
45	<i>R. beggeriana</i> Schrenk	Akhar	Gulkhor
46	<i>R. huntica</i> Chrshan.	Akhar	Gulkhor
47	<i>R. kokanica</i> (Regel) Juz.	Akhar	Gulkhor
48	<i>R. korshinskiana</i> Bouleng.	Akhar	Gulkhor
49	<i>R. nanothamnus</i> Bouleng	Akhar	Gulkhor
50	<i>R. popovii</i> Chrshan.	Akhar	Gulkhor
51	<i>R. webbiana</i> Wall. ex Royle	Akhar	Gulkhor
52	<i>Meililotus albus</i> Medik.	Shorgarj, shorgarjak	Zardrishqa
53	<i>Trifolium pretense</i> L.	Sebargarushgulak	Shaftal, sebarga
54	<i>Alcea nudiflora</i> (Lindl.) Boiss.	Jermesk, jeramesk, jarmeskarwukhk	Garmash
55	<i>Elaeagnus orientalis</i> L.	Seezd	Sinjid
56	<i>Angelica ternata</i> Regel et Schmalh.	Kirifs, charefs	Karafs
57	<i>Bunium badachschanicum</i> R.Kam.	Zira	Zira
58	<i>B. persicum</i> (Boiss.) B. Fedtsch.	Zira	Zira
59	<i>Ferula foetidissima</i> Regel et Schmalh.	Revzak, kamul, kamol, uch	Row, kamol
60	<i>Ferula grigorievii</i> B. Fedtsch.	Revzak, kamul, kamol, uch	Kamol
61	<i>Heracleum lehmannianum</i> Bunge.	Kurukhkukh, chimoth	Krush
62	<i>Prangos pabularia</i> Lindl.	Warkh	Ogun
63	<i>Primula macrophylla</i> D. Don	Guli bunafsha	Guli banafsh
64	<i>Macrotomia euchroma</i> (Royle) Pauls.	Khipikhhikpikhhk, pikh-pikh	Surkhchuk, surkhshuk, surkhsoch
65	<i>Mentha asiatica</i> Boriss.	Wuthn, withm, wern	Warn, pudina, hulba
66	<i>M. arvensis</i> L.	Wuthn, withm, wern	Warn, pudina, hulba
67	<i>Nepeta glutinosa</i> Benth.	khi hichofgarth, khichofgarth, khichofgarg	Murmicek, shikastaband
68	<i>Ziziphora pamirolaica</i> Juz.	Jambilak, jambilakwokh, pukhtai withm, validolwokhak	Jambilak
69	<i>Solanum nigrum</i> L.	Karyopch	Kryopch
70	<i>Plantago lanceolata</i> L.	Ragakwokh, ragwokh, kalgacak	Rishtakshak
71	<i>Valeriana ficariifolia</i> Boiss.	Sunbul	Sunbul
72	<i>Achillea biebersteinii</i> Afan.	Zirdos, zirdados, zirdathaws	Zardsarak
73	<i>Achillea filipendulina</i> Lam.	Zirdos, zirdados, zirdathaws	Zardsarak
74	<i>A. scoparia</i> Waldst. et Kit.	Vidirmeej	Jorubi watani
75	<i>A. sieversiana</i> Willd.	Buin sadikhs	Push
76	<i>A. vachanica</i> Krasch. ex Poljak.	Suthm	Push
77	<i>Pyrethrum pyrethroides</i> (Kar. et Kir.) B. Fedtsch. ex Krasch.	Kakhchiver, kakhchivergulak	Spurgak