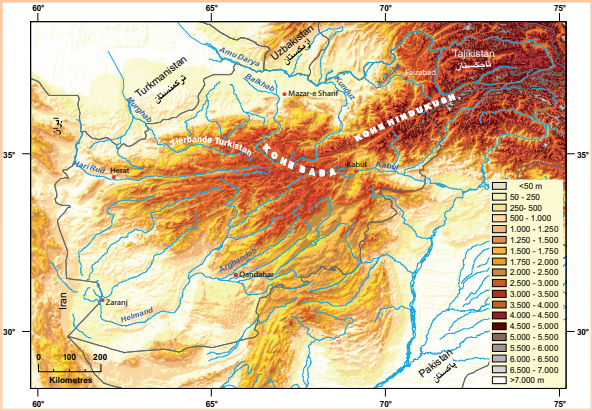

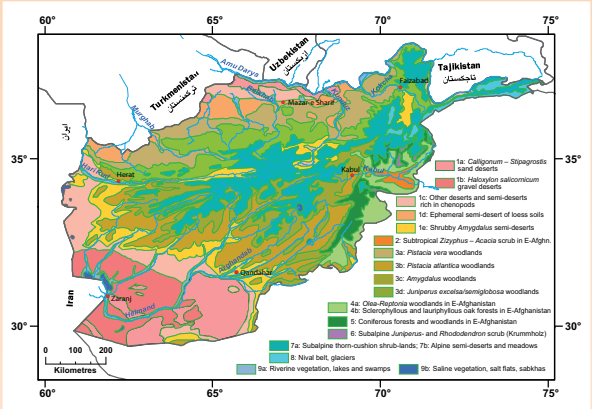

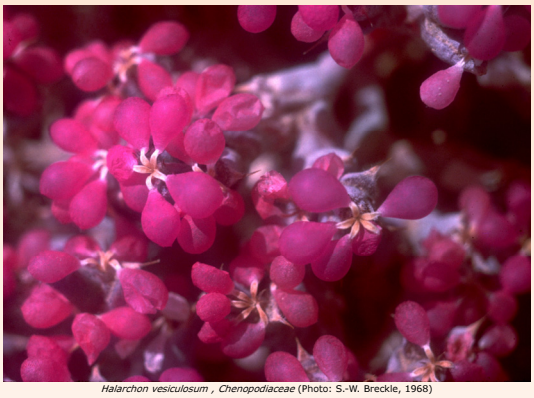

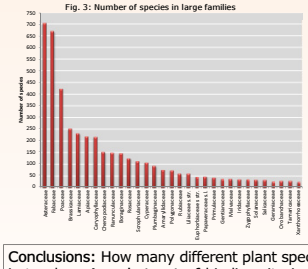

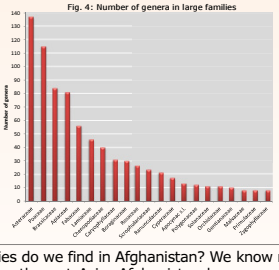

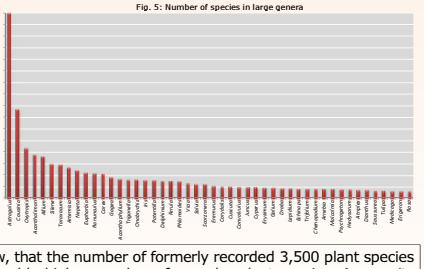

Vascular plants of Afghanistan – an augmented checklist

گیاهان رگدار افغانستان – یک چک لیست جامع

Funding: German Academic Exchange Service (DAAD) & the German Department of Foreign Affaires (AA)

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How many different plant species do we find in Afghanistan?

Introduction:

Afghanistan is topographically very complex (Fig. 1); its geology, soils, and climates are very diverse (RAFIQPOOR & BRECKLE 2010: see BRECKLE & RAFIQPOOR: Field Guide Afghanistan [FGA]: 23-77), as well as its natural vegetation (Fig. 2) (FREITAG et al., FGA 2010: 79-115) and flora. Because of the country's tremendous habitat heterogeneity (geodiversity) a high floristic diversity (biodiversity) could be expected.

Methods:

Inventories in herbaria, floras, floristic and taxonomic papers, online taxonomic data banks, photo archives, expert knowledge, etc.

Aims:

Critical inventory of valid nomenclature, synonymy, data on internal and external geographical distribution, altitudinal range, degree of endemism of taxa; working list for future studies; working list for future studies; **data-files for many future applied projects (Agriculture, Forestry, nature conservation etc.).**

Checklist:

In December 2013 the „Vascular Plants of Afghanistan – an Augmented Checklist" has been published. It is the obligatory scientific amendment to the published **FGA** with 1,200 species in 2,000 colour photographs. An evaluation of species-numbers (Fig. 3), number of genera (Fig. 4), species-rich genera (Fig. 5) etc. is included. It provides founded knowledge on biodiversity issues as well as on how to collect and document digitally herbar specimens. **Main references used:** World checklist of selected plant families; Rechinger's 179 fascicles of Flora Iranica; Flora of Pakistan; Flora of China, Flora of Iran (Farsi) etc. See list of References below.

Fig. 1: Physical Nature of Afghanistan

Liliaceae

(**Liliaceae *s.str.* with: *Fritillaria, Gagea, Lilium, Llyodia, Nothiolirion* and *Tulipa***)

Tulipa aitchisonii

Gagea spec.

In the past, Liliaceae was a core family among the monocotyledons with a very large number of genera and species, but recent studies, especially molecular, have shown that it needs to be totally re-defined and circumscribed. Here we have followed the Angiosperm Phylogeny Group's APG 3 classification system although aware that future research may well modify the system. In its currently contracted form Liliaceae has c. 16 genera and about 700 mostly north hemisphere species. There are 6 bulbous genera in Afghanistan, *Gagea* is especially complex.

Selected References

ALI SI 2005: Liliaceae in ALI SI & QAISER M eds. Flora of Pakistan 215. Karachi/Missouri [FP]

ALI SI, LEVICHEV IG 2007: *Gagea* in ALI SI & QAISER M eds. Flora of Pakistan 215: 17– 81. Karachi/Missouri [FP]

BOTSCHANTZEVA ZP 1982: Tulips: taxonomy, morphology, cytology, phytogeography and physiology. [English Translation] Balkema

CHEN XINQI, LIANG SONGYUN et al 2000: Liliaceae in WU ZHENGYI, RAVEN PH eds. Flora of China 24: 73–263 Beijing/St. Louis [FC]

GOVAERTS, R: World Checklist of Liliaceae. Facilitated by the Royal Botanic Gardens, Kew.. Published on the internet, http://apps.kew.org/wcsp/ [WCSP]

LEVICHEV IG 1999: Phytogeographical analysis of the genus *Gagea.* Komarovia 1: 45–57

PERSSON K 1992: Liliaceae 3 in Rechinger KH ed. Flora Iranica 170. Graz

RECHINGER KH, BROWICZ K, PERSSON K, WENDELBO P 1990: Liliaceae 2 in RECHINGER KH ed. Flora Iranica 165. Graz

TAMURA MN 1998: Liliaceae in KUBITZKI K ed. The families and genera of vascular plants 3: 343–353. Springer

WATSON L, DALLWITZ MJ 1992 →: The families of flowering plants: descriptions, illustrations, identification, and information retrieval. (Version: 18th May 2012), http://delta-intkey.com

WENDELBO P 1982: Liliaceae I in RECHINGER KH ed. Flora Iranica 151. Graz

Taxon	Internal Distribution	External Distribution	Altitude [m]	Notes FGA-page
◆***Fritillaria ariana*** (A. Los. & Vved.) Rix, Iran. J. Bot. 1: 82. 1977 (= *Rhinopetalum arianum* A. Los. & Vved. in Komarov, Fl. URSS 4: 738. 1935)		E-Iran, Turkm	300-400	
Fritillaria bucharica Regel, Trudy Imp. St. Petersburgsk. Bot. Sada 8: 652. 1883 (= *Rhinopetalum buchariсum* (Regel) A. Los. in Komarov, Fl. URSS 4: 298. 1935)		Pam	900	FGA 748
[*Fritillaria chitralensis* see *F. imperialis* L. var. *chitralensis*]				
Fritillaria cirrhosa D. Don, Prodr. Fl. Nepal. 51 1825 (= *F. cirrhosa* subsp. *roylei* (Hook.) Ali in Ali & Qaiser, Fl. Pakistan 215: 10. 2007)		Pak, Himal, Ind	?	FP 10
Fritillaria gibbosa Boiss., Diagn. Pl. Orient. ser. 1, 7: 107. 1846 (= *Rhinopetalum gibbosum* (Boiss.) A. Los. & Vved. in Komarov, Fl. URSS 4: 297. 1935)		Iran, Cauc, CAs, Pak	700-2400	FGA 748

Ranunculaceae

Adonis turkestanicus

Anemone bucharica

Different authors have contrasting opinions on the status and nomenclature of many taxa in the family, both at generic and species level. For example, the aquatic species of *Ranunculus* are sometimes placed in the independent genus *Batrachium.* Other generic examples are: *Aconitella* split off *Delphinium; Anemonastrum* split off *Anemone*; *Hegemone* split off *Trollius*; *Parapyrum* split off *Isopyrum*; *Shibateranthis* split off *Eranthis*. Here, we are conservative. The family, mainly herbaceous, has a global temperate distribution with c. 50 genera and over 2,000 species. In Afghanistan there are 20 genera and c. 150 species

Selected References

EMADZADE K, LEHNEBACH C, LOCKHART P, HÖRANDL E 2010: A molecular phylogeny, morphology and classification of genera of Ranunculeae (Ranunculaceae). Taxon 59, 3: 809–828

IRANSHAHR M, RECHINGER KH, RIEDL H 1992: Ranunculaceae. In: RECHINGER KH (ed): Flora Iranica 171. Graz

RAU MA 1993: Ranunculaceae. In: SHARMA BD, BALAKRISHNAN NP (eds): Flora of India 1: 1–145. Botanical Survey India, Calcutta

RIEDL H, NASIR YJ 1991: Ranunculaceae. In: ALI SI & NASIR YJ (eds): Flora of Pakistan 193, Islamabad.

TAMURA M 1993: Ranunculaceae. In: KUBITZKI K (ed): The families and genera of vascular plants 2: 563–583. Springer

WANG WENCAI, FU DEZHI, LI LIANGQIAN, et al. 2001: Ranunculaceae. In: WU ZHENGYI, RAVEN PH (eds): Flora of China 6: 133–437. http://hua.huh.harvard.edu/china/ [FC]

Generic References

Aconitum. RIEDL H 1993: The genus *Aconitum* in Pakistan and adjacent countries. Linzer Biol. Beitr. 25, 1: 67–79

Adonis. WANG WEN-TSAI 1994: Revision of *Adonis* I. Bull. Bot. Res. Northeast Forest. Univ. 14, 1: 1–31 [in Chinese]

Anemone. ZIMAN S, BULAKH EV, KADOTA Y, KEENER 2008: Modern view on the taxonomy of *Anemone* sensu stricto. Jap. J. Bot. 83, 3: 127–155

EHRENDORFER F, ZIMAN SN, KÖNIG C, et al. 2009: Taxonomic revision, phylogenetics and transcontinental distribution of *Anemone* section *Anemone.* Bot. J. Linn. Soc. 160: 312–354 [ANEM]

Clematis. GREY-WILSON C 2000: *Clematis* the genus. Oregon. Timber Press

JOHNSON M 2001: The genus *Clematis.* Södertälje, Sweden [CLEM]

WANG, WEN-Tsai 2003: A revision of *Clematis* sect. *Clematis*. Acta Phytotax. Sin. 41, 1: 1–62; 41, 2: 97–172 [CLEM]

Delphinium. MALYUTIN NI 2001: The system of the genus *Delphinium.* Bot Zhurn. [Moscow & Leningrad] 68, 8: 120–130 [in Russian]

Ranunculus. SRIVASTAVA SK 2010: Revision of genus *Ranunculus* in India. Taiwania 55, 3: 273–314 [RANU]

Taxon	Internal Distribution	External Distribution	Altitude [m]	Notes FGA-page
◆***Aconitum kurramense*** Qureshi & Chaudhri, Pakistan Syst. 2: 6. 1978		SaKoh		Doubtful status
Aconitum rotundifolium Kar. & Kir., Bull. Soc. Imp. Nat. Moscou 15: 139. 1842 (= *A. tapeinocranum* Rech. f., Anz. Math.-Nat. Kl. Österr. Akad. Wiss. 91: 71. 1954)		CAs, Pak, Himal, Xinj	2200-4200	FGA 604

Fig. 2: Natural Vegetation of Afghanistan (Freitag 1971, Breckle 1973 etc.)

Salvia pterocalyx, Lamiaceae (Photo: Catherine Schloeder, 2009

Halarchon vesiculosum , Chenopodiaceae (Photo: S.-W. Breckle, 1968)

Ixiolirion tataricum (Tatar-Lily) (Photo: Frank Joisten, may 2012)

Fig. 3: Number of species in large families

Fig. 4: Number of genera in large families

Fig. 5: Number of species in large genera

References:

ALAM, M. (2011): Trees and shrubs of Afghanistan. Rossolis/Lausanne 530pp.

BRECKLE, S.-W., & RAFIQPOOR, M.D. (2010) (eds.: BRECKLE, S.-W., Dittmann, A. & RAFIQPOOR, M.D.): Field Guide Afghanistan – Flora and Vegetation. Scientia Bonnensis, Bonn, Manama, New York, Floríanópolis. 864 pp.

Flora of China: Online data bank (http://flora.huh.harvard.edu/china/).

International Plant Names Index [IPNI] (2008): Online taxonomic data bank http://www.ipni.org).

NASIR, E. & ALI, S.I. (eds.) (1970ff): Flora of Pakistan. National Herbarium, NARC, Islamabad and Department of Botany, University of Karachi, Karachi.

NOWAK, A., NOBIS, M. et al. (2008-2011): Atlas of Vascular Plants of Tajikistan, Part 1–3 Opole.

Plant List: Online taxonomic data bank (www.theplantlist.org; acc. nov.2011-may 2012).

PODLECH, D. (2012): Checklist of the Flowering Plants of Afghanistan. (www.sysbot.biologie.unimuenchen.de/de/personen/podlech/flowering_plants_afghanistan.pdf).

RECHINGER, K.H., RECHINGER, W. (eds.) (1963–2013ff): Flora Iranica, No 1–179ff. Akad. Druck– und Verlagsanstalt/Graz.

Tropicos/Flora of Pakistan (http://www.tropicos.org/Project/Pakistan).

Conclusions: How many different plant species do we find in Afghanistan? We know now, that the number of formerly recorded 3,500 plant species is too low. As a **hotspot** of biodiversity in south-west Asia, Afghanistan has a considerably higher number of vascular plant species. Among its many attributes, the checklist enables us to state, with some confidence, that the total number of Afghan vascular plant species is almost 5,000; species endemism rate is c. 24%. Checklists are very helpful in many aspects. The enormous data files are a basic tool for agriculture, forestry, nature conservation, ecological validation, indicating the geographical background of the flora, the internal, external and altitudinal distribution, with better precise quantitative data for development projects, as well as for education and teaching, and useful for evaluation of digital photographic archives for future research, hopefully in future for mountaineering and eco-tourism projects.

Take-home Message:

Wenn Sie Bilder/Dias afghanischer Pflanzen haben, bitte melden Sie sich: *sbreckle@gmx.de* oder *d.rafiqpoor@uni-bonn.de*.

Wenn Sie in den kommenden Wochen/Monaten nach Afghanistan fahren, aktivieren Sie Ihre Digitalkamera für Pflanzen-Portraits: Bäume, Sträucher, Blumen, Unkräuter, Wildkräuter, Nutzpflanzen, Gemüse, Früchte, Gebirgspflanzen, Wasserpflanzen, Straßenbäume, Ornamentalpflanzen, Landschaften usw.