

Adapting agriculture to climate change:  
collecting, protecting and preparing crop wild relatives

# Pakistan



## Seed Collecting Guide



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RBG Kew (2016) Pakistan Seed Collecting Guide

Cover photos: TOP LEFT: Rice fields in Sindh, CREDIT: UK Department for International Development (DFID); TOP RIGHT: Mount Masherbrum from Hushe village, CREDIT: Adeel Shaikh via Flickr; BOTTOM LEFT: *Pennisetum orientale*, CREDIT: Wikimedia user Cillas; BOTTOM RIGHT: *Cajanus scarabaeoides* CREDIT: JSTOR.

This work was undertaken as part of the initiative “Adapting Agriculture to Climate Change” which is supported by the Government of Norway. The project is managed by the Global Crop Diversity Trust with the Millennium Seed Bank of the Royal Botanic Gardens, Kew, in partnership with national and international genebanks and plant breeding institutes around the world. It is implemented in accordance with the International Treaty on Plant Genetic Resources for Food and Agriculture. For further information see the project website: [www.cwrdiversity.org/](http://www.cwrdiversity.org/)

Many individual scientists, herbaria, genebanks and specialist institutes are contributing advice and information to the Project and these guides. The Project aims to collect the wild relatives of 29 key crops, conserve them in genebanks, and prepare them for use in plant improvement programmes to breed new crop varieties adapted to future climates.



The boundaries and names shown on the maps included in this guide do not imply official endorsement or acceptance by the Adapting Agriculture to Climate Change Project. Data source: GADM, Version 1.0 via [diva-gis.org](http://diva-gis.org)

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# Acknowledgements

The Harlan and de Wet Crop Wild Relatives Checklist was developed by Holly Vincent and Nigel Maxted at the University of Birmingham.

UNIVERSITY OF  
BIRMINGHAM



**CIAT**

Centro Internacional de Agricultura Tropical  
International Center for Tropical Agriculture

The Gap Analysis work which informed the list of species included in this guide, and all the map files, were produced by the Gap Analysis team at CIAT: Andy Jarvis, Nora Castañeda, Colin Khoury and Julian Ramirez-Villegas.

RBG Kew is involved in the research and collection phases of the project. This collecting guide was developed based on the work of the Millennium Seed Bank Enhancement Project Species Targeting Team.

Royal Botanic Gardens  
**Kew**



**CROP  
TRUST**

The Crop Wild Relatives Project is led by the Global Crop Diversity Trust. This work was undertaken as part of the initiative.

Specimen data was kindly provided to this project by many individuals and organisations who are listed on the website: <http://www.cwrdiversity.org/home/data-sources>  
This dataset will be made available for download. Please refer to the website for more information on this dataset.

For any feedback or questions about this collecting guide please contact:

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This collecting guide consists of species profiles and information sheets contained within this folder, alongside a CD which contains localities of the taxa in an excel file.

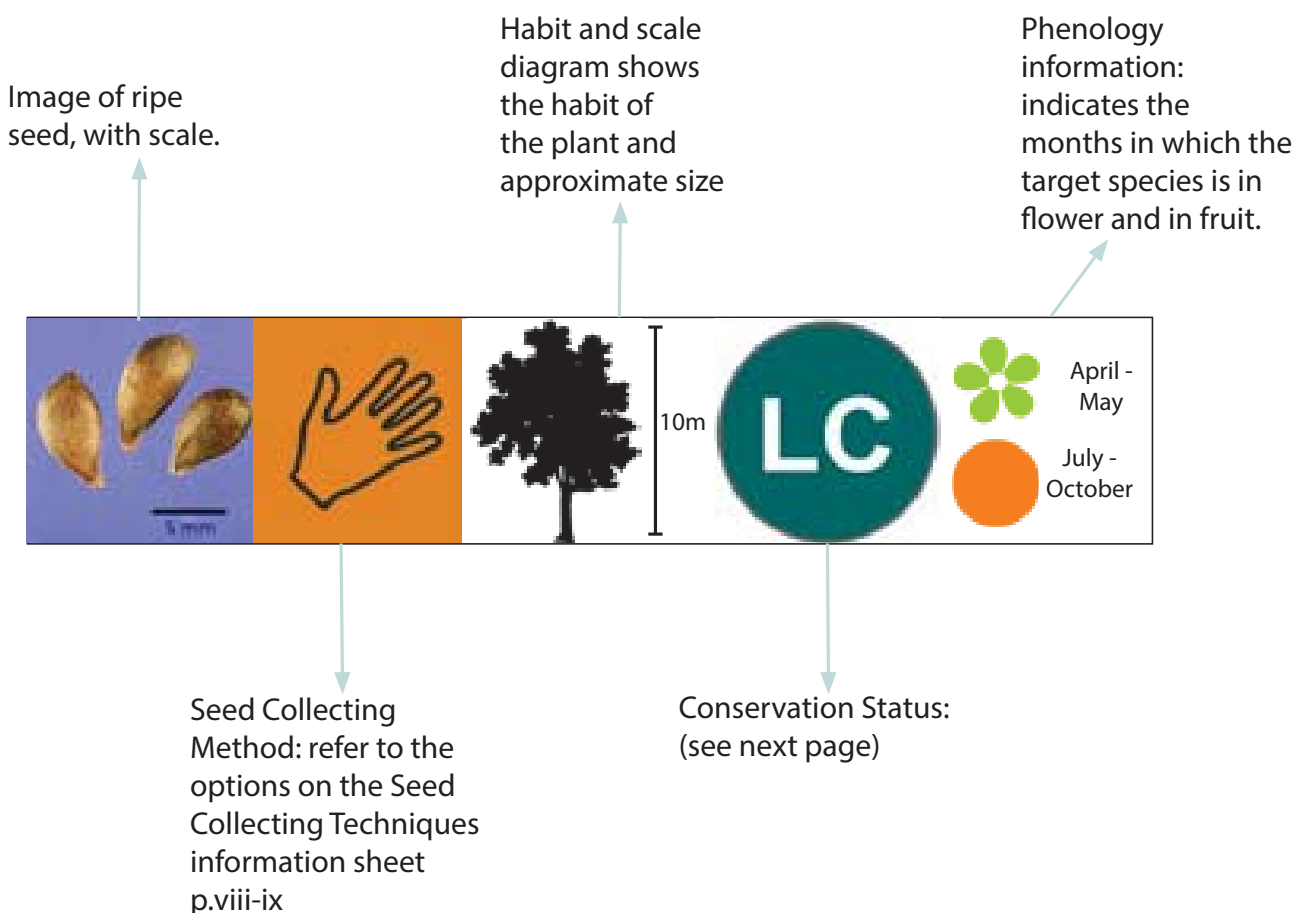
The species included in this guide are a selection of the wild relatives of the 29 key crops which this project covers (African Rice, Alfalfa, Apple, Aubergine, Bambara groundnut, Banana, Barley, Bread Wheat, Butter Bean, Carrot, Chickpea, Common Bean, Cowpea, Faba bean, Finger millet, Grasspea, Lentil, Oat, Pea, Pearl millet, Pigeon pea, Plantain, Potato, Rice, Rye, Sorghum, Sunflower, Sweet potato, Vetch). It is not a definitive guide to the Crop Wild Relatives in this country.

The guides are designed to be used both in the planning of a collecting trip, and also in the field.

At the front of this guide there is a phenology table showing the flowering and fruiting times of all the taxa to indicate which species may be found at a certain time of year, or when to collect target species.

Synonyms for each species are listed in the Appendix at the end of this guide.

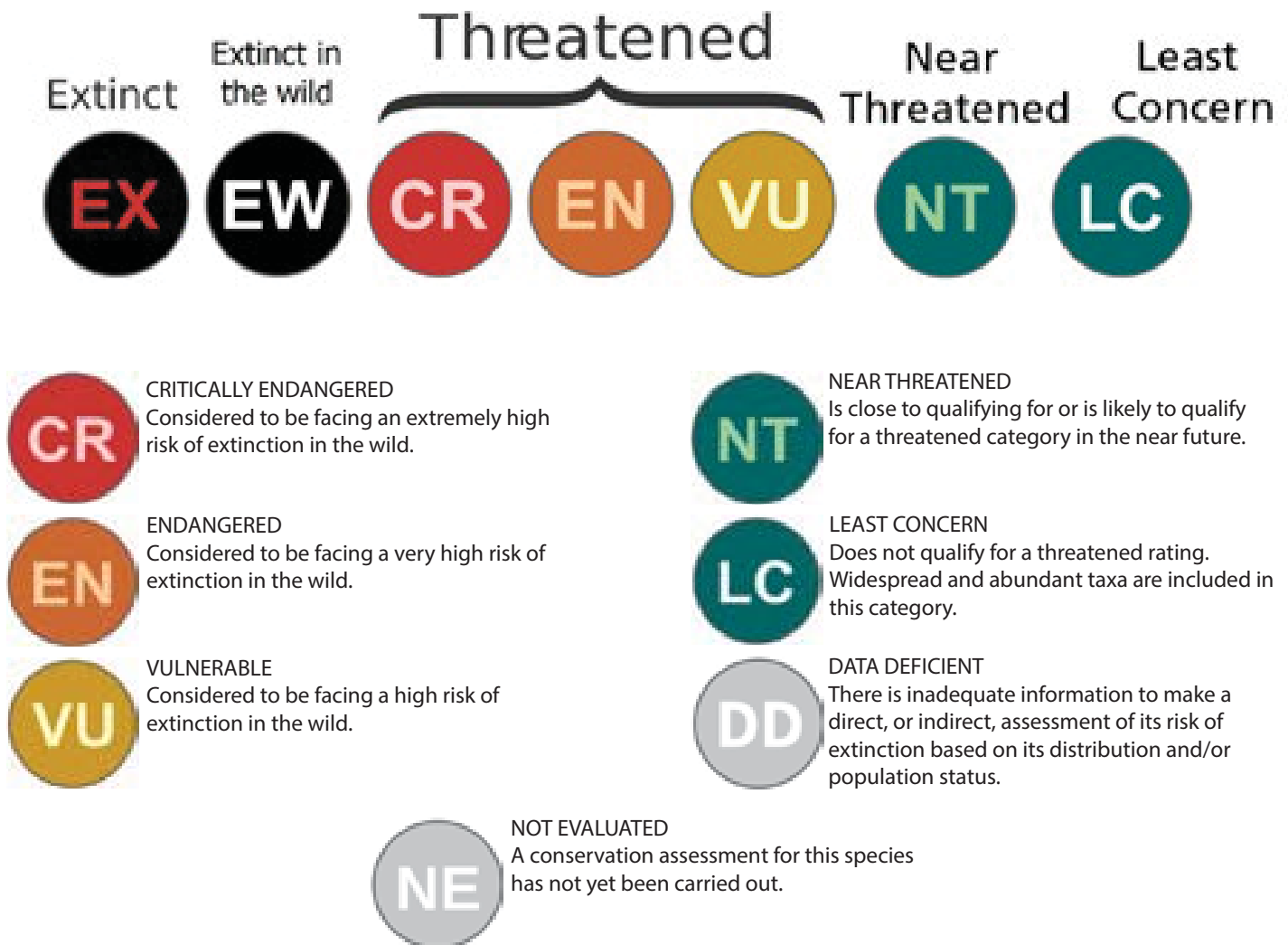
On each species profile, there is a collection of images to help identify the target species, accompanied by a series of symbols :



# Conservation Assessments

## Conservation Status:

Assessments are completed using 2001 IUCN Red List Categories and Criteria version 3.1 with the following categories:



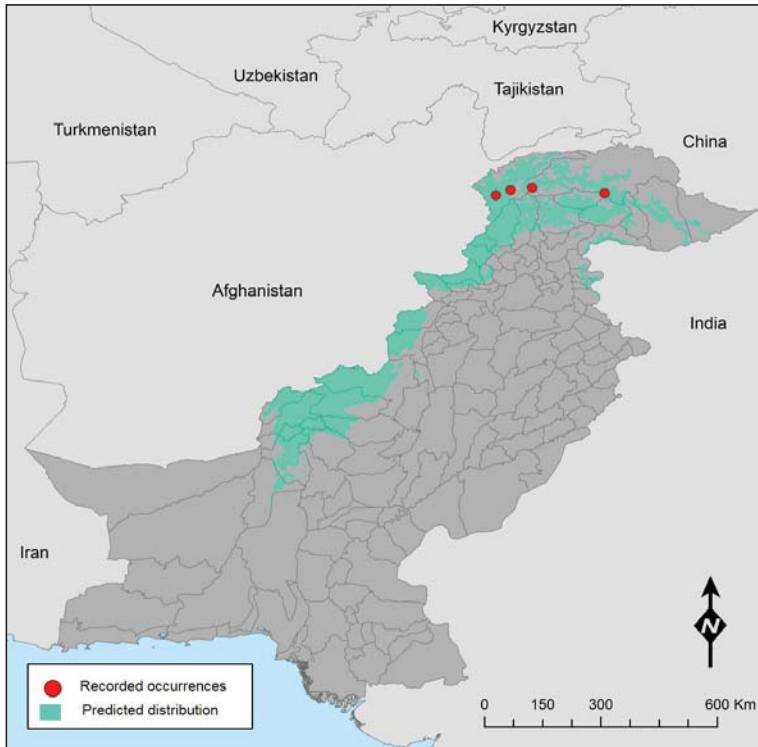
Where a full conservation assessment has not been completed, a preliminary conservation rating may be indicated. Preliminary assessments are produced using specimen locality data and GIS, which calculated two parameters accepted by IUCN as suitable measures of range: namely extent of occurrence (EOO) and area of occupancy (AOO). These values derived for each species are then compared with thresholds set out by IUCN under Criterion B.

Where a preliminary conservation assessment has been calculated this is indicated by the word PRELIM:

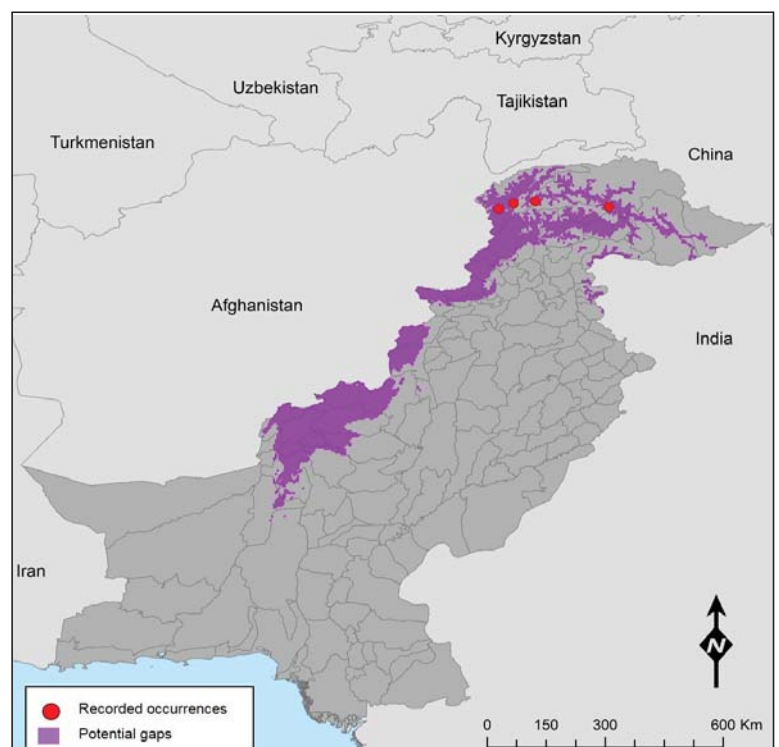


# Maps

Two maps are provided for each target species. The first map shows a point distribution of all the known localities of this species based on herbarium specimen records and existing data-sets. The area shaded on this map shows the predicted distribution based on Maxent.



The second map shows the potential gaps in gene bank collections, where seed collections should be targeted.



# Useful resources

The following resources are available online, or on the CD which accompanies this guide.

## Kew technical information sheets

- Assessing a potential seed collection:

[http://www.kew.org/ucm/groups/public/documents/document/ppcont\\_014343.pdf](http://www.kew.org/ucm/groups/public/documents/document/ppcont_014343.pdf)

- Post-harvest handling of seed collections:

[http://www.kew.org/ucm/groups/public/documents/document/ppcont\\_014345.pdf](http://www.kew.org/ucm/groups/public/documents/document/ppcont_014345.pdf)

Other sheets covering the following topics are available from <http://www.kew.org/science-research-data/kew-in-depth/msbp/publications-data-resources/technical-resources/technical-information-sheets/index.htm>

- Protocol for comparative seed longevity testing
- Measuring seed moisture status using a hygrometer
- Selecting containers for long-term seed storage
- Low-cost monitors of seed moisture status
- Small-scale seed drying methods
- Equilibrating seeds to specific moisture levels
- Identifying desiccation-sensitive seeds
- Seed bank design: seed drying rooms
- Seed bank design: cold rooms for seed storage
- Cleaning seed collections for long-term conservation

## ENSCONET seed collecting manual

[http://ensconet.maich.gr/PDF/Collecting\\_protocol\\_English.pdf](http://ensconet.maich.gr/PDF/Collecting_protocol_English.pdf)

## Seed Conservation: turning science into practice

<http://www.kew.org/science-research-data/kew-in-depth/msbp/publications-data-resources/technical-resources/seed-conservation-science-practice/index.htm>

## Collecting plant genetic diversity: Technical guidelines (Bioversity)

[http://cropgenebank.sgrp.cgiar.org/index.php?option=com\\_content&view=article&id=390&Itemid=557](http://cropgenebank.sgrp.cgiar.org/index.php?option=com_content&view=article&id=390&Itemid=557)

## FAO - Commission on Genetic Resources for Food and Agriculture

<http://www.fao.org/nr/cgrfa/en/>

## IUCN Red List Categories and Criteria version 3.1

[http://www.iucnredlist.org/documents/redlist\\_cats\\_crit\\_en.pdf](http://www.iucnredlist.org/documents/redlist_cats_crit_en.pdf)

## e-monocot.org

An online resource for monocot plants.

For more information about the Crop Wild Relatives Project, and to access the Harlan and de Wet Crop Wild Relatives checklist, please visit the website:

[www.cwrdiversity.org](http://www.cwrdiversity.org)



# Seed Collecting Techniques

Michael Way and Kate Gold, Seed Conservation Department

Seed collecting from wild plants requires care, resourcefulness and determination. There are many different collecting techniques. The most appropriate technique will depend on the species, particularly the type of dispersal unit (fleshy fruit, dry fruit, individual seeds etc). This information sheet outlines the manual techniques most commonly used to make seed collections of adequate quality and quantity, for long term conservation.

## Hand picking of whole fruits

The most basic and flexible of techniques, hand picking or plucking, has many benefits. Consider though, if you can use a more efficient technique.



Plucking is particularly suitable when:

- target fruits can easily be selected by eye (e.g. due to colour or texture change of fruit coat, or swelling of fruit);
- non-target (e.g. immature or damaged) fruit cannot be excluded from the collection by more efficient techniques;
- fruits are easily accessible and collectors can tie buckets or similar containers around the waist, releasing both hands for collecting;
- collecting many-seeded fleshy or dry indehiscent fruits; and
- making small seed collections.

## Pruning clusters of fruit

This technique is typically used to collect tree seeds. Cut groups or clusters of fruits using secateurs or tree pruners. Assess for ripeness and damage before adding seeds to the collection.

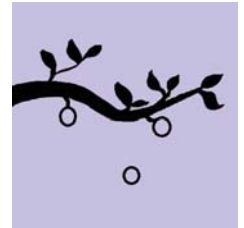


This is a very effective technique when:

- seed is clustered at the distal (terminal) parts of branches;
- the species is abundant and a small associated loss of branch and foliage is acceptable;
- seed is beyond reach of the collectors and has to be obtained using tree pruners.

## Shaking branches

Careful shaking of branches will sometimes dislodge the best available seed, which can be collected in buckets or on a tarpaulin held or spread out beneath the plant. Start with gentle taps, and carefully check each sample of seed dislodged. Light shaking will often dislodge fully ripe fruits and seeds, leaving immature, poorly developed and damaged seeds to be retained on the parent plant. Too-heavy beating of branches may cause damage to the tree, and may also dislodge other plant material and associated insects, necessitating additional cleaning of the collection.



Shaking branches may be useful when collecting:

- dehiscent fruits with medium large seeds;
- seeds with irritant plumes (e.g. *Cercocarpus* of the Rosaceae);
- spiny trees such as *Prosopis* (Fabaceae);
- on level, open terrain suitable for tarpaulin use.

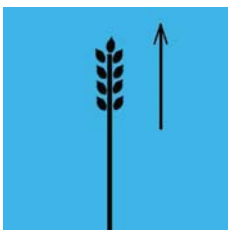
This technique may not be suitable for light, plumed seed from *Bombacaceae* and *Asclepiadaceae*, which may be carried away by air currents.



ABOVE: Stripping seed heads may be appropriate for grasses  
Credit: Global Crop Diversity Trust/Britta Skagerfalt

## Stripping entire seed-heads

This is a popular technique for collecting seed from grasses and may be suitable for other species with erect infructescences (seedheads). Grasp the seedheads at the base with a gloved hand and slide the hand upwards, dislodging many or all of the seeds. This technique may introduce a proportion of immature seeds into the collection. Such seeds might need further postharvest ripening which can be time consuming and is best avoided.

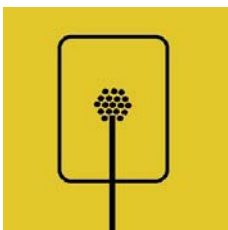


The stripping technique is most suitable for:

- dense, mono-specific stands of target species with no weed or other species present; and
- infructescences which are completely and consistently at the natural dispersal stage.

## Bagging seed-heads

If there is frequent access to the collecting site, and if seeds would otherwise be lost, fix a well-tied mesh bag loosely over pre-dispersal seed heads. Seeds are captured as soon as they are shed, and can be periodically removed. This has been successfully used on a small scale, e.g. for collecting *Fouquieria* sp.



## Collecting from the ground

You will frequently find seeds on the ground below trees or shrubs, but they will often be damaged by pests or pathogens. The seeds may have been on the ground for several months, and could even date from the previous year. Such seed will have aged and life-span in storage will be reduced. Inspect the seed carefully, noting any variation in the fruit, seed coat and internal tissues.



In general, only collect from the ground when:

- the parent tree(s) can be determined without doubt;
- you are certain that you are collecting recently dispersed seeds;
- seeds have not suffered significant damage from pests or pathogens; and
- other techniques or collecting options are unsuitable.

## Collecting fleshy fruits

- Collect fleshy fruits directly into strong plastic bags or tubs with as much air as possible.
- Pack the bags in a rigid plastic container to ensure that the fruits are not squashed and help prevent them getting too hot and fermenting during transit.
- You may need to remove the seeds from fleshy fruits either during or immediately after the field trip.



ABOVE Collecting small seeds into paper bags  
Credit: Ruth Harker/ RBG Kew

## Containers

Collect into buckets, cloth or paper bags, and check each person's sample carefully before combining into a single population collection.

Using buckets has the advantage of allowing you to monitor the quality of the collection whilst associated insects disperse freely.

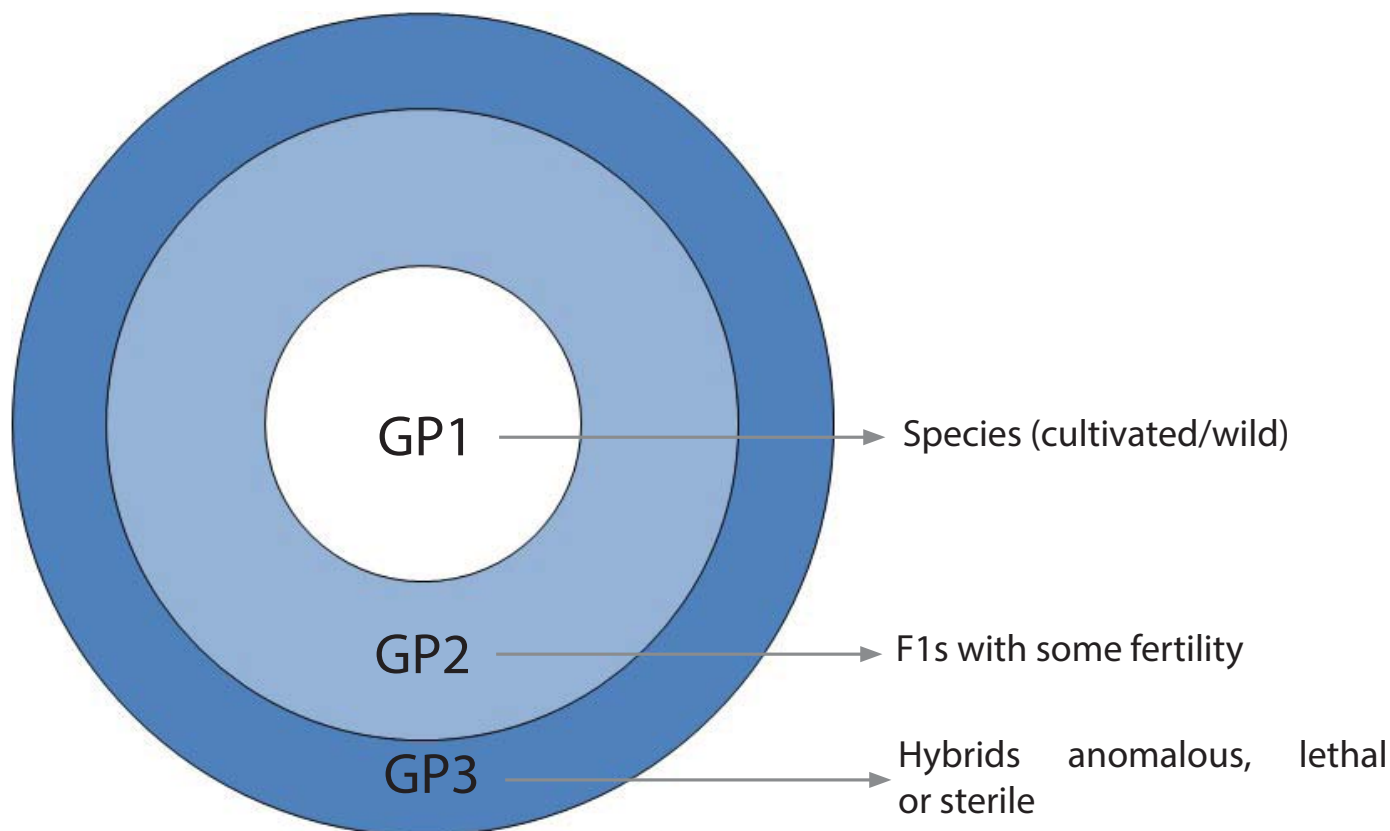
Place collections of dry, ripe seed into cloth or paper bags for transit. Store any awned seed or hooked fruit, that would damage or get stuck in cotton bags, in cardboard boxes or strong paper bags. Never collect or store seeds in plastic bags.

Label all seed containers inside and out with a unique collection number, and seal them securely. It is best to prepare sufficient labels before filling the containers.

Each target species in this guide is a wild relative of a crop. On each species profile it is indicated how closely related the target species is to the crop using either the Gene Pool concept or the Taxon Group concept. Species more closely related to the crop are higher priorities for collecting.

## Gene Pool Concept

Harlan and de Wet, 1971



## Taxon Group Concept

Maxted et al. 2006

Taxon Group 1 – cultivated/wild form of the crop

Taxon Group 2 – species in same series/section as crop

Taxon Group 3 – species in same subgenus as crop

Harlan, J. and J. de Wet (1971). Towards a rational classification of cultivated plants. *Taxon* 20: 509-517.

Maxted, N., B.V. Ford-Lloyd, S.L. Jury, S.P. Kell and M.A. Scholten (2006). Towards a definition of a crop wild relative. *Biodiversity and Conservation* 14: 1-13.

# Identification Keys

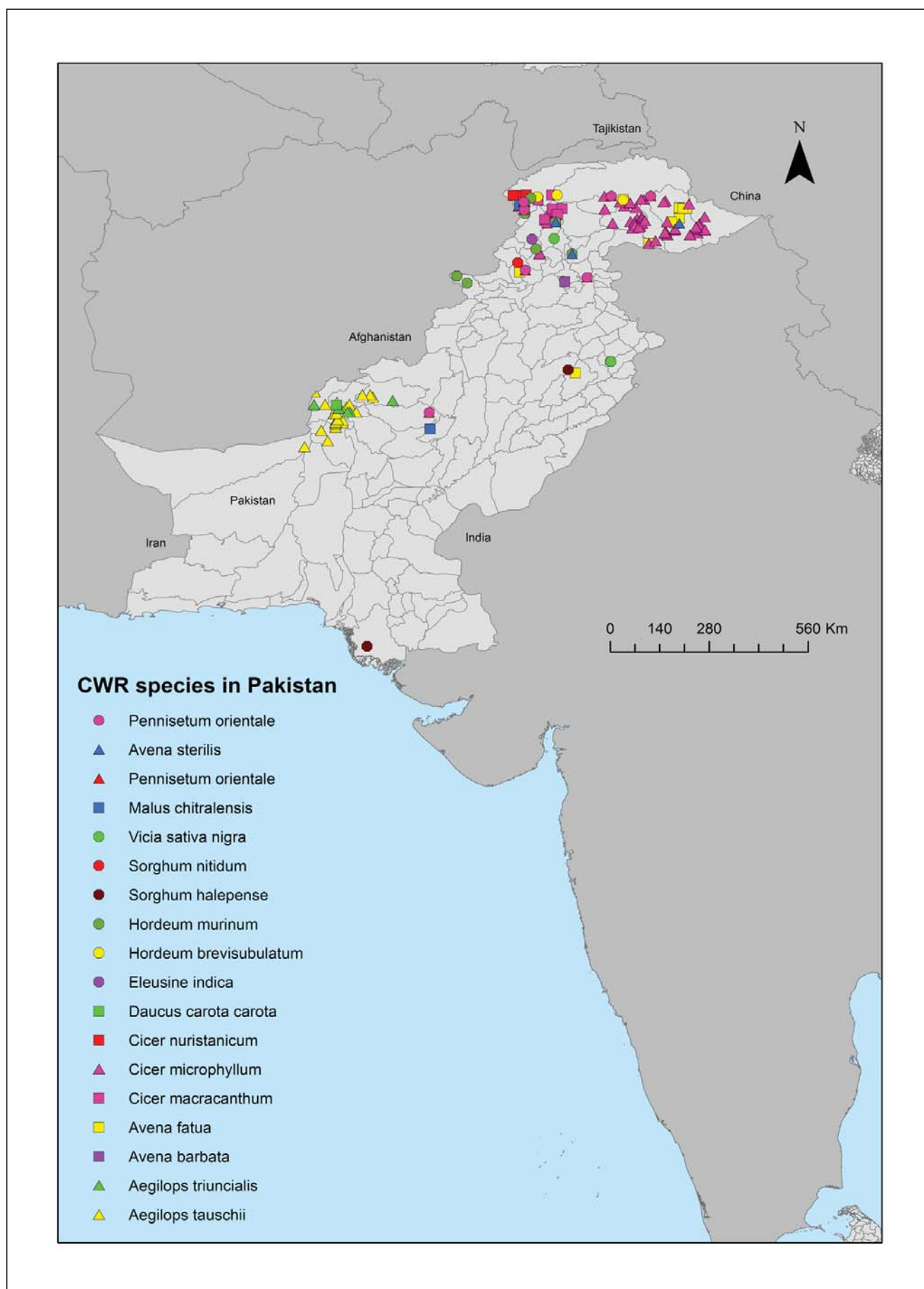
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Interactive identification keys can be accessed using the links below.

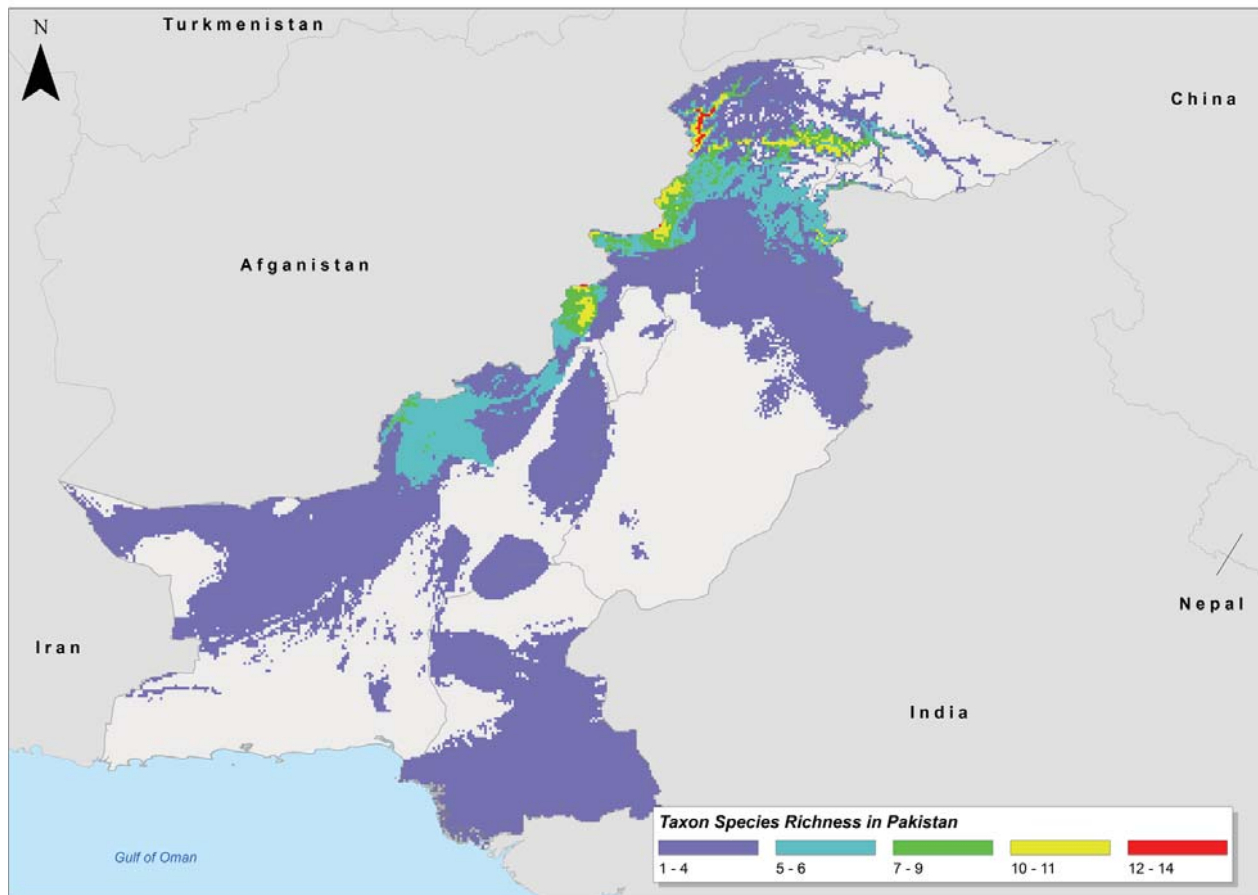
[Kew Grassbase interactive identification key](http://www.kew.org/data/grasses-db/ident.htm)

<http://www.kew.org/data/grasses-db/ident.htm>

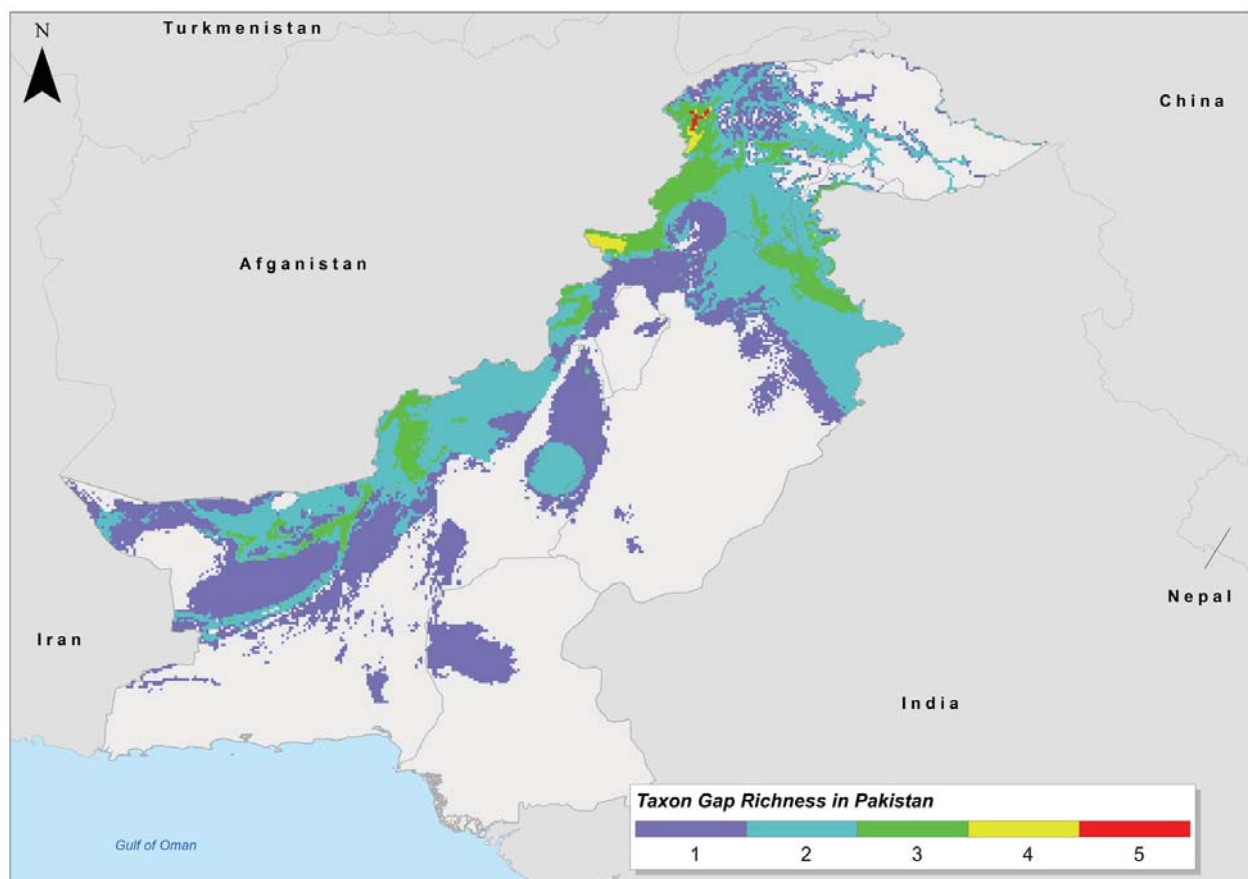
Occurences of all taxa in this guide, as a point distribution



## Species richness



## Gap richness



# Species in this guide

Species profiles are arranged alphabetically by family and taxon.

Family	Taxon	Genepool	Collection Priority	Sheet
Apiaceae	<i>Daucus carota</i> subsp. <i>carota</i>	Carrot	Low	1
Convolvulaceae	<i>Ipomoea cairica</i>	Sweet Potato	Low	2
Leguminosae	<i>Cajanus crassus</i>	Pigeon pea	Low	3
Leguminosae	<i>Cajanus mollis</i>	Pigeon pea	Low	4
Leguminosae	<i>Cajanus platycarpus</i>	Pigeon pea	Low	5
Leguminosae	<i>Cajanus scarabaeoides</i>	Pigeon pea	Low	6
Leguminosae	<i>Cicer acanthophyllum</i>	Chickpea	Low	7
Leguminosae	<i>Cicer macracanthum</i>	Chickpea	Low	8
Leguminosae	<i>Cicer microphyllum</i>	Chickpea	Low	9
Leguminosae	<i>Cicer nuristanicum</i>	Chickpea	Low	10
Leguminosae	<i>Lathyrus hirsutus</i>	Grasspea	Low	11
Leguminosae	<i>Lens culinaris</i> subsp. <i>orientalis</i>	Lentil	Low	12
Leguminosae	<i>Medicago sativa</i> subsp. <i>falcata</i>	Alfalfa	High	13
Leguminosae	<i>Vicia sativa</i> subsp. <i>nigra</i>	Vetch	Low	14
Poaceae	<i>Aegilops cylindrica</i>	Wheat	Low	15
Poaceae	<i>Aegilops tauschii</i>	Wheat	Low	16
Poaceae	<i>Aegilops triuncialis</i> var. <i>triuncialis</i>	Wheat	Low	17
Poaceae	<i>Avena barbata</i>	Oat	Low	18

# Species in this guide

Species profiles are arranged alphabetically by family and taxon.

Family	Taxon	Genepool	Collection Priority	Sheet
Poaceae	<i>Avena fatua</i>	Oat	Low	19
Poaceae	<i>Avena hybrida</i>	Oat	Low	20
Poaceae	<i>Avena sterilis</i>	Oat	Low	21
Poaceae	<i>Avena trichophylla</i>	Oat	Low	22
Poaceae	<i>Eleusine indica</i>	Finger millet	High	23
Poaceae	<i>Hordeum bogdanii</i>	Barley	Low	24
Poaceae	<i>Hordeum brevisubultum</i>	Barley	High	25
Poaceae	<i>Hordeum marinum</i>	Barley	Low	26
Poaceae	<i>Hordeum murinum</i>	Barley	Low	27
Poaceae	<i>Ochthochloa compressa</i>	Finger millet	Low	28
Poaceae	<i>Oryza coarctata</i>	Rice	Low	29
Poaceae	<i>Pennisetum orientale</i>	Pearl millet	High	30
Poaceae	<i>Secale cereale</i> subsp.	Rye	High	31
Poaceae	<i>Sorghum halepense</i>	Sorghum	High	32
Poaceae	<i>Sorghum nitidum</i>	Sorghum	High	33
Poaceae	<i>Thinopyrum intermedium</i>	Wheat	Low	34
Rosaceae	<i>Malus chitralensis</i>	Apple	High	35
Solanaceae	<i>Solanum insanum</i>	Eggplant	Low	36
Solanaceae	<i>Solanum virginianum</i>	Eggplant	Low	37







# Phenology table

Taxon	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<i>Hordeum murinum</i>			Species in flower	Species in flower	Species in flower	Species in flower						
			Species in fruit	Species in fruit	Species in fruit							
<i>Ochthochloa compressa</i>												
<i>Oryza coarctata</i>												
<i>Pennisetum orientale</i>				Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower		
				Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit		
<i>Secale cereale</i> subsp. <i>afghanicum</i>												
<i>Sorghum halepense</i>												
<i>Sorghum nitidum</i>												
<i>Thinopyrum intermedium</i>												
<i>Malus chitralensis</i>					Species in flower							
<i>Solanum insanum</i>	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower	Species in flower
	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit	Species in fruit
<i>Solanum virginianum</i>												

## KEY

Species in flower



Species in fruit



Data gathered from literature and herbarium specimens



**HABIT:** Biennial, 1st year plants composed of a rosette of leaves, 2nd year plants bolting to 120 cm.

**LEAVES:** Basal leaves oblong, 2-3-pinnate/pinnatisect, ultimate segments linear to lanceolate, 2-15 × 0.5-4 mm, glabrous to hispid especially on the veins and margins, apex acute, mucronate.

**INFLORESCENCE:** Solitary, compound umbels on long peduncle, flat-topped or slightly domed. Each inflorescence has 20-90 umbellets, each umbellet has 15-60 flowers. Peduncles 10-55 cm, retrorsely hispid, bracts foliaceous, pinnate, rarely entire, lobes linear, 3-30 mm, margins scarious, rays 2-7.5 cm, unequal, bracteoles 5-7, linear, entire or 2-3-lobed, more or less scarious and ciliate, equalling or exceeding flowers.

**FLOWER:** 2-3 mm across, petals white, sometimes yellow or pinkish.

**FRUIT:** 2-seeded schizocarps, about 3-4 mm long by 2 mm wide, ellipsoid, slightly flattened, bristly. At fruiting stage umbel folds inwards into a more-or-less spheroid shape.

**Habitat:**

Mountain slopes, ruderal areas.

**Distribution:**

Worldwide in temperate regions.

**Altitude:** 0 - 3000 m

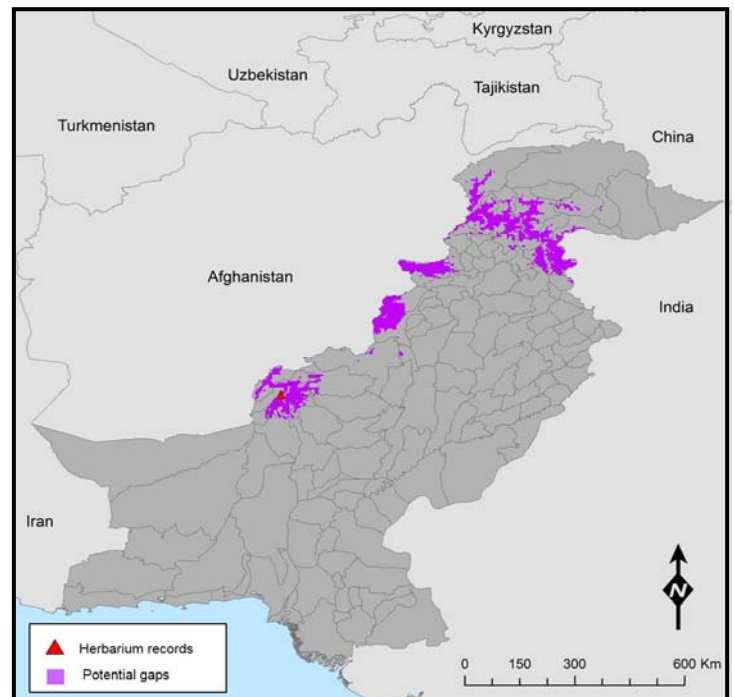
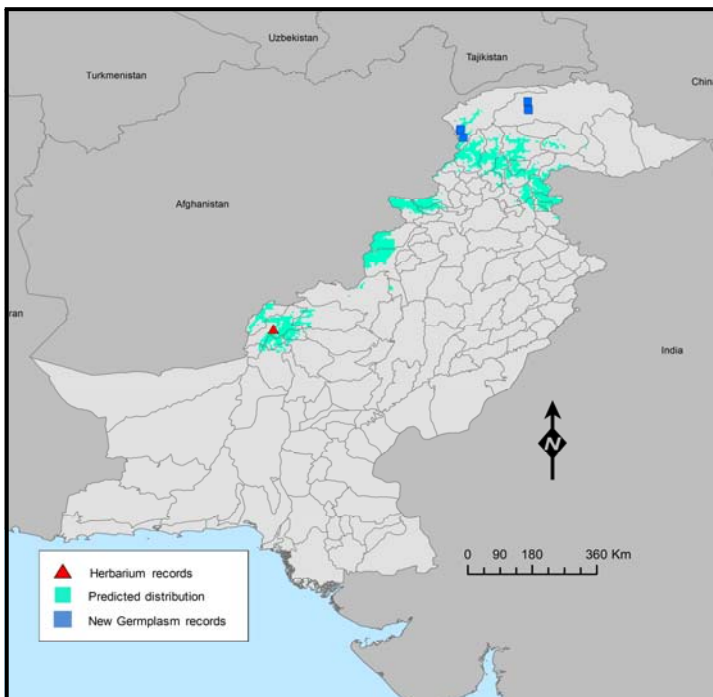
*Daucus carota subsp. carota*

Taproot slender, branched, woody, not fleshy, usually brown. Wild carrots often have one dark purplish sterile flower at the centre of the umbel.

## May be confused with:

*Daucus carota subsp. sativa*

Taproot thickened, elongate terete or clavate, fleshy, reddish, reddish-yellow, or yellow.



**References:** Flora of China, Volume 14, p205 via [www.efloras.org](http://www.efloras.org)  
[http://www.efloras.org/florataxon.aspx?flora\\_id=2&taxon\\_id=200015518](http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200015518)



Wikimedia user Quartl



Wikimedia user Quartl



Flora Batava via Wikimedia

*Daucus Carota* 93.



Wikimedia user Phuong Tran



0-1.2 m



May - Jul

Jul - Sep

Wild relative of sweet potato

Morning glory, Mile-a-minute vine

**HABIT:** Perennial herb with twining and trailing stems, reaching up to 5 m. Roots tuberous and plant rooting at nodes. Plants hairless.

**LEAVES:** Round in outline, 3-10 cm long and wide, deeply 5-segmented with basal segments often lobed; leaf stalk 2-6 cm long.

**INFLORESCENCE:** Axillary, 1-3 flowered.

**FLOWER:** Corolla fused, funnel-shaped, 3.5-6 cm long, 6-8 cm wide, violet (rarely white), with darker violet hairless mid-petal bands, throat usually darker. Stamens and style included in flower tube. Calyx 0.4-0.8 cm long.

**FRUIT:** An almost globe-shaped capsule, 9-12 mm wide, with 2 chambers, splitting into 4 valves, contains up to 4 seeds.

**SEEDS:** Dark brown to black, 5-6 mm long, flattened ovoid, hairy with pale brown long hairs on outer ridges.

**Habitat:**

A common inhabitant of swampy grassland, riverine edges and roadsides, where it may cover extensive areas.

**Distribution:**

Throughout tropical Africa; also from the eastern Mediterranean region through Asia to Taiwan.

**Altitude:** Up to 1650 m

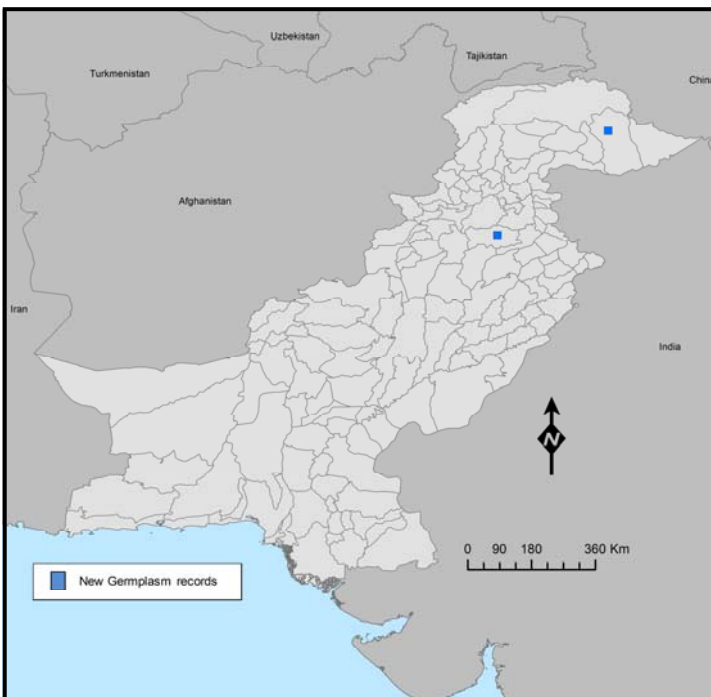
*Ipomoea cairica*

May be confused with:  
*Ipomoea batatas*

Deeply 5(-7)-lobed leaves.



Leaves entire.



All populations priority for collection

**References:** Hyde, M.A., Wursten, B.T., Ballings, P. & Dondeyne, S. (2013). Flora of Mozambique: Species information: *Ipomoea cairica* var. *cairica*. [http://www.mozambiqueflora.com/speciesdata/species.php?species\\_id=147580](http://www.mozambiqueflora.com/speciesdata/species.php?species_id=147580), retrieved 22 May 2013; Thorp, J.R., Wilson, M, Weeds Australia - [www.weeds.org.au](http://www.weeds.org.au)

CONVOLVULACEAE

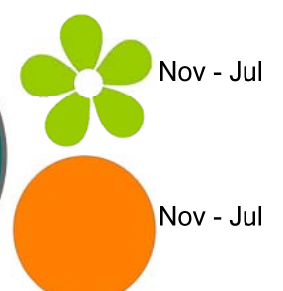
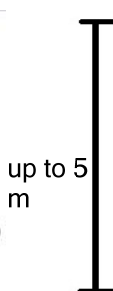
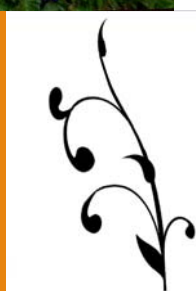
Wild relative of sweet potato

*Ipomoea cairica* (L.) Sweet

Morning glory, Mile-a-minute vine



Steve Hurst @ USDA-NRCS PLANTS Database





Tertiary Gene Pool relative of *Cajanus cajan* (L.) Millsp.

**HABIT:** Perennial climbers, supported by trees. Branches brownish pubescent (hairs very short), terete, firm, length up to 10 m. Stipules minute, ca 1 mm, triangular, caducous.

**LEAVES:** Pinnately trifoliolate, petiole 4-11 cm, rachis 0.3-1 cm. Leaflets coriaceous, thick, lower surface brownish pubescent, also on the thick prominent ribs, glandular-punctate, upper surface dark green, thinly puberulous especially on the veins; top leaflet subtrapezoid, acuminate, 3.5-10 cm long, 3-9.5 cm wide, below the middle narrowing to the rounded or cordate base, apex acuminate-cuspidate, side leaflets obliquely so, 3.5-10 cm long, 2.5-7.5 cm wide, petiolules 2-3 mm.

**INFLORESCENCE:** Racemes crowded, 3-6 cm, up to ca 20 flowers, 1-2 flowers per node.

**FLOWER:** Corolla yellow, marcescent, pedicels 4-10 mm, in fruit firm. Bracts large, elliptic-ovate, apex obtuse, fringed or acute, 10-15 mm long, 6-12 mm wide, thinly pubescent, caducous. Calyx pubescent (interior also), tube 4-6 mm, teeth triangular, shorter than the tube.

**FRUIT:** Pods sturdy, oblong, ends rounded acuminate, 2.5-5 cm long, 0.8-1.4 cm wide, (4-)5-6 seeds, shortly puberulous, sticky, transverse depressions oblique or straight, deep when fully developed.

**SEEDS:** Rectangular-rounded, ca. 4-5 mm long and wide, 3 mm thick, black with cream mosaic, or cream, strophiole 1 x 2.5 mm, divided, yellowish white.


**Habitat:**

Climber in trees of dry forests (sal, teak, pine) or shrub vegetation, along streams or on dry soils, on alluvium, loam schists, granite rocks.

**Distribution:**

China, Papua New Guinea, Southcentral and Southeastern Asia.

**Altitude:** 0 - 800 m

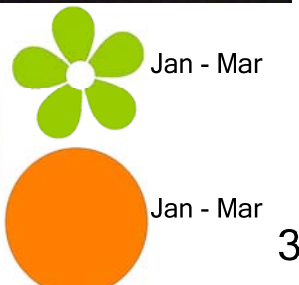
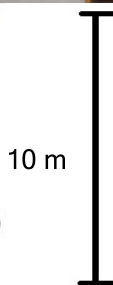
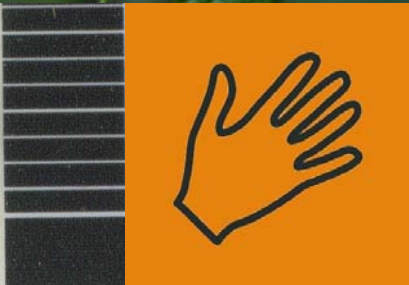
<i>Cajanus crassus</i>	May be confused with: <i>Cajanus goensis</i>
End of pod rounded acuminate.	Apex of pod beaked. 

Reported from Pakistan  
but no localities known

All populations priority for  
collection

**References:** van der Maesen, L.J.G. (1985). *Cajanus* DC. and *Atylosia* W. & A. (Leguminosae). A revision of all taxa closely related to the pigeonpea, with notes on other related genera within the subtribe Cajaninae. Wageningen Papers 85-4.

Tertiary Gene Pool relative of *Cajanus cajan* (L.) Millsp.



**HABIT:** Vines, woody, twining, densely villous. Stems longitudinally ribbed.

**LEAVES:** Pinnately 3-foliolate, stipules lanceolate, 2-3 mm, deciduous; petiole 1-2.5(-5) cm, petiolules extremely short; leaflets papery to thickly papery, both surfaces pubescent, denser abaxially and with rosin-like glands. Terminal leaflet obovate-rhomboid, 4-7 × 2-4.5 cm, base rounded to obtuse, apex acuminate, basal veins 3. Lateral leaflets slightly smaller, obliquely ovate, 4-7 × 2-4.5 cm.

**INFLORESCENCE:** Raceme axillary, robust, 3.5-6 cm, bracts large, ovate, to 1.7 cm, membranous, exterior with several longitudinal striae and rosin-like glands, clothed with micro-villous hairs, deciduous, pedicels 3-7 mm, hairy.

**FLOWER:** Calyx campanulate, 5-lobed, lobes lanceolate, unequal, upper 2 nearly connate, sparsely pubescent. Corolla yellow, ca. 1.5 cm, persistent, standard obovate-circular, with inflexed auricles on each side, wings oblong, slightly shorter than standard, keels subequal to wings, with auricles, apex curved. Ovary densely pubescent, style filiform, apex curved.

**FRUIT:** Pod oblong, inflated, 4-7 × 0.8-1 cm, hairy, transversely constricted between seeds.

**SEEDS:** 8-10, ellipsoidal to oblong, ca. 3 mm in diameter, strophiole thick and succulent.

**Habitat:**

Climbing in pine or broadleaf forest, scrub vegetation.

**Distribution:**

Himalaya foothills from Pakistan to Sikkim and Bhutan.

**Altitude:** 700 - 2100 m

<i>Cajanus mollis</i>	May be confused with: <i>Cajanus crassus</i>
Grey downy non reticulate leaves beneath, top leaflet longer than broad, and 8-10 seeded pods.	More sparsely brown pubescent reticulate leaves beneath, top leaflet almost as long as broad, and 3-5 seeded pods.

Reported from Pakistan  
but no localities known

All populations priority for  
collection



RBG Kew



RBG Kew



RBG Kew herbarium specimen

RBG Kew



RBG Kew



Tertiary Gene Pool relative of *Cajanus cajan* (L.) Millsp.

**HABIT:** Usually annual, creeping or trailing, stems 0.2-1 m long. Branches sparsely pubescent, internodes 1-15 cm long. Stipules lanceolate, caducous, 3-6 mm long.

**LEAVES:** Pinnately trifoliolate, petiole up to 10 cm long, petiolules 2-3 mm long, terminal leaflet often reduced in size. Leaflets membranous, thinly pubescent above, faintly glandular below. Terminal leaflet ovate to obicular, other leaflets ovate, 3-8 cm long, 3-7.5 cm wide, base truncate to subcordate, apex acuminate.

**INFLORESCENCE:** Racemes lax, up to 5-flowered, peduncle 0.5-8 cm long, pedicels 8-12 mm, recurved.

**FLOWER:** Calyx pubescent with yellow hairs, tube 3-5 mm long; corolla yellow, sometimes with purple veins or dots, standard clawed at the base, biauriculate, 12-15 mm long; lateral petals auriculate at base, 11-13 mm long; stamens fused for 3/4 of their length, curved upwards; ovary densely covered with long hairs, ovules 5-7.

**FRUIT:** Pod flat-oblong, 2-4.5 cm long by 1-1.5 cm wide, when young speckled and reddish, with sparse, caducous, pale hairs, tip of style persistent.

**SEEDS:** 4-6 mm long, 2.5 mm thick, rectangular-rounded, brown to almost black, strophiole large, 1 mm by 3 mm, horseshoe-shaped.

**Habitat:**

Usually associated with grasses, in grasslands, roadsides, pine forests and in crops.

**Distribution:**

Northwest and central India, Nepal, Pakistan, Java.

**Altitude:** 50 - 2600 m

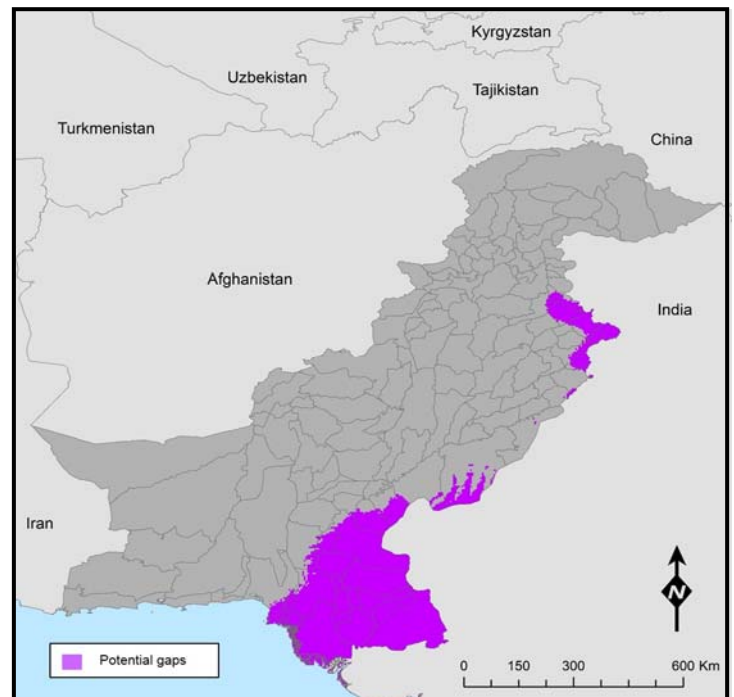
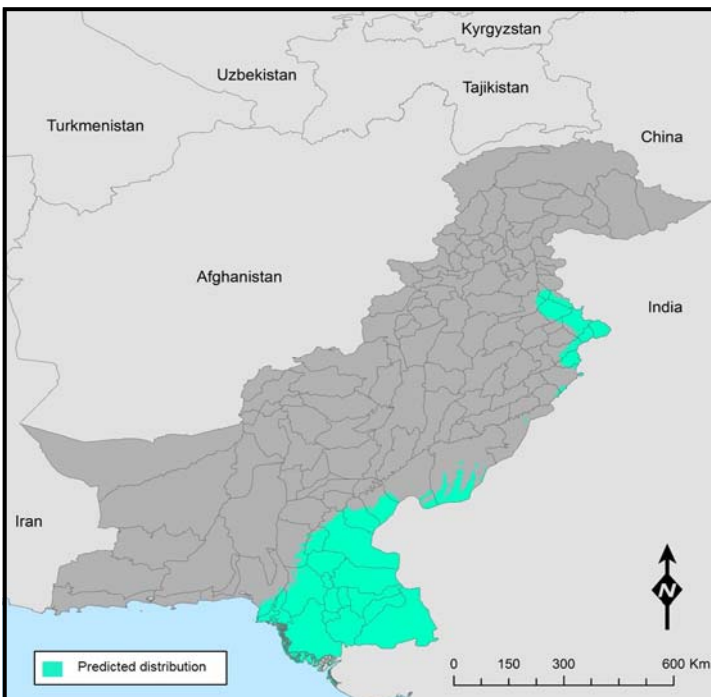
*Cajanus platycarpus*

Annual creepers; leaflets larger (3-8 cm long), ovate; pods broad (1-1.5 cm wide), flattened in cross section, papery.



May be confused with:  
*Cajanus scarabaeoides*

Perennial creepers or twiners; leaflets small (1.2-4 cm long), elliptic to obovate; pods narrow (0.4-0.6 cm wide), slightly rounded in cross-section.

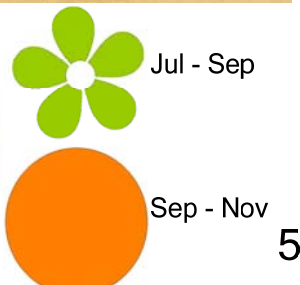
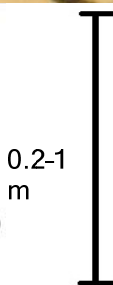


**References:** Maesen, L.J.G. van der (1985) *Cajanus* DC. and *Atylosia* W. & A. (Leguminosae). Agricultural University Wageningen Papers 85-4, pp 160-164.

LEGUMINOSAE

*Cajanus platycarpus* (Benth.) Maesen

Tertiary Gene Pool relative of *Cajanus cajan* (L.) Millsp.



Secondary Gene Pool relative of *Cajanus cajan* (L.) Millsp.**HABIT:** Perennial, woody, creepers or twiners, stems to 2 m. Stems slender, ± pubescent.**LEAVES:** Pinnately 3-foliolate; stipules small, ovate, hairy, usually deciduous; petiole 1-2 cm; stipels absent; petiolules extremely short; leaflets papery or nearly leathery, with glandular spots, sparsely pubescent on both surfaces, denser abaxially, basal veins 3, obviously convex below; terminal leaflet elliptic or obovate-elliptic to obovate, 1.2-4 × 0.8-1.5(-3) cm, apex obtuse or rounded; lateral leaflets smaller, obliquely elliptic to obliquely obovate.**INFLORESCENCE:** Raceme axillary, usually less than 2 cm, 1-5-flowered; peduncle 2-5 mm, densely brown to dull brown villous.**FLOWER:** Calyx campanulate, 5-lobed, or 4-lobed with upper 2 incompletely connate, lobes linear-lanceolate. Corolla yellow, ca. 1 cm, usually deciduous, standard obovate, with emarginate auricle and claw at base, wings narrowly elliptic, slightly curved, base auriculate, keels curved at apex, densely very pale brown villous. Ovules several.**FRUIT:** Pod oblong, 1.5-2.5 × 0.4-0.6 cm, leathery, densely villous, transversely constricted between seeds.**SEEDS:** 2-7, dark brown, ellipsoidal, ca. 4 mm, strophiole convex.**Habitat:**

Fields, roadsides, grassy slopes, coastal areas.

**Distribution:**

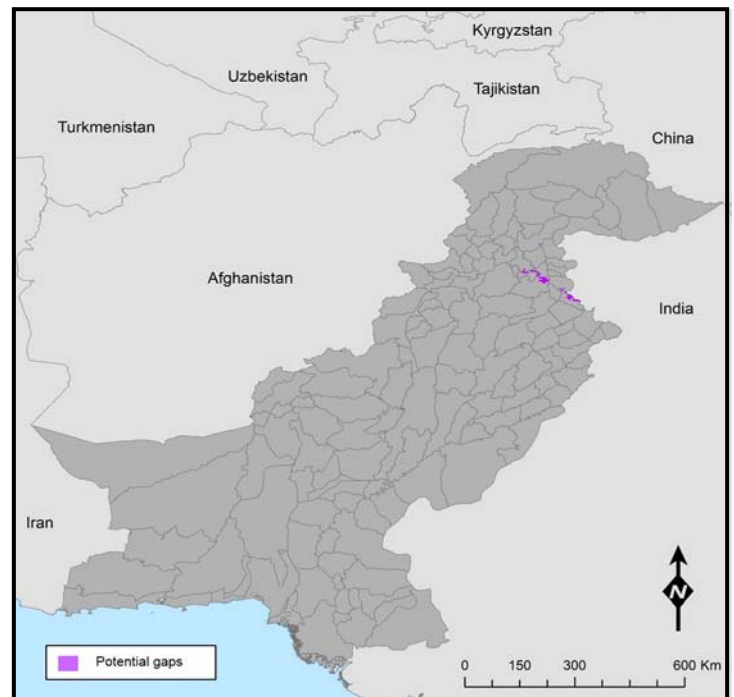
China, Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam; Africa, Oceania.

**Altitude:** 100 - 1500 m*Cajanus scarabaeoides*

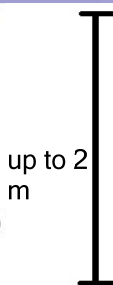
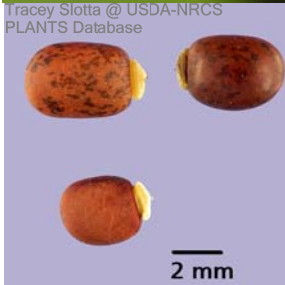
Perennial creepers or twiners; leaflets small (1.2-4 cm long), elliptic to obovate; pods narrow (0.4-0.6 cm wide), slightly rounded in cross-section.

May be confused with:  
*Cajanus platycarpus*

Annual creepers; leaflets larger (3-8 cm long), ovate; pods broad (1-1.5 cm wide), flattened in cross section, papery.

**References:** Flora of China, Volume 10, p232 via [www.efloras.org](http://www.efloras.org) [http://www.efloras.org/florataxon.aspx?flora\\_id=2&taxon\\_id=242309519](http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=242309519)

Secondary Gene Pool relative of *Cajanus cajan* (L.) Millsp.





Wild relative of *Cicer arietinum* L.

**HABIT:** Perennial shrublet branched from the base, pubescent. Stems straight, sometimes flexuous, faintly ribbed, 20-35 cm long. Stipules spinose, 2-6(-15) mm, often a second spinelet at the base, 1-2 mm.  
**LEAVES:** Paripinnate, rachis 2-4.5 cm, grooved above, ending in a spine. Leaflets 10-16, rather remote, obovate-truncate, base rounded, top truncate acuminate, sometimes incised, toothed, 2-5 mm long, 1-3 mm wide, both sides prominently veined, teeth 5-7(-9), midrib often prolonged.  
**INFLORESCENCE:** Flowers axillary, solitary or paired, peduncle (15-)20-40(-60) mm long with a spiny arista, bracts minute, triangular-lanceolate, pedicels 7-15 mm, recurved when bearing fruits.  
**FLOWER:** Calyx strongly dorsally gibbous at the base, tube 3-4 mm, teeth triangular-lanceolate, acuminate, 4-6 mm long. Corolla veined, purplish blue, apex emarginate-mucronulate, base spoon-shaped, 16-22 mm long, 10-14 mm wide, alae oblong-ovate, base shortly auriculate. Stamens 9 +1, persistent, filaments ca. 15 mm long (fused for 12 mm). Ovary ovate-elongate, ovules 10, style ca. 11 mm, upturned, stigma broadened.  
**FRUIT:** Pods elliptic-rhomboid, elongated, 18-26 mm long, 7-8 mm wide.  
**SEEDS:** Obovate, beaked, 5 mm long, 2.5 mm wide (not fully mature), seed coat brown, irregularly greyish tuberculated.

**Habitat:**

Rubble slopes, dry valleys, near lakes.

**Distribution:**

Afghanistan, Pakistan, Tajikistan.

**Altitude:** 2500 - 4000 m

<p><i>Cicer acanthophyllum</i></p>	<p>May be confused with: <i>Cicer macracanthum</i></p>
<p>Simple stipules, mostly not exceeding 8 mm and sometimes up to 15 mm long.</p> 	<p>Paired secondary stipules, sometimes up to 3 pairs, the largest up to 4 mm.</p> 

Reported from Pakistan  
but no localities known

All populations priority for  
collection

**References:** L.J.G. van Der Maesen. *Cicer* L., A monograph of the genus, with special reference to the chickpea (*Cicer arietinum* L.), its ecology and cultivation.

Wild relative of *Cicer arietinum* L.



RBG Kew

No seed  
image  
available

0.2-  
0.35m

NT

Jul - Aug

Jul - Aug

PRELIM

7

Wild relative of *Cicer arietinum* L.

**HABIT:** Perennial, much branched, glandular pubescent. Stipules spiny, c. 8-25 mm long, bifid, one arm longer than the other, secondary spiny stipules often present.

**LEAVES:** Rachis (up to the tip) c. 20-65 mm long, leaflets 9-19, opposite to sub-opposite, 3-10 mm long, c. (2-)4-6 mm broad, serrate towards the tip, glabrous above, pilose below, tip apiculate.

**INFLORESCENCE:** 1(-3) -flowered, ending in a spine, peduncle (up to the tip) c. 1.5-5 cm long. Flower pedicellate, pedicel 5-13 mm long.

**FLOWER:** Calyx c. 9-13 mm long, pilose, tube oblique, teeth 5-6 mm long. Corolla veined, dark blue or violet, vexillum c. 16-22 mm long. Stamens 9 + 1, fused part 9 mm, free part 4 mm, incurved, anthers dorsifix. Ovary lanceolate-ovate, 9mm, 2 mm wide, 8 ovules.

**FRUIT:** Pods ovate-oblong to rhomboid-oblong, 18-25 mm long, 5-7 mm broad, beaked, pilose, many-seeded.

**SEEDS:** Elongated-ovate, beaked, 4-5 mm long, 3 mm wide, seed coat brown.

**Habitat:**

Dry stream-beds, valleys, dry stony and rubble slopes.

**Distribution:**

Pakistan; Afghanistan; Russia, Uzbekistan, Tajikistan.

**Altitude:** 2200 - 3600 m

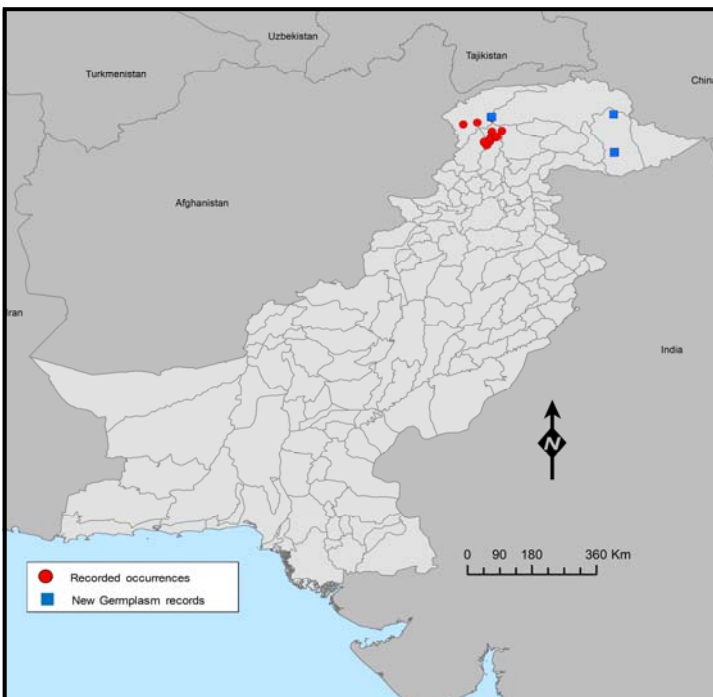
*Cicer macracanthum*

Leaf rachis ending in a mucro; leaflet margin dentate only in upper half; pod 18-25 mm long.



May be confused with:  
*Cicer nuristanicum*

Leaf rachis ending in a tendril; more than half leaflet margin dentate; pod 20-35 mm long.



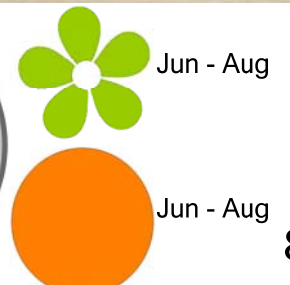
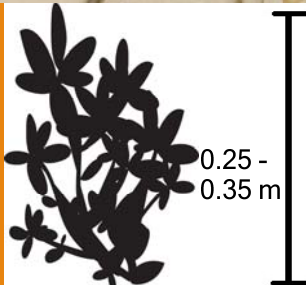
All populations priority for collection

**References:** [http://www.efloras.org/florataxon.aspx?flora\\_id=5&taxon\\_id=250065298](http://www.efloras.org/florataxon.aspx?flora_id=5&taxon_id=250065298); Ref: L.J.G. van Der Maesen. *Cicer* L., A monograph of the genus, with special reference to the chickpea (*Cicer arietinum* L.), its ecology and cultivation.

LEGUMINOSAE

*Cicer macracanthum* Popow

Wild relative of *Cicer arietinum* L.



Wild relative of *Cicer arietinum* L.

**HABIT:** Herbs annual, 0.15-0.4 m tall. Stem much branched, erect, glandular hairy. Stipules 3-12 mm long, foliaceous, glandular hairy, margin 5-7-toothed.

**LEAVES:** Paripinnate with a terminal tendril, leaflets 6-15-paired, obovate-cuneate, 4-12 mm long by 3-7 mm wide, both surfaces glandular pilose, base cuneate, margin dentate only in distal half, apex rounded or truncate, often mucronate.

**INFLORESCENCE:** 1(-2)-flowered, peduncle 2-10 cm long, ending in a spine.

**FLOWER:** Flower solitary, pedicel 5-25 mm, glandular hairy. Calyx ca. 12 mm, deeply toothed, densely glandular hairy. Corolla veined, blue-purple, white or light blue, ca. 25 mm, vexillum 20-25 mm long, ovary elongate-elliptic, 6 mm long, stamens 9 + 1, loose filaments 14-16 mm.

**FRUIT:** Pod elliptic in outline, 2.5-3.5 cm, densely white pubescent, beaked, many seeded.

**SEEDS:** Subglobular to obovate, beaked, 4-5 mm long, 3-4 mm wide, seed coat blackish brown, irregularly greyish regulate.

**Habitat:**

Hill slopes, meadows on sunny slopes, riverbanks, gravels, sands.

**Distribution:**

Central Asia, Afghanistan, Himalaya (Kashmir to W. Nepal), Tibet.

**Altitude:** 1600 - 4600 m

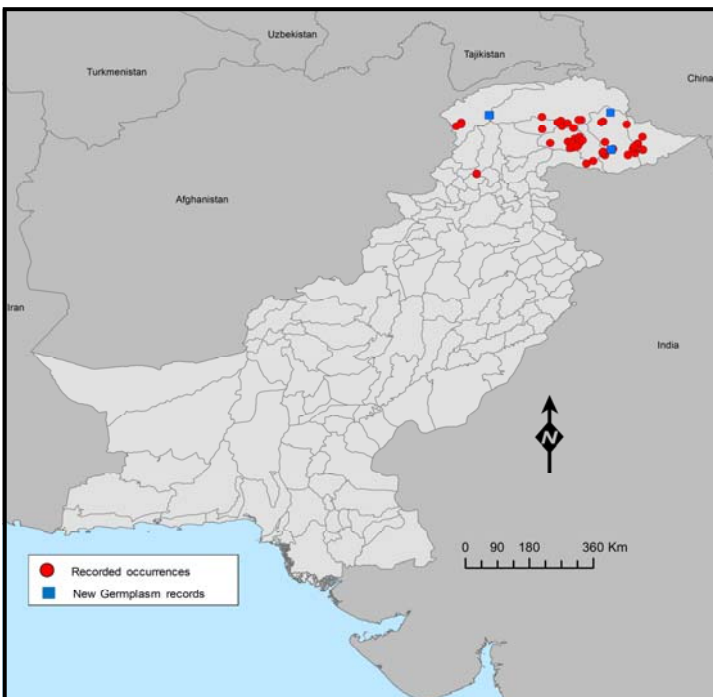
*Cicer microphyllum*

Leaves with a terminal tendril, leaflets 6-15-paired, obovate-cuneate; corolla ca. 25 mm; seeds ca. 2.5 mm.



May be confused with:  
*Cicer arietinum*

Leaves with a terminal leaflet, leaflets 3-8-paired, elliptic; corolla 8-10 mm; seeds 5-15 mm.



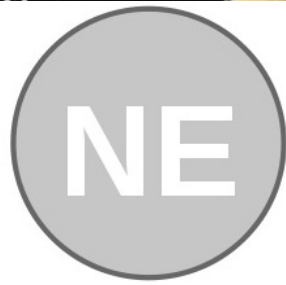
All populations priority for collection

**References:** Flora of China. Volume 10, p546 via [www.efloras.org](http://www.efloras.org) [http://www.efloras.org/florataxon.aspx?flora\\_id=2&taxon\\_id=242312834](http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=242312834); Flora of Pakistan. [http://www.efloras.org/florataxon.aspx?flora\\_id=5&taxon\\_id=242312834](http://www.efloras.org/florataxon.aspx?flora_id=5&taxon_id=242312834); L.J.G. van Der Maesen. *Cicer* L., A monograph of the genus, with special reference to the chickpea (*Cicer arietinum* L.), its ecology and cultivation.

Wild relative of *Cicer arietinum* L.



0.15-0.4 m



Jun - Aug

Jun - Aug

Wild relative of *Cicer arietinum* L.

Koksul

**HABIT:** Perennial, woody rootstock, branching from the base, multistemmed, glandular puberulous, stems straight or slender, faintly ribbed, 25-40 cm long.

**LEAVES:** (9)16-26(28) leaflets, paripinnate or imparipinnate, rachis (3)6-14 cm, ending in a tendril or an end leaflet. Leaflets not very close, opposite or nearly so, obovate or obovate-elliptic, base cuneate, top rounded, 10-26, 5-15 mm long, 4-10 mm wide, margin dentate except near the base, pubescent.

**INFLORESCENCE:** 1-2-flowered, peduncle ending in a spine, 15-35 mm long. Flower pedicellate, pedicel 5-10 mm long.

**FLOWER:** Calyx 8-16 mm long, glandular pubescent, teeth 5-10 mm long. Corolla veined, bluish violet, vexillum 18-23 mm long. Stamens 9 + 1, filaments 14 mm, ovary ovate-acuminate, 8 mm long, style 10 mm long, upturned.

**FRUIT:** Pod 20-35 mm long, 9-12 mm wide, glandular pubescent.

**SEEDS:** Ovate-cordate, beaked, 5.5 mm long, 5.5 mm wide, testa black with whitish tubercles.

**Habitat:**

Abies forest, pastures, shady humid, limestone rocks.

**Distribution:**

Pakistan, Chitral; Afghanistan.

**Altitude:** 2300 - 4600 m

*Cicer nuristanicum*

Leaf rachis ending in a tendril; more than half leaflet margin dentate; pod 20-35 mm long.



May be confused with:  
*Cicer macracanthum*

Leaf rachis ending in a mucro; leaflet margin dentate only in upper half; pod 18-25 mm long.



All populations priority for collection

**References:** Ref: L.J.G. van Der Maesen. *Cicer* L., A monograph of the genus, with special reference to the chickpea (*Cicer arietinum* L.), its ecology and cultivation.



No seed image available



0.25 - 0.40 m

EN  
PRELIM



Jun - Aug

Jun - Aug



Tertiary Gene Pool relative of *Lathyrus sativus* L.Caley Pea, Winterpea,  
Rough Pea, Hairy V

**HABIT:** Scrambling annual, sparsely pubescent, 40-60 cm tall. Stems branching from the base, ascending or erect, winged. Stipules 10-18 mm long, linear, semi-sagittate, shorter than petioles.  
**LEAVES:** Petioles shorter than leaflets. Leaflets usually 1-paired, 30-60 mm long, 3-11 mm wide, linear-elliptic, apex abruptly tapering, mucronate. Rachis ending in 3-sect or pinnately branched tendrils.  
**INFLORESCENCE:** Raceme 1-3-flowered, peduncle much longer than leaf.  
**FLOWER:** 10-13 mm long, blue-violet or occasionally reddish; calyx 4.5-5.5 mm long, teeth subequal, as long as or slightly longer than the tube, standard much longer than keel, wings approximately equalling keel, limb broadly auricled at base.  
**FRUIT:** Pods 20-50 mm long by 5-8 mm wide, oblong-linear, tuberculate, densely beset with white hairs on tubercles when young, glabrescent when ripe, 5-10-seeded.

**Habitat:**

Usually found in grasslands and on cultivated land, sometimes on sand dunes and in marshy areas.

**Distribution:**

Southern and Central Europe, Lebanon, Crimea, Caucasus, North Africa and Iran. Introduced in the USA and East Africa, Afghanistan, India.

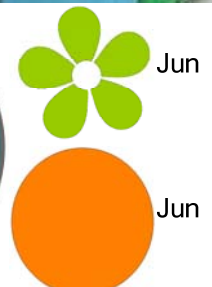
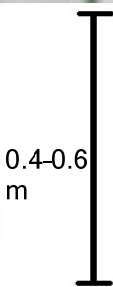
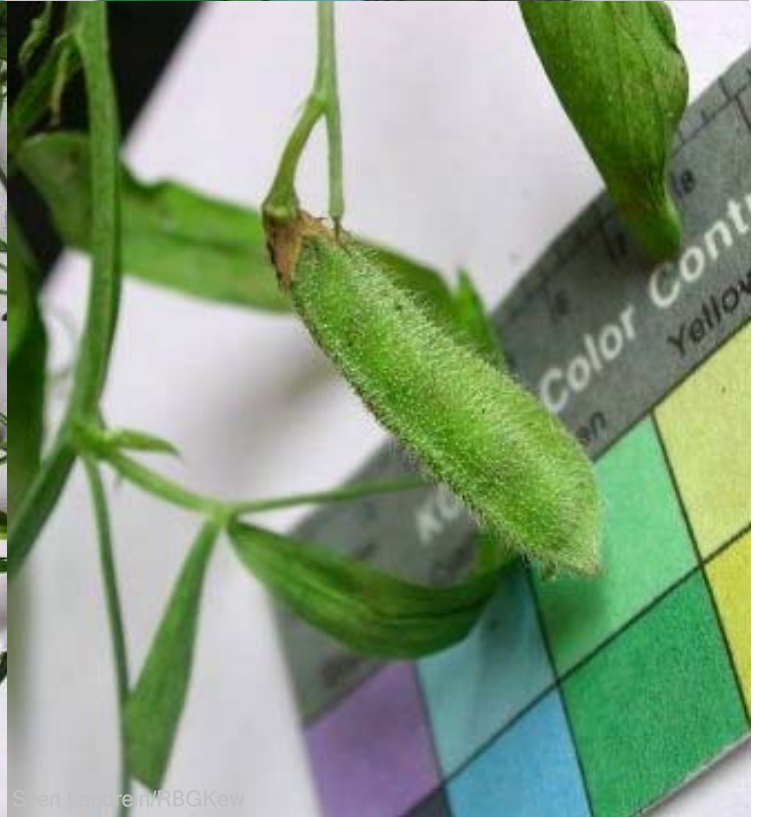
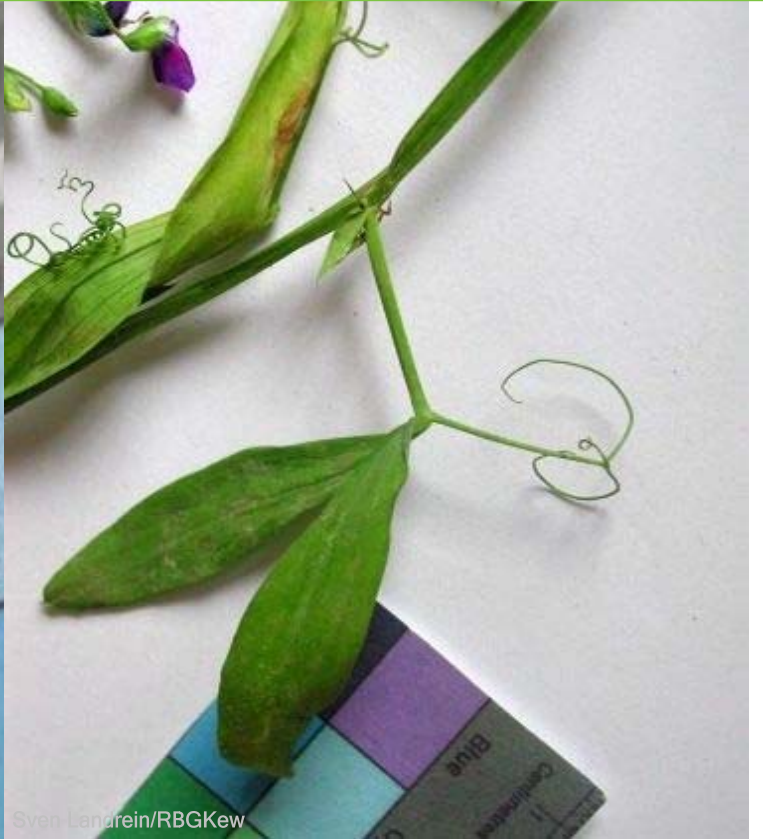
**Altitude:** 0 - 1000 m

<i>Lathyrus hirsutus</i>	May be confused with: <i>Lathyrus laxiflorus</i>
Annual plants, stem winged; stipules usually narrower than leaflets; leaflets linear-elliptic.	Perennial with tuberous rootstock, stem angled but not winged; stipules at least as broad as leaflets, often broader; leaflets ovate.

Reported from Pakistan  
but no localities known

All populations priority for  
collection

**References:** Davis, P.H. (1970) Flora of Turkey, Volume 3, p362; Komarov, V.L., ed. (1948) Flora of the USSR (English version). Volume 13, p370.



**HABIT:** Erect, pale green annual herb up to 60(-75) cm tall. Stem square, much-branched, taproot slender. Stipules entire, 2.5-6 mm long.

**LEAVES:** Alternate, pinnately compound, with 5-16 leaflets, rachis (1-)2.5-3.5(-5) cm long, usually ending in a tendril or bristle. Leaflets opposite or alternate, sessile, oblong or elliptical, (3-)10-15(-20) mm long, (1.5-)2-5(-8) mm wide, margins entire.

**INFLORESCENCE:** 1-4(-7)-flowered, axillary, racemose, peduncle slender, (2-)3-4(-5.5) cm long, pedicel short.

**FLOWER:** Calyx campanulate, narrowly 5-lobed, tube c. 1.5 mm long, lobes c. 3 mm long. Corolla pale blue, white or pink, standard 5-7 mm × 4-5 mm, wings c. 4.5 mm × 1.5 mm, keel c. 4.5 mm × 2 mm, stamens 10, 9 united and 1 free, anthers uniform; ovary superior, 1-celled, style inflexed, inner surface bearded.

**FRUIT:** A rhomboid, laterally compressed pod, 6-20 mm long by 3.5-12 mm wide, glabrous, short-beaked, 1-2(-3)-seeded.

**SEEDS:** Lens-shaped, 2-9 mm × 2-3 mm, grey, green, brownish green, pale red speckled with black, or black, hilum minute.

**Habitat:**

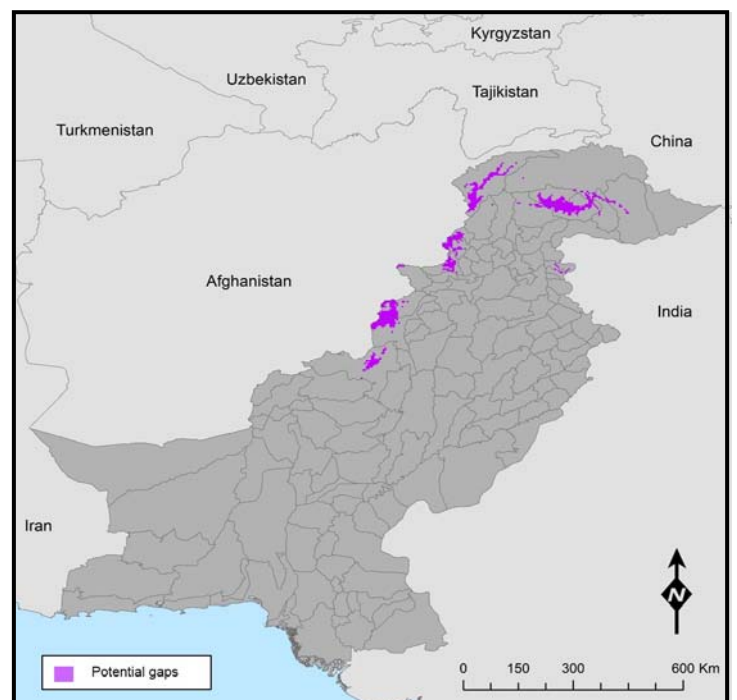
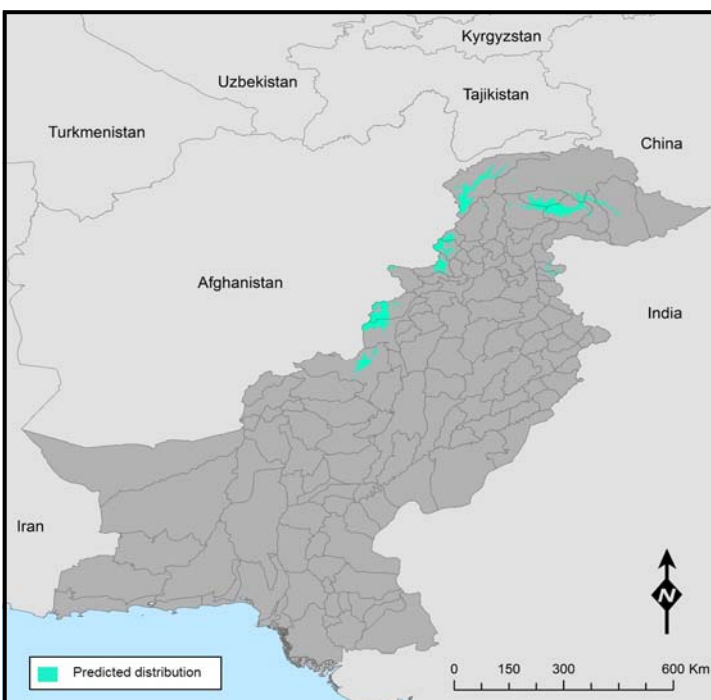
Inland habitats, often grasslands but sometimes associated with woodland, often occurs on limestone.

**Distribution:**

From Greece eastwards to Uzbekistan, and from the Crimean Peninsula southwards to Jordan.

**Altitude:** 250 - 800 m

<i>Lens culinaris subsp. orientalis</i>	May be confused with: <i>Lens culinaris ssp. culinaris</i>
Stipules obliquely lanceolate; fruit dehiscent.	Stipules lanceolate; fruit indehiscent.



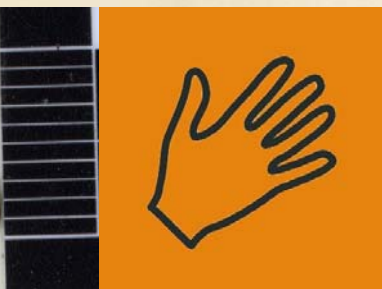
**References:** Bejiga, G., 2006. *Lens culinaris* Medik. In: Brink, M. & Belay, G. (Editors). PROTA 1: Cereals and pulses/Céréales et légumes secs. [http://database.prota.org/PROTAhtml/Lens%20culinaris\\_En.htm](http://database.prota.org/PROTAhtml/Lens%20culinaris_En.htm)

LEGUMINOSAE

Primary Gene Pool relative of *Lens culinaris* Medik.

*Lens culinaris* subsp. *orientalis* Medik.

Oriental Wild Lentil



up to  
0.6m



Mar - Jun

Mar - Jun

LEGUMINOSAE

*Medicago sativa* L. subsp. *falcata* (L.) Arcang. var. *falcata* (L.) Arcang.

Primary relative of *Medicago sativa* L., Secondary relative of *Medicago sativa* L.

Sickle Medick, Yellow alfalfa

**HABIT:** Perennial herbs, (20-)40-100(-120) cm. Stems erect or ascending, terete, branched. Stipules lanceolate to linear-lanceolate, base hastate, apex acuminate.

**LEAVES:** Leaflets obovate to linear, (5-)8-15(-20) × (1-)2-5(-10) mm, pubescent abaxially, glabrous or appressed puberulent adaxially, margin serrulate in apical 1/4 or margin 2- or 3-serrate, lateral veins 5-15 pairs, base cuneate, apex rounded, obtuse, or acute, mucronate.

**INFLORESCENCE:** Racemes 10-20(-40) mm, with 6-25 flowers, crowded, peduncles axillary, straight, equal to or slightly longer than leaves, bracts ca. 1 mm, pedicels 2-3 mm.

**FLOWER:** Corolla yellow, 6-9(-11) mm, standard long obovate. Ovary linear, ovules 2-5.

**FRUIT:** Pod falcate or straight, (8-)10-15 × 2.5-3.5(-4) mm, appressed puberulent, veins oblique and thin.

**SEEDS:** 2-4, brown, ovate-elliptic, ca. 2×1.5 mm.

**Habitat:**

Grassy places, slopes, ravines, dry sandy fields.

**Distribution:**

Throughout Asia and Europe, Morocco, South Africa, Canada and USA.

**Altitude:** 0 - 2500 m

<i>Medicago sativa</i> subsp. <i>falcata</i> var. <i>falcata</i>		May be confused with: <i>Medicago sativa</i> subsp. <i>caerulea</i>	
Corolla yellow; fruit falcate or straight.		Corolla purple; fruit with at least 1.5 coils.	

Reported from Pakistan but no localities known

All populations priority for collection

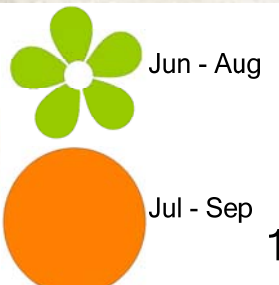
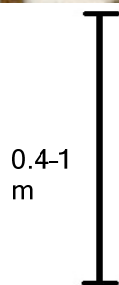
**References:** Small, E. (2011) Alfalfa and Relatives: Evolution and classification of *Medicago*. NRC Research Press, Ottawa.

LEGUMINOSAE

*Medicago sativa* L. subsp. *falcata* (L.) Arcang. var. *falcata* (L.) Arcang.

Primary relative of *Medicago sativa* L., Secondary relative of *Medicago sativa* L.

Sickle Medick, Yellow  
alfalfa



**HABIT:** Annual with scrambling and climbing growth habit, 10-70 cm long. Stems arising from the base hollow, squarish in cross-section. Slender taproot system with numerous lateral branches.

**LEAVES:** Compound pinnate with 3-8 pairs of opposite leaflets and 2-3 terminal tendrils. Leaflets narrowly oblong, square at the apex and with a small projecting mid rib, usually less than 10 mm broad. Stipules small and divided.

**INFLORESCENCE:** Flowers solitary or paired, on short peduncles arising at the base of the leaves, mainly blue to purple but sometimes white.

**FLOWER:** Calyx 7-12 mm, teeth c. 2.5-8 mm. Corolla 10-20 mm.

**FRUIT:** Pods narrow.

**SEEDS:** 4-12 per fruit, flattened, black to greyish in colour, sometimes marbled, 2.5-4 mm.

**Habitat:**

Agricultural and disturbed land, margins of woodland.

**Distribution:**

Common pan-temperate and semi-tropical weed.

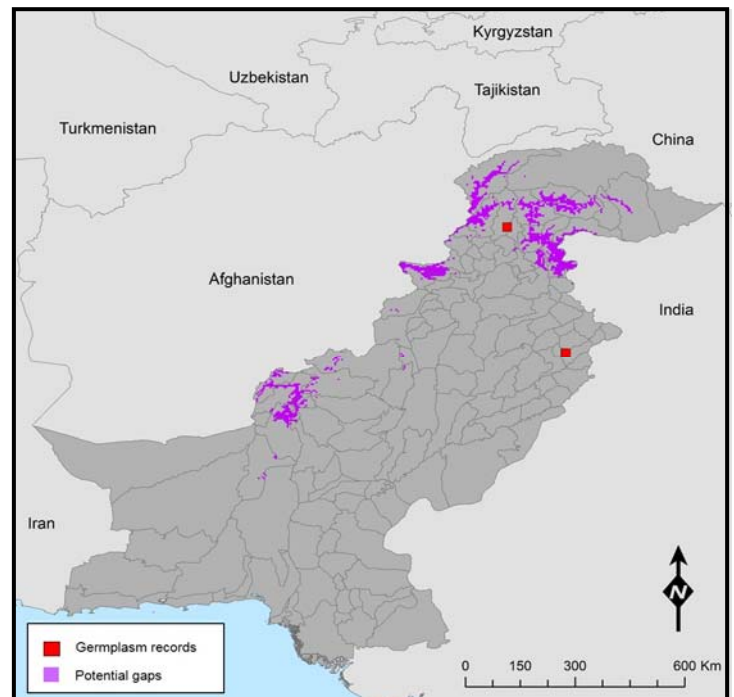
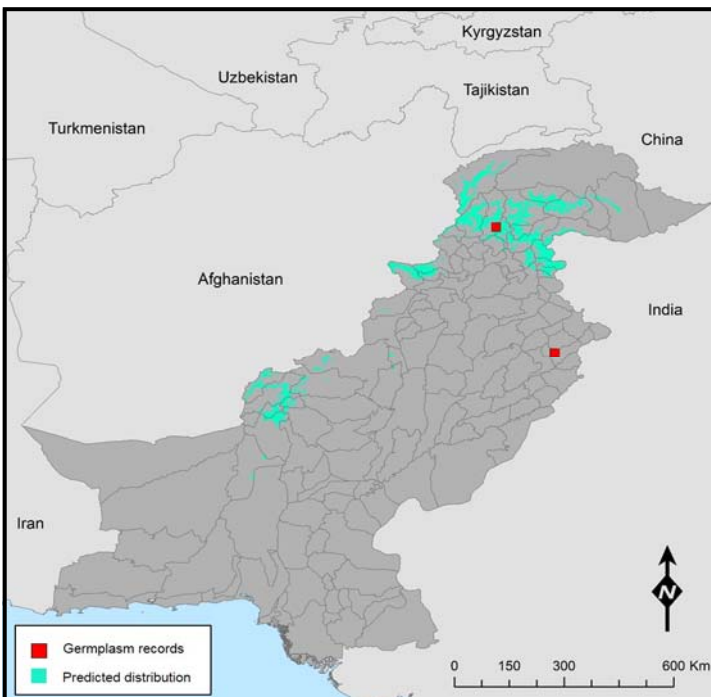
**Altitude:** 0 - 2900 m

*Vicia sativa* subsp. *nigra*

May be confused with:  
*Vicia sativa* subsp. *sativa*

Pod black or brownish black, not contracted between seeds, 25-55 × (2.5-)3-6 mm; usually glabrous.

Pod brown or yellow-brown, contracted between seeds, 35-70 × 6-11 mm, usually hairy.



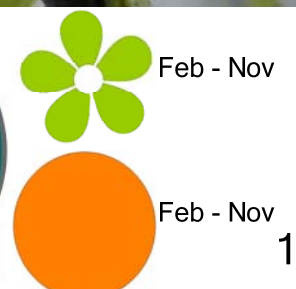
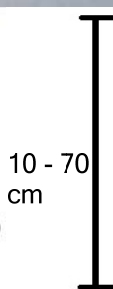
**References:** Mxated, N. (1995) An ecogeographical Study of *Vicia* subgenus *Vicia*.; FAO Grassland Species Profiles <http://www.fao.org/AG/agp/agpc/doc/Gbase/>; Davis, P.H. Flora of Turkey (3) p139

LEGUMINOSAE

Primary Gene Pool relative of *Vicia sativa* L.

*Vicia sativa* L. subsp. *nigra* (L.) Ehrh.

Black pod vetch





**HABIT:** Clump-forming annuals. Culms often densely tufted, 20-40(-80) cm long high, erect or geniculately ascending. Leaf-sheath auricles falcate. Ligule an eciliate membrane.

**LEAVES:** Leaf-blades glabrous or sparsely hairy, up to 12 cm long, 0.2-0.5 cm wide.

**INFLORESCENCE:** Spikes 6-11 cm long (excluding the awns), cylindrical with 1-2 vestigial spikelets at the base; rachis breaking up at internodes at maturity. Basal sterile spikelets rudimentary, 1-2 in number. Fertile spikelets 4-6, glumes of lateral spikelets 7-9 mm long (to the base of the apical sinus), 2-toothed, 1 of the teeth short and blunt, the other produced as an awn up to 18 mm long, awns of terminal spikelet shorter than the spike.

**GLUMES:** Equal, shorter than spikelet, oblong, asymmetrical, 7-9 mm long, ribbed, coriaceous, apex bifid, with a terminal awn 9-18 mm long. Fertile lemma oblong, 9-11 mm long, coriaceous, not keeled 5 -veined, apex truncate, awned only on distal spikelets. Principal lemma awn shorter than raceme. Palea 2 -veined. Palea keels scabrous.

**FRUIT:** Caryopsis with adherent pericarp, hairy at apex.

**Habitat:**

Ruderal and disturbed sites, e.g. waste ground, cultivated areas, roadsides, dry slopes, grasslands.

**Distribution:**

Europe: central, southeastern and eastern. Asia-temperate: Soviet far east, Soviet Middle Asia, Caucasus and western Asia. Asia-tropical: India. Throughout USA.

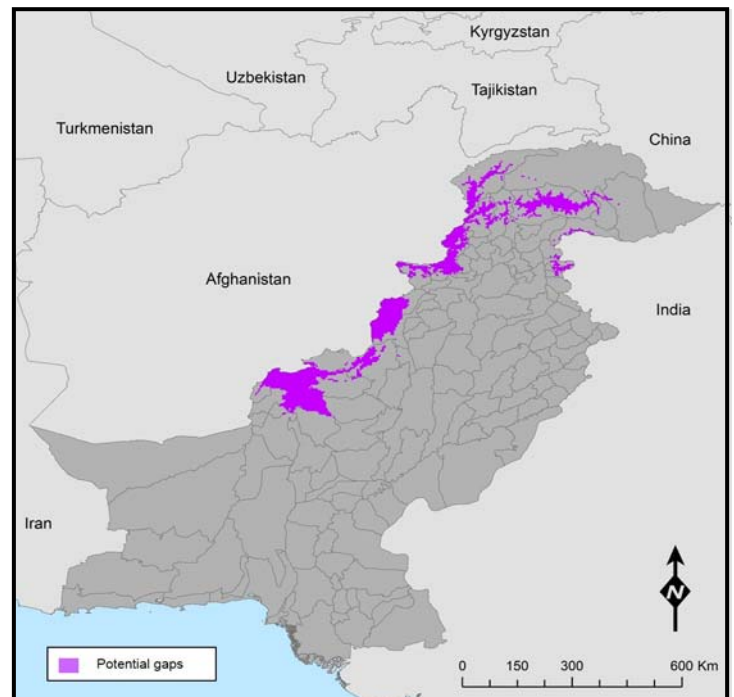
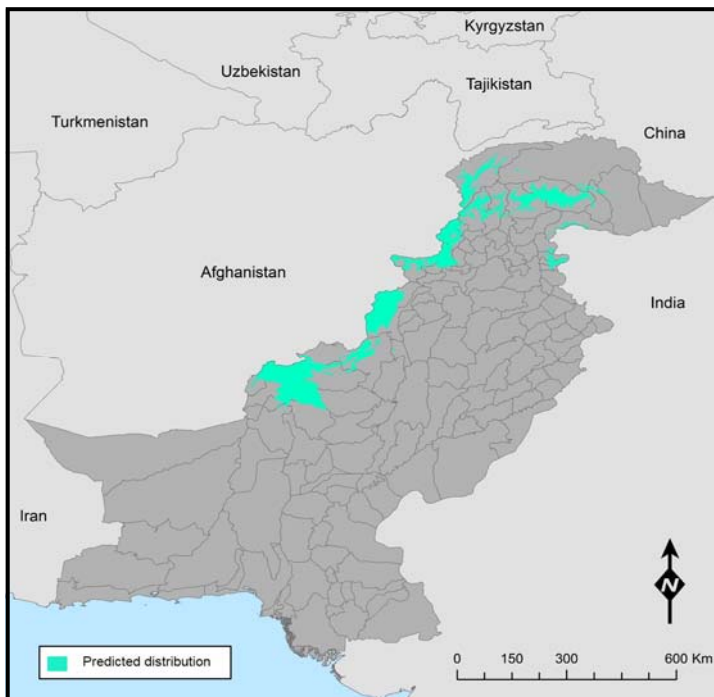
**Altitude:** 100 - 1750 m

*Aegilops cylindrica*

May be confused with:  
*Aegilops caudata*

Glumes on apical spikelets about 3-6 cm long (shorter than length of spikelet); lemmas with 4-8 cm long awns.

Awns on glumes of apical spikelet 4.5-12 cm long (longer than entire spike); lemmas without awns (mucronate at most).



**References:** Slageren, M.W. van (1994) Wild Wheats: A Monograph of *Aegilops* L. and *Amblyopyrum* (Jaub. & Spach) Eig. Wageningen Agricultural University Papers; GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>.



USDA-NRCS PLANTS Database / Hitchcock, A.S. (1950)



Matt Lavin via wikimedia



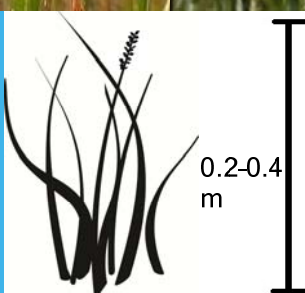
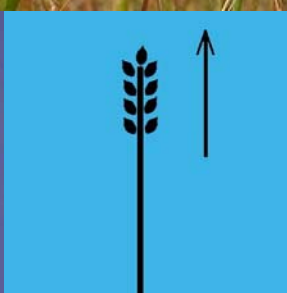
Matt Lavin via wikimedia



USDA APHIS PPQ



Steve Hurst @ USDA-NRCS PLANTS Database



**HABIT:** Culms often densely tufted, 18-30(-60) cm high, erect or geniculately ascending. Leaf-sheath oral hairs ciliate, auricles falcate. Ligule an eciliate membrane.

**LEAVES:** Leaf-blades glabrous or sparsely hairy, up to 17 cm long, 2-6 mm wide.

**INFLORESCENCE:** Spikes 5-10 cm long (excluding the awns), cylindrical, with 0(-2) vestigial spikelets at the base rachis breaking up at internodes at maturity. Fertile spikelets 5-13, glumes of lateral spikelets 5-7.5 mm long, truncate, with a short, very blunt tooth on the upper margin, awns of terminal spikelet shorter than the spike.

**GLUMES:** Equal, shorter than spikelet, oblong, 5-6 mm long, coriaceous, not keeled, 7-9 -veined, venation ribbed, apex with a unilateral tooth, truncate. Fertile lemma oblong, or ovate, 6-7 mm long, coriaceous, not keeled, 5 -veined, apex entire, truncate, sometimes awned. Principal lemma awn 30-40 mm long, those of lower spikelets if present up to 18 mm. Palea 2 -veined, keels scaberulous.

**FRUIT:** Caryopsis with adherent pericarp; hairy at apex.

### Habitat:

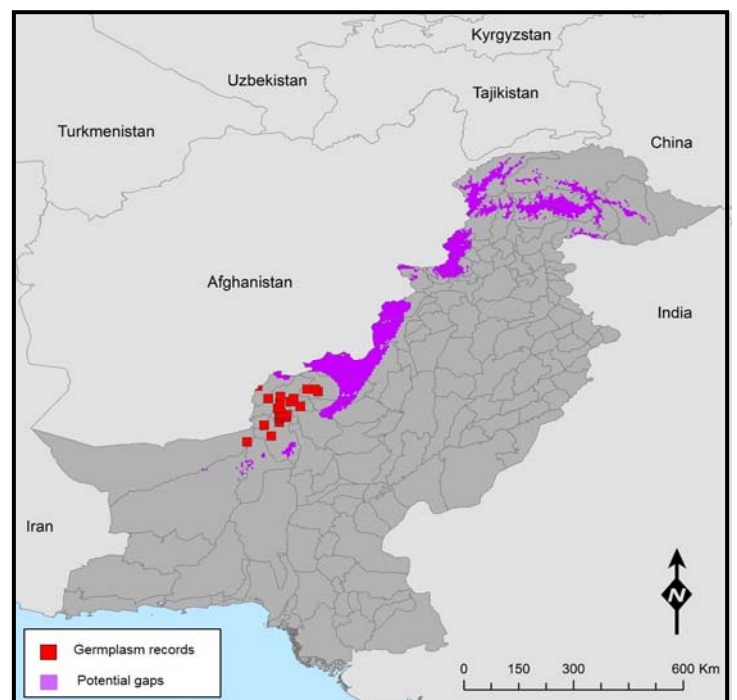
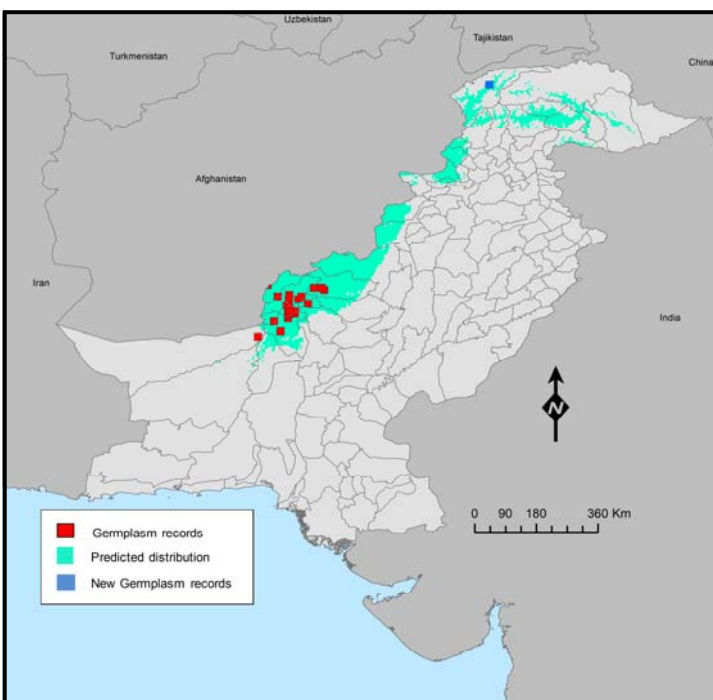
A wide range of habitats including: grasslands, fallow ground, steppes, wastelands, roadsides, within cultivation, forests, stony slopes.

### Distribution:

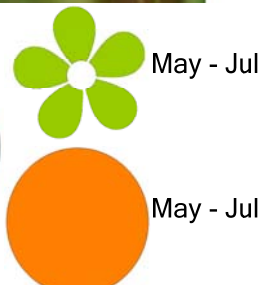
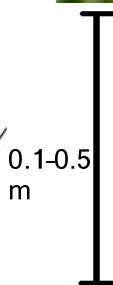
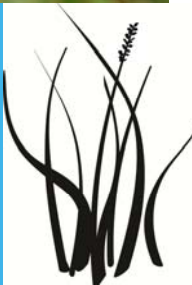
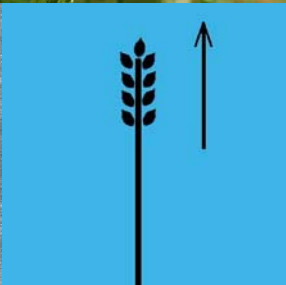
Eastern Europe, Central and Western Asia, from the Caucasus to India and China.

**Altitude:** 1300 - 2700 m

<i>Aegilops tauschii</i>	May be confused with: <i>Aegilops vavilovii</i>
Inflorescence 4-8 cm, barely tapering towards apex.	Inflorescence 10-15 cm long, tapering towards apex.



**References:** Slageren, M.W. van (1994) Wild Wheats: A Monograph of *Aegilops* L. and *Amblyopyrum* (Jaub. & Spach) Eig. Wageningen Agricultural University Papers. GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>.



Secondary Gene Pool relative of *Triticum aestivum* subsp. *compactum*

**HABIT:** Annual herbs, caespitose. Culms erect, or geniculate ascending, 15–45 cm long. Leaf-sheath oral hairs ciliate. Leaf-sheath auricles falcate. Ligule an eciliate membrane.

**LEAVES:** Leaf-blades flat, or involute, 5–10 cm long, 1–2 mm wide, glabrous, or pilose.

**INFLORESCENCE:** Racemes single, lanceolate, bilateral, 3–6 cm long, bearing (3–)4–6 fertile spikelets on each. Rhachis tough or fragile at the nodes. Spikelet packing broadside to rhachis. Basal sterile spikelets rudimentary, 2–3 in number. Spikelets oblong, laterally compressed, 7–10 mm long, when rachis fragile falling entire, with interodes.

**GLUMES:** Equal, shorter than spikelet, oblong, 7–10 mm long, coriaceous, not keeled, 7–9 -veined, venation ribbed, surface smooth, or scabrous, apex dentate, 3-fid, awned, 2–3 -awned, awn 10–60 mm long. Fertile lemma oblong, 7–10 mm long, coriaceous, not keeled, 5-veined, apex dentate, bifid, 3-awned on distal spikelets. Principal lemma awn 5–6 mm long overall. Palea 2-veined, keels scaberulous.

**FRUIT:** Caryopsis with adherent pericarp, hairy at apex. Disseminule comprising a rhachis internode, or inflorescence.

**Habitat:**

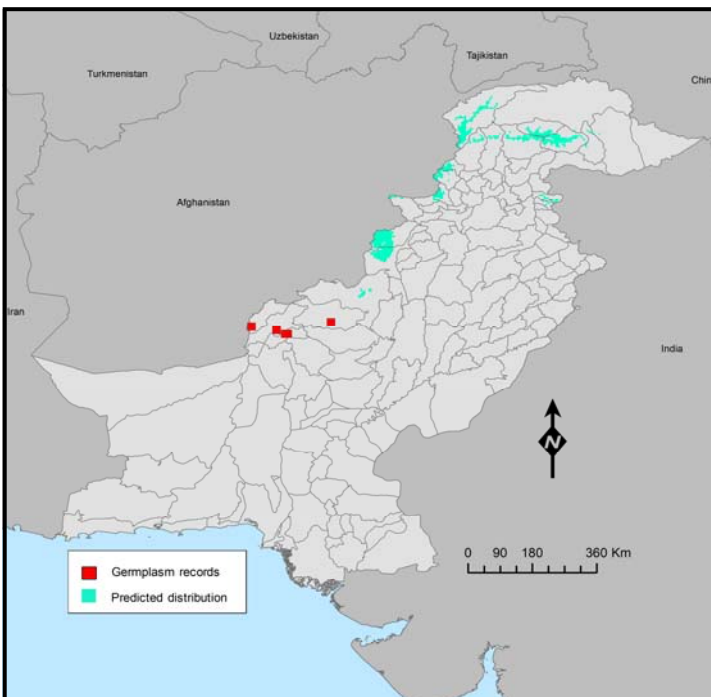
Dry, disturbed habitats e.g. wastelands, on the edges of and within cultivation, roadsides, dry rocky slopes, field edges, woodland, forest and scrub, dry riverbeds.

**Distribution:**

Mediterranean, Turkey, Iran, Crimea, Caucasus, Asia as far east as Pakistan, in Africa only in the Atlas mountains.

**Altitude:** 500 - 1200 m

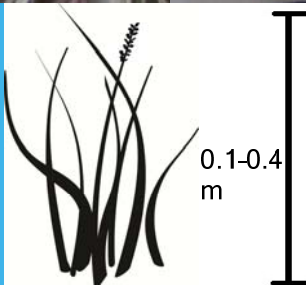
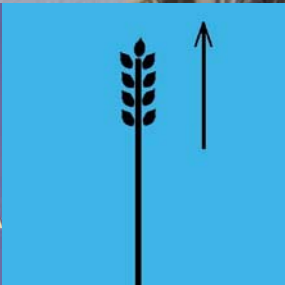
<i>Aegilops triuncialis</i> var. <i>triuncialis</i>	May be confused with: <i>Aegilops neglecta</i>
Inflorescence subcylindrical, 2.5–6 cm long; glumes of apical spikelets with 3 awns.	Inflorescence ovoid to oblong, 1.5–4.5(–6) cm long; glumes of apical spikelets with 2–3 awns.



All populations priority for collection

**References:** Slageren, M.W. van (1994) Wild Wheats: A Monograph of *Aegilops* L. and *Amblyopyrum* (Jaub. & Spach) Eig. Wageningen Agricultural University Papers  
GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>.

Secondary Gene Pool relative of *Triticum aestivum* subsp. *compactum*

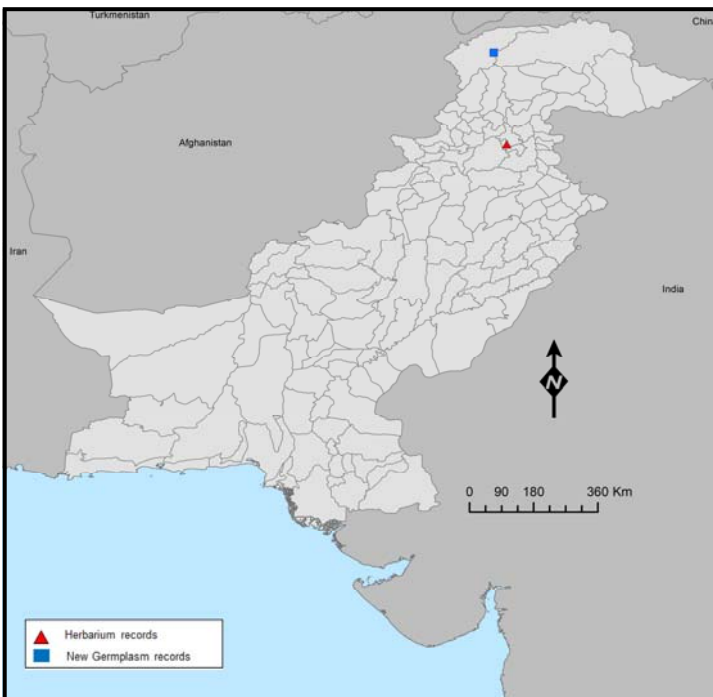


Tertiary Gene Pool relative of *Avena sativa* L.**HABIT:** Annual, culms 30-100 cm high, erect or ascending, slender to rather stout, simple.**LEAVES:** Leaf-blades up to 30 cm long, 3-8 mm wide, sparsely hairy to ciliate, ligules 2-5 mm long.**INFLORESCENCE:** Panicle subsecund, up to 30(-50) cm long and 12 cm wide, loose with smooth or faintly scaberulous branches. Spikelets 18-30 mm long, 2-3-flowered, the rachilla articulated beneath each floret and with a barren extension.**GLUMES:** Persistent, lanceolate, 16-26 mm long, apex acuminate, exceeding apex of florets, thinner than fertile lemma. Lemmas 12-20 mm long, upper surface scabrous, with long stiff hairs up to the insertion of the awn, lower surface densely hairy, apex bifid, with an awn 3-6 cm long, geniculate. Palea 10-18 mm long.**FLOWER:** Anthers 3. Ovary pubescent.**FRUIT:** Caryopsis with adherent pericarp, sulcate on hilar side, hairy all over. Hilum linear.**Habitat:**

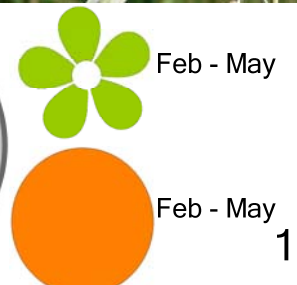
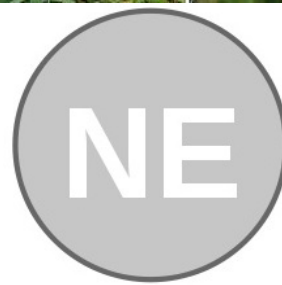
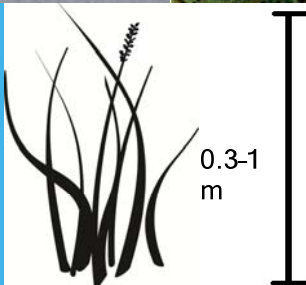
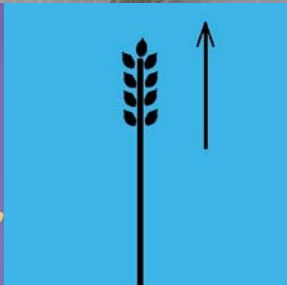
Disturbed sites, hillsides on shallow soils, shrublands, open grasslands, salt marshes, edges of paddy fields.

**Distribution:**

Circum-Mediterranean, northern Middle East, Central and Eastern Asia.

**Altitude:** 0 - 240 m*Avena barbata*May be confused with:  
*Avena fatua*Ligule obtuse; lemma tip biaristulate;  
epiblast 0.3-0.4 mm wide.Ligule acute; lemma tip bidenticulate;  
epiblast 0.45-0.7 mm wide.All populations priority for  
collection**References:** Baum, B.R. (1971). Oats: Wild and Cultivated. A Monograph of the Genus *Avena* L. (Poaceae). Biosystematics Research Institute Monograph No. 14. Supply and Services Canada, Ottawa.

Tertiary Gene Pool relative of *Avena sativa* L.





**HABIT:** Annual. Relatively tall plants, 80-160 cm high. Culms 30-150 cm long, erect or geniculate ascending, stout, simple.

**LEAVES:** Leaves cauline. Leaf blades 10-45 cm long, 3-15 mm wide, glabrous, surface rough, ligules up to 6 mm long.

**INFLORESCENCE:** Panicles nodding (sometimes one-sided), narrowly to broadly pyramidal, 10-40 cm long and up to 20 cm wide, loose with scaberulous branches. Spikelets cuneate, pendulous, 18-30 mm long, 2-3-flowered, the rhachilla disarticulating below each floret.

**GLUMES:** Persistent, exceeding florets, 18-28 mm long, lanceolate, apex finely acute. Fertile lemma 12-25 mm long, with a basal callus, densely bearded around the callus with hairs up to 4 mm long, brown and densely hispid in lower two thirds, green and rough towards the tip, unequally and shortly 2-4-toothed at the apex, awn 2.5-4 cm long, geniculate.

**FLOWER:** Ovary pubescent. Anthers 3 mm long.

**FRUIT:** Caryopsis with adherent pericarp, 6-8 mm long, hairy all over. Hilum linear.

**Habitat:**

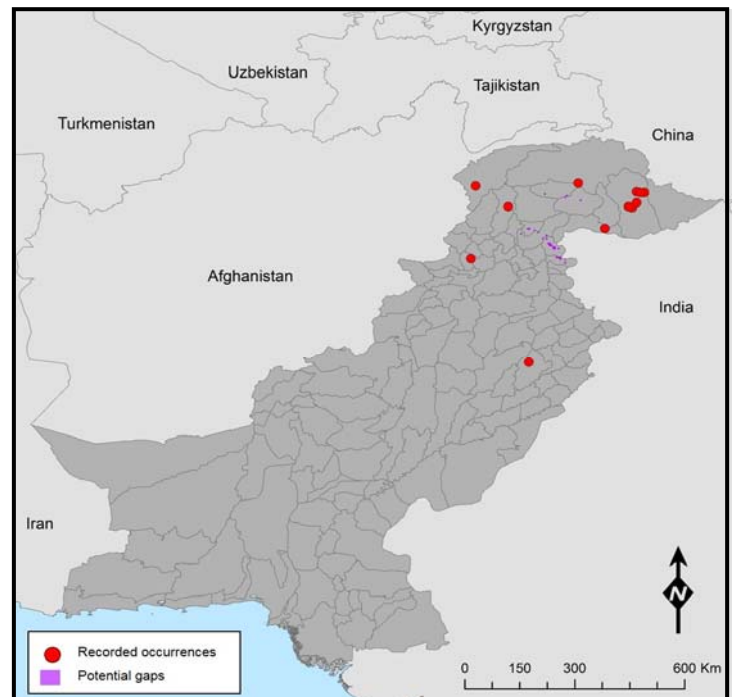
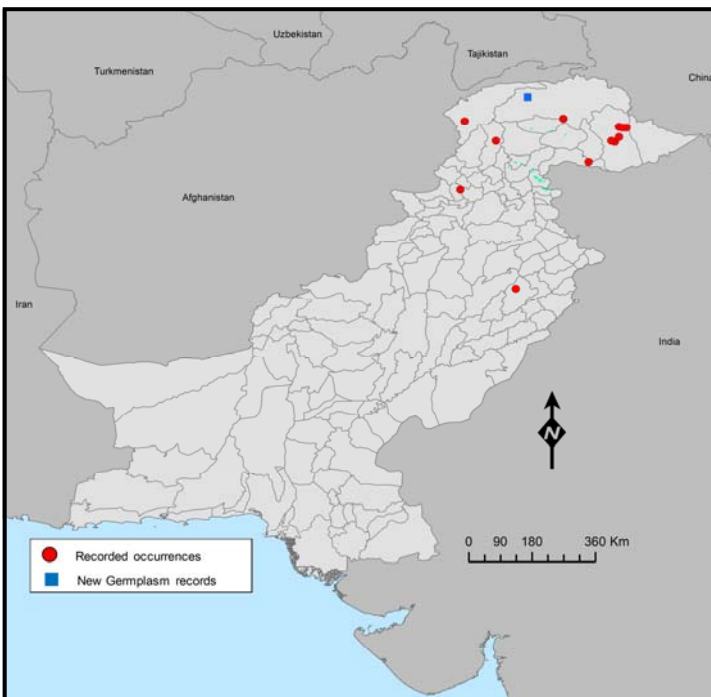
Roadside weed or weed of arable land.

**Distribution:**

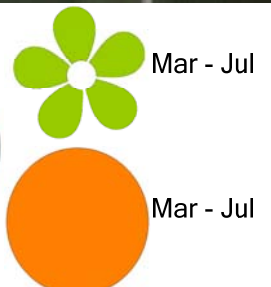
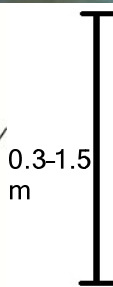
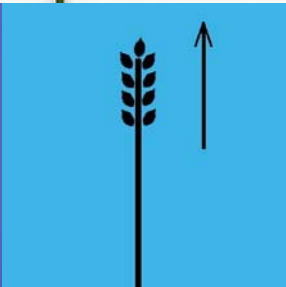
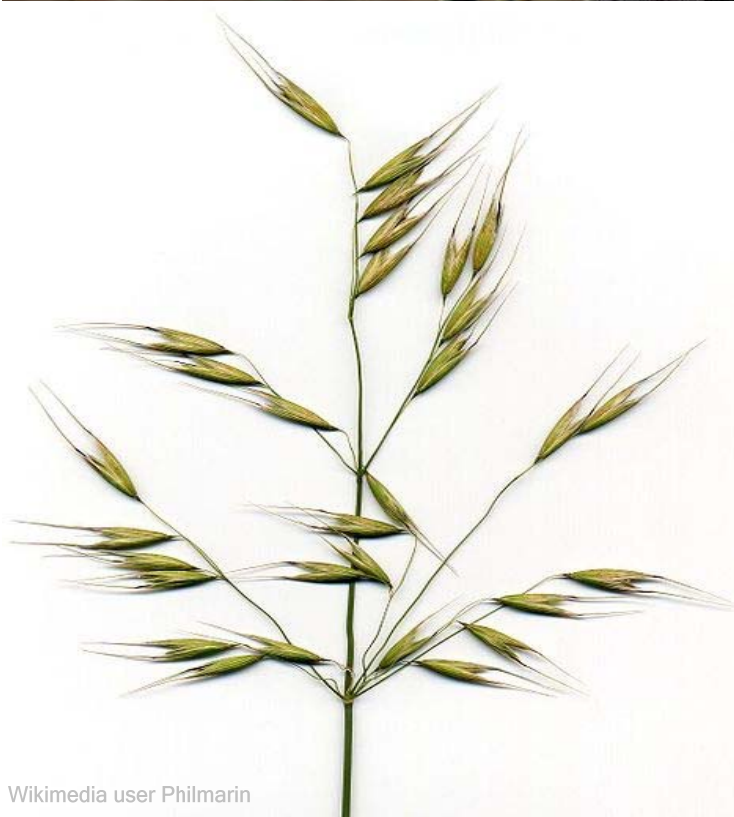
Distributed globally.

**Altitude:** 0 - 2400 m

<i>Avena fatua</i>	May be confused with: <i>Avena sterilis</i>
Rhachilla disarticulating between each floret; every lemma with a basal callus.	Rhachilla disarticulating only below lowest floret; only lowest lemma with a basal callus.



**References:** GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>; Phillips, S. (1995) Poaceae. In: Flora of Ethiopia and Eritrea. Volume 7, pp 37



Primary Gene Pool relative of *Avena sativa* L.

**HABIT:** Annual 0.8-1 m tall, culms erect, nodes often hairy. Ligules acute or obtuse with a point.  
**INFLORESCENCE:** Panicle equilateral. Spikelets 1.5-2.4 cm long excluding awn, each spikelet with 2-4 florets (usually 3).  
**GLUMES:** Usually equal in length, 16-22 mm long with 7-9(-11) nerves. All florets disarticulating at maturity, scars elliptic to circular, scars on 3rd (and sometimes 2nd) florets heart-shaped. Scar with a peripheral ring comprising 1/3 to 1/2 of the scar. Awns inserted centrally on lemma. Lemmas tough in texture, apex irregularly bidentate to bisubulate, macrohairs present or absent. Paleas usually with 2 rows of cilia along edges of keels, underside prickly.

**Habitat:**

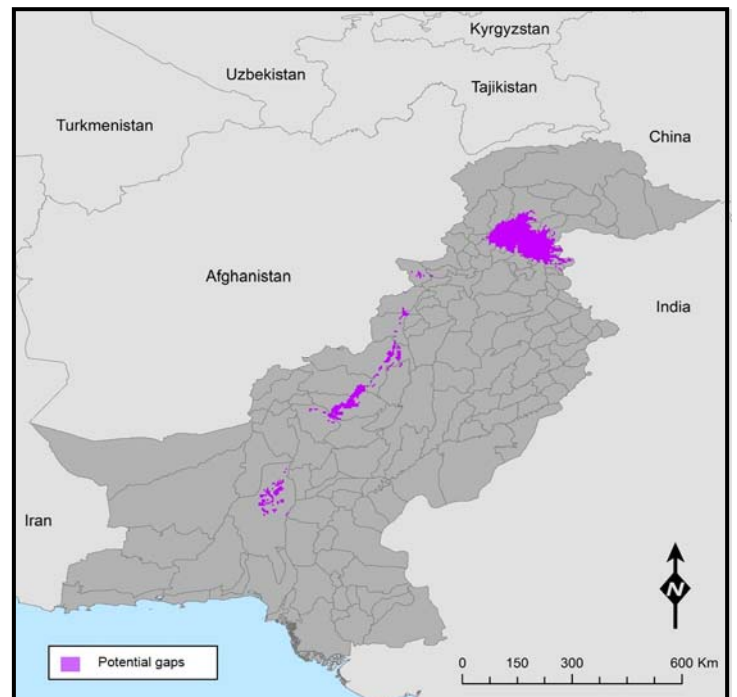
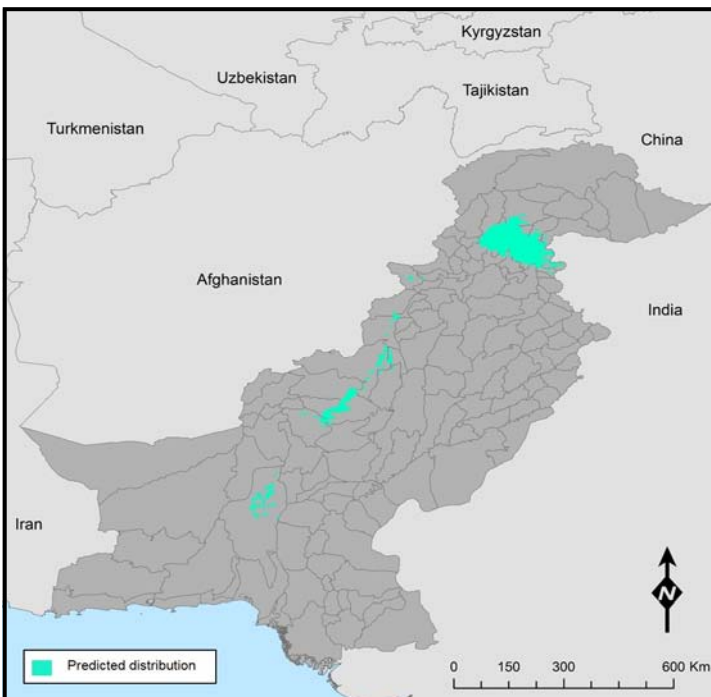
Mountain slopes, hills, valleys, clearings in *Quercus* forests, roadsides, as a weed in crops.

**Distribution:**

Europe, Middle East, central Asia, Indo-China and the Himalayas.

**Altitude:** unknown

<i>Avena hybrida</i>	May be confused with: <i>Avena occidentalis</i>
Glumes 15-22 mm long.	Glumes 30-40 mm long.




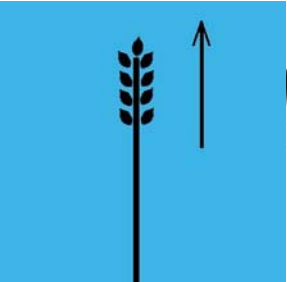
**References:** Baum, B.R. (1977). Oats: Wild and Cultivated. A Monograph of the Genus *Avena* L. (Poaceae). Biosystematics Research Institute Monograph No. 14. Supply and Services Canada, Ottawa.

Primary Gene Pool relative of *Avena sativa* L.




Wikimedia commons: Flora of Batava


No seed image available




0.8-1 m



DD



Jul - Aug



Jul - Aug

20

**HABIT:** Annual. Culms 30-180 cm long, geniculately ascending, or decumbent, 2-5-noded.

**LEAVES:** Cauline, blades 10-60 cm long, 4-18 mm wide, surface rough.

**INFLORESCENCE:** Paniculate, nodding, pyramidal, 10-45 cm long, 5-25 cm wide. Spikelets 23-50 mm long, breaking up at maturity, disarticulating above glumes but not between florets. Fertile spikelets comprising 2-5 fertile florets, with a sterile rhachilla extension.

**GLUMES:** Persistent, exceeding apex of florets. Fertile lemma lanceolate, 15-40 mm long, coriaceous, much thinner above, apex dentate, bifid, with a dorsal awn, arising 0.5 way up back of lemma, geniculate, 30-80 mm long, with twisted column. Column of lemma awn hispidulous to pubescent. Palea keel ciliate.

**FLOWER:** Ovary pubescent all over. Floret callus evident, bearded, obtuse, disarticulating obliquely.

**FRUIT:** Caryopsis with adherent pericarp, 11-12 mm long, hairy all over. Hilum linear.

**Habitat:**

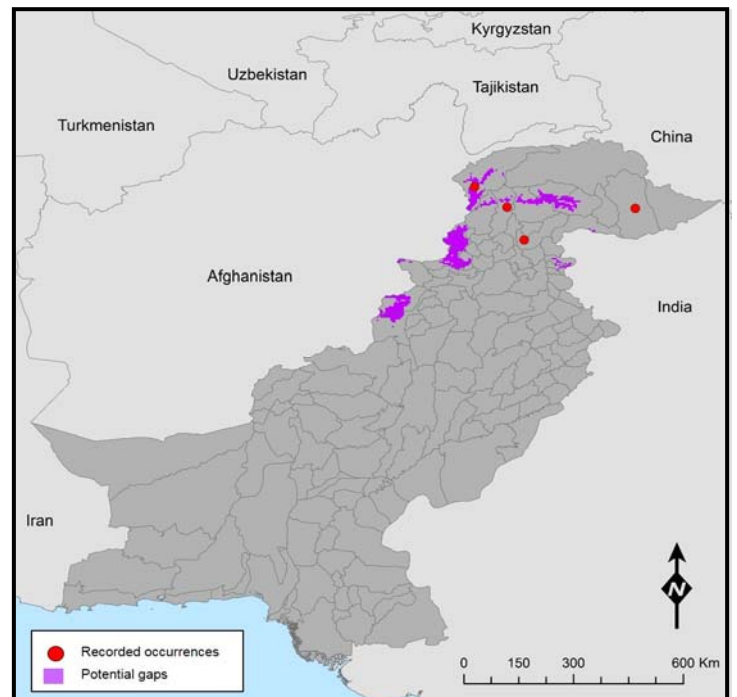
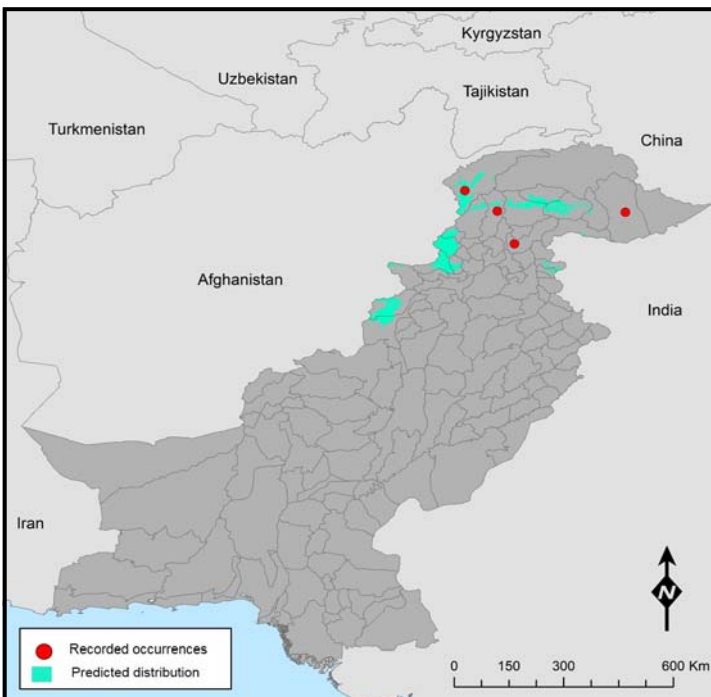
Arable land, especially fields of cereals, disturbed open ground, roadsides and field edges.

**Distribution:**

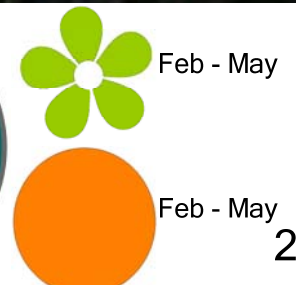
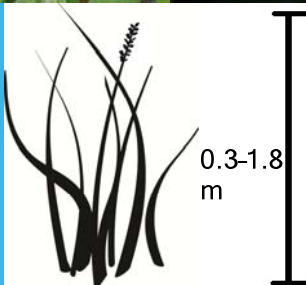
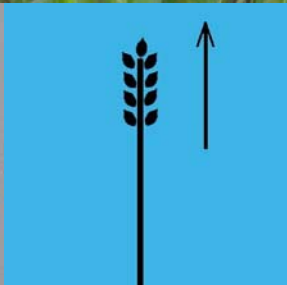
Distributed globally.

**Altitude:** 2100 - 2400 m

<i>Avena sterilis</i>	May be confused with: <i>Avena fatua</i>
Rhachilla disarticulating only below lowest floret, only lowest lemma with a basal callus.	Rhachilla disarticulating between each floret, every lemma with a basal callus.



**References:** GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>; Phillips, S. (1995) Poaceae. In: Flora of Ethiopia and Eritrea. Volume 7, p 37



Primary Gene Pool relative of *Avena sativa* L.

**HABIT:** Annual herbs. Juvenile growth prostrate to erect, becoming erect, 30-120 cm tall.

**LEAVES:** Ligule acute.

**INFLORESCENCE:** Panicles equilateral, at maturity only lowermost floret disarticulating. Spikelets 2-3.5 cm long excluding awns, 3-4 florets per spikelet.

**GLUMES:** Approximately equal in length, 25-45 mm long, each with 9-11 veins. Only lowermost floret disarticulating at maturity, scars broadly elliptic, periphery ring comprising 1/3 of scar. Awns inserted about lower 1/3 of lemma. Lemmas densely beset with macrohairs below awn insertion point, or sometimes only a few hairs present, apex bisubulate, sometimes bidenticulate. Paleas with 1-2(-3) rows of cilia along edges of keels, underside beset with prickles or hairs. Lodicule sativa type.


**Habitat:**

Fields, arid places, rocky slopes, river banks, steppes, farmland, in hedges and disturbed habitats.

**Distribution:**

Northern Europe, Mediterranean, western Asia, northern Middle East, Pakistan and India, Canary Islands. Introduced in Brazil.

**Altitude:** unknown

<i>Avena trichophylla</i>	May be confused with: <i>Avena sterilis</i>
Lemma tip bisubulate.	Lemma tip bidenticulate. 

Reported from  
Pakistan but no  
localities known

All populations priority for  
collection

**References:** Baum, B.R. (1971). Oats: Wild and Cultivated. A Monograph of the Genus *Avena* L. (Poaceae).





Confirmed use in breeding for *Pennisetum glaucum* (L.) R. Br.

Oriental fountain grass

**HABIT:** Clump-forming perennial. Rhizomes short. Culms erect, or geniculately ascending, 20-200 cm long, woody. Lateral branches fastigiate. Ligule a fringe of hairs.

**LEAVES:** Leaf-blades flat, or convolute, 30-60 cm long, 7-15 mm wide. Leaf-blade surface smooth, or scaberulous, glabrous, or pubescent.

**INFLORESCENCE:** Panicle spiciform, linear, continuous, or interrupted, 8-30 cm long. Primary panicle branches accrescent to a central axis, axis with sessile scars, angular, puberulous, or pubescent, bearing deciduous spikelet clusters. Fertile spikelets 1-3(-5) in the cluster, 1 sessile. Spikelets subtended by an involucre composed of bristles, 15-30 mm long, base bluntly stipitate 0.5-1.5 mm long. Involucral bristles deciduous with the fertile spikelets, numerous, 15-30 mm long.

**GLUMES:** Dissimilar, shorter than spikelet, thinner than fertile lemma. Basal floret sterile, other floret fertile, without rachilla extension. Basal sterile florets male, with palea. Lemma of lower sterile floret elliptic, 1 length of spikelet, chartaceous, setaceously attenuate. Fertile lemma lanceolate, 4.5-6.5 mm long, chartaceous, without keel. Lemma margins flat, apex setaceously attenuate. Palea chartaceous.

**FLOWER:** Soft, pink. Anthers 3, anther tip apiculate.

**Habitat:**

Well drained soil, sandy loams with good drainage.

**Distribution:**

Native to Asia and North Africa.

**Altitude:** unknown

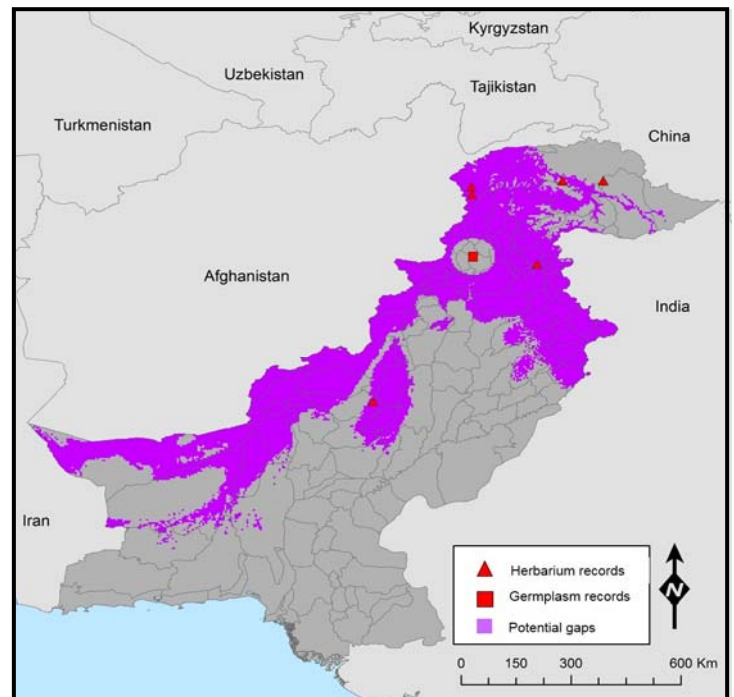
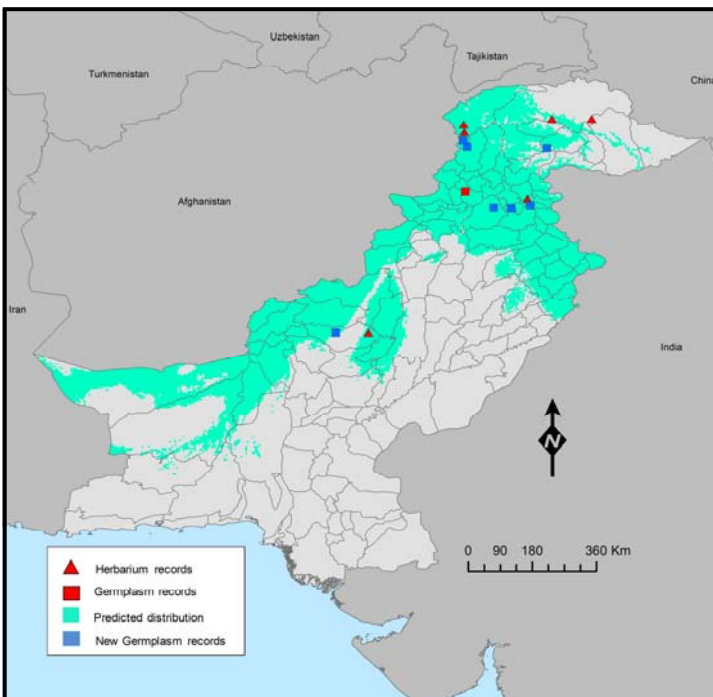
*Cenchrus orientalis*

Panicle 8-30 cm long; 1-3 fertile spikelets per cluster, spikelets lanceolate, involucral bristles 15-30 mm long; glumes 2, dissimilar, apex acute or acuminate.

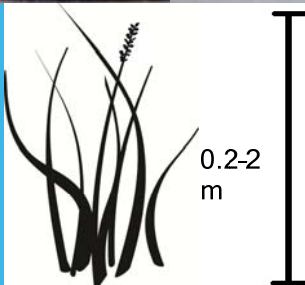
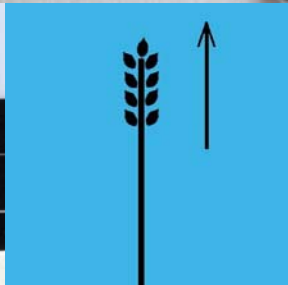


May be confused with:  
*Pennisetum glaucum*

Panicle 4-200 cm long; 1-9 fertile spikelets per cluster, spikelets obovate, involucral bristles 2-7 mm long; glumes apparently 1 (the 2nd absent or obscure), apex obtuse or acute.



**References:** Clayton, W.D., Vorontsova, M.S., Harman, K.T. and Williamson, H. (2013). GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>.



Tertiary Gene Pool relative of *Eleusine coracana* (L.) Gaertn.**HABIT** Perennial. Stolons present. Culms decumbent, 10-30(-90) cm long. Ligule a ciliate membrane.**LEAVES:** Leaf-blades conduplicate, (1-)2.5-15 cm long by 2-3 mm wide, glaucous.**INFLORESCENCE:** Racemes (2-)3-5, digitate, unilateral, 1.5-4.5 cm long. Rhachis deciduous from axis, angular, glabrous on margins. Spikelet packing broadside to rhachis, crowded. Spikelets appressed, solitary. Fertile spikelets sessile, comprising 4-8 fertile florets, with diminished florets at the apex. Spikelets elliptic, or oblong, laterally compressed, breaking up at maturity, disarticulating above glumes but not between florets.**GLUMES:** Persistent, similar, shorter than spikelet, thinner than fertile lemma. Lower glume oblong, 0.5 length of upper glume, 1-keeled, 1-veined. Lower glume lateral veins absent, apex acute. Upper glume oblong, 0.7 length of adjacent fertile lemma, membranous, 1-keeled, 3-veined (all in keel). Upper glume apex acute. Fertile lemma ovate, 3.8-5.5 mm long, chartaceous, 1-keeled, 3-veined. Lemma surface glabrous, or pilose, hairy above, margins pubescent, hairy below, apex acute, mucous, or mucronate. Palea keels ciliate. Apical sterile florets resembling fertile though underdeveloped.**FRUIT:** Caryopsis with free soft pericarp.**Habitat:**

Desert and Xeric Shrubland.

**Distribution:**

Northeast Tropical Africa, Arabian Peninsula, Western Asia and Tropical Asia.

**Altitude:** unknown

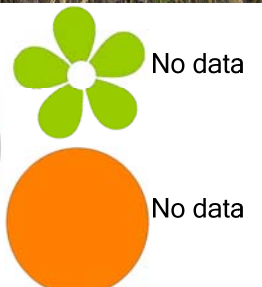
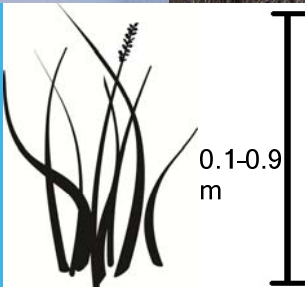
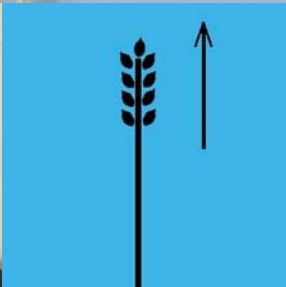
<i>Chloris flagellifera</i>	May be confused with:

Reported from  
Pakistan but no  
localities known

All populations priority for  
collection

**References:** <http://e-monocot.org/taxon/urn:kew.org:wcs:taxon:426104>

Tertiary Gene Pool relative of *Eleusine coracana* (L.) Gaertn.



Gene Pool Primary relative of *Eleusine coracana* (L.) Gaertn.

Capim-pé-de-galinha; Pé-de-galinha

**HABIT:** Clump-forming annuals. Culms geniculately ascending, or decumbent, slender, 15-90 cm long.**LEAVES:** Mostly basal. Leaf-sheaths keeled, outer margin hairy. Leaf-blades conduplicate, 5-35 cm long, 2.5-6 mm wide.**INFLORESCENCE:** Racemes 1-10(-17), single (rarely), or digitate, unilateral, 3.5-15.5 cm long, 3-3.5 mm wide. Spikelets comprising 3-9 fertile florets, with diminished florets at the apex. Spikelets elliptic, laterally compressed, 3-5 mm long, breaking up at maturity.**GLUMES:** Persistent, similar, shorter than spikelet. Fertile lemma lanceolate in profile, 2.1-3.6 mm long, membranous, 3-veined (excluding subsidiaries). Lodicules 2, cuneate, fleshy.**FRUIT:** Caryopsis with free soft pericarp, ellipsoid, isodiametric, trigonous, concealed by floret, 1-1.3 mm long, black, striate.**Habitat:**

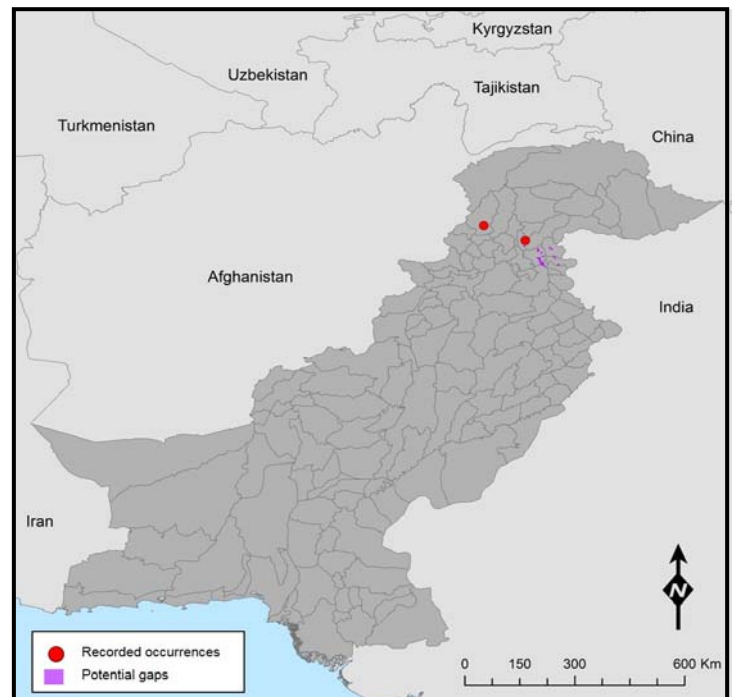
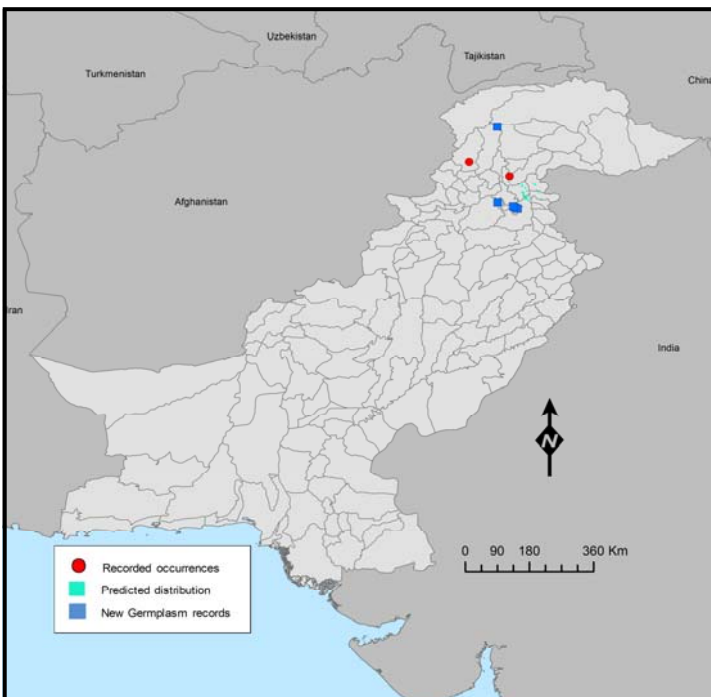
In open anthropic areas, grasslands and savannas in the Amazon Rainforest, Caatinga, Cerrado, Atlantic Rainforest and Pampa phytogeographic domains.

**Distribution:**

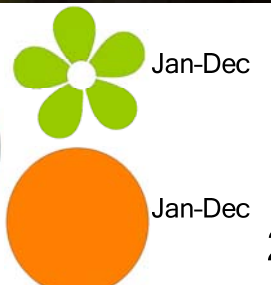
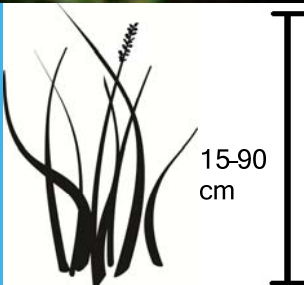
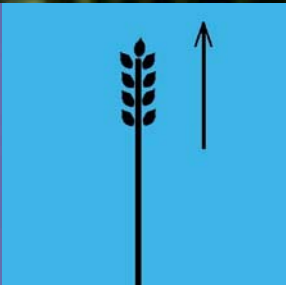
Widespread throughout Africa, the Americas, Southern Europe, Asia and Australasia. In Brazil in the North (AC, AM, AP, PA, RO, RR, TO); Northeast (AL, BA, CE, MA, PB, PE, PI, RN, SE); Central West (DF, GO, MS, MT); Southeast (ES, MG, RJ, SP), and South (PR, RS, SC).

**Altitude:** 0 - 1200 m

<i>Eleusine indica</i>	May be confused with: <i>Eleusine tristachya</i>
Spikes usually more than 3 cm long, usually less than 7 mm broad; backs of lemmas usually straight or very slightly curved towards apex.	Spikes less than 3 cm, 7-10 mm broad; backs curved inward towards lemma.



**References:** GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>  
*Eleusine indica* in Flora do Brasil 2020. JBRJ. <http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB13192>



Tertiary Gene Pool relative of *Hordeum vulgare* L.

**HABIT:** Plants perennial, tufted. Culms 40-80(-100) cm tall, ca. 2 mm in diam., (2-)3-5(-6)-noded, densely appressed hairy at nodes.

**LEAVES:** Leaf sheath membranous or fibrous, smooth, but those of lower leaves sometimes hairy, ligule 0.2-0.6 mm, membranous, auricles usually absent; leaf blade glaucous green, flat, 6-15 × 0.3-0.8(-1) cm, stiff, both surfaces scabrous or adaxial surface pilose.

**INFLORESCENCE:** Spike pale whitish glaucous or greenish violet to somewhat dark violet, 4-10 × (0.3-)0.5-0.7 cm, rachis usually tough except apically, margin scabrous hairy. Lateral spikelets pedicellate, male or perfect and setting seeds, glumes setaceous, rarely somewhat flattened at base, equal or proximal one slightly shorter (6-10 mm), lemma 5-7 mm, pubescent, awn 4-9 mm, palea usually equaling lemma. Central spikelet: sessile, lanceolate, glumes setaceous, 5-10 mm, lemma 5-7 mm, densely shortly hairy, awn 5-10 mm, palea subequaling lemma, apex truncate or acute.

**FLOWER:** Anthers 3, 1.4-2.4 mm long. Ovary pubescent on apex.

**FRUIT:** Caryopsis with adherent pericarp; sulcate on hilar side; hairy at apex. Hilum linear.

**Habitat:**

Alkaline or saline moist meadows, riverside sands, pebbles.

**Distribution:**

Afghanistan, China, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russia (W Siberia), Turkmenistan, Uzbekistan.

**Altitude:** 1000 - 4000 m

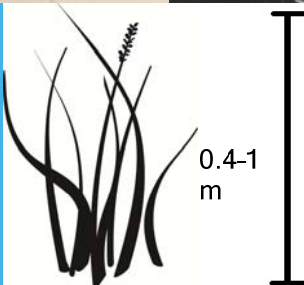
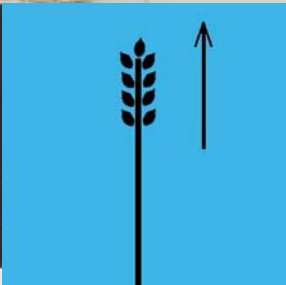
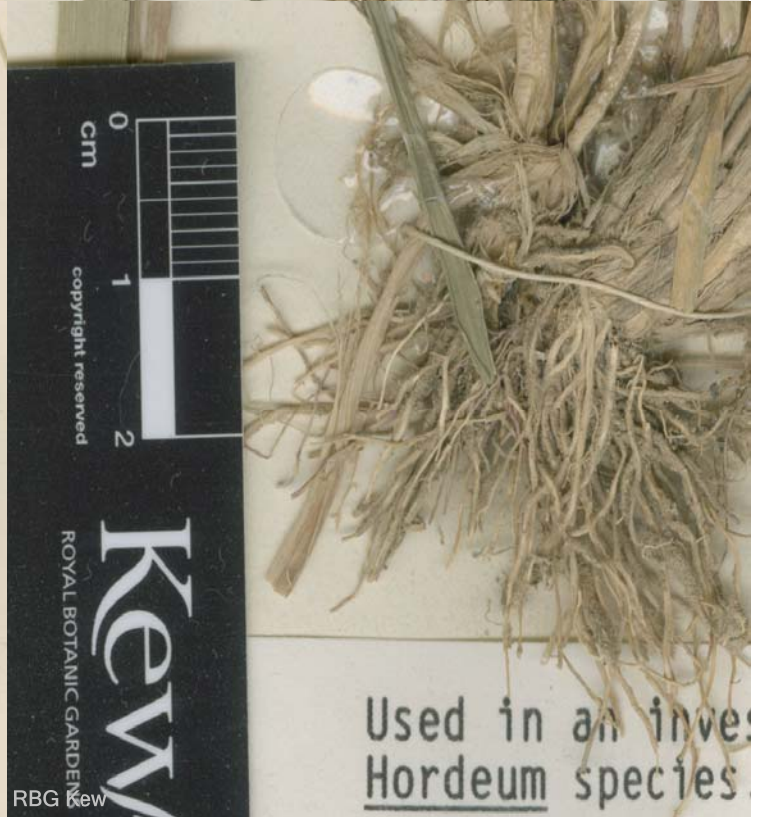
<i>Hordeum bogdanii</i>	May be confused with: <i>Hordeum brevisubulatum</i>
Anthers 1.5 - 2.5 mm long.	Anthers 2.5-4 mm long.

Reported from  
Pakistan but no  
localities known

All populations priority for  
collection

**References:** <http://www.kew.org/data/grasses-db/www/imp05421.htm>

Tertiary Gene Pool relative of *Hordeum vulgare* L.





Tertiary Gene Pool relative of *Hordeum vulgare* L.**HABIT:** Perennial, tufted or with short rhizomes. Culms usually erect, glabrous or densely pubescent at nodes.**LEAVES:** Leaf sheath usually fibrous at base, sometimes membranous, ± pubescent; ligule 0.2-0.7 mm, auricles present or absent; leaf blade flat or sometimes involute, (3-) 5-150 (-175) × (0.2-)0.6-5 (-7.1) cm, abaxial surface glabrous to scabrous or densely pilose, epidermis with straight or sinuous long cells, with or without silica cells, adaxial surface scabrous or densely pubescent or pilose.**INFLORESCENCE:** Spike pale glaucous to greenish or grayish violet, (2.3-) 3-8.5 (-9.6) × 0.4-0.8 cm, rachis brittle. Lateral spikelets: usually developed, sometimes rudimentary, pedicellate; pedicel 0.9-2.3 mm. Central spikelet: sessile or subsessile, lanceolate; glumes setaceous, equal, 5.5-6.5 (-7) mm, lemma glabrous, subglabrous, pubescent, or densely pinkish violet pilose or long spinulose, apex acute-acuminate to shortly awned, awn usually shorter than lemma body, palea apex ± acute. Lodicules (0.6-)0.8-1.4 (-1.6) mm, ± pubescent distally and at margin, apex acute to acuminate.**FLOWER:** Anthers yellow to violet, (2-) 2.5-4 mm.**FRUIT:** Caryopsis yellow-brown to dark violet.**Habitat:**

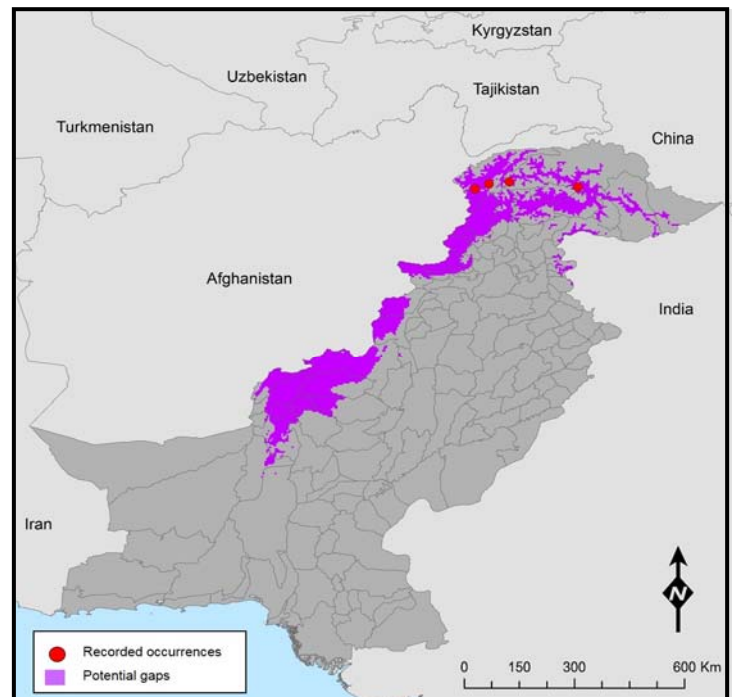
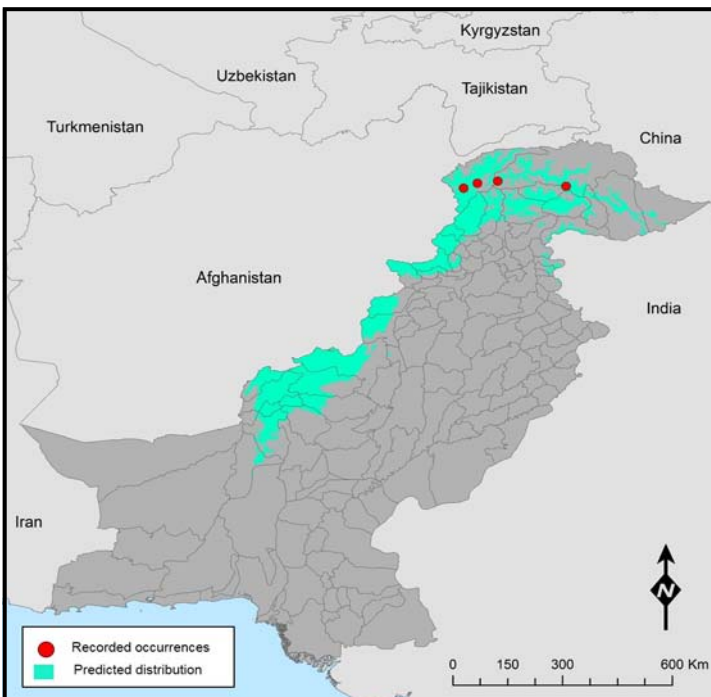
Steppe valleys at timberline, wet meadows, saline meadows, stream banks, salt steppes, dry valleys, dry stony slopes and other dry habitats, rarely as a weed.

**Distribution:**

Throughout Eastern Europe and Asia.

**Altitude:** 1400 - 5000 m

<i>Hordeum brevisubulatum</i>	May be confused with: <i>Hordeum bogdanii</i>
Anthers 2.5-4 mm long.	Anthers 1.5-2.5 mm long.

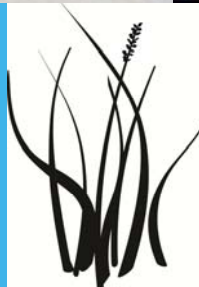


**References:** Flora of China, Volume 22, p396 via [www.efloras.org](http://www.efloras.org)  
[http://www.efloras.org/florataxon.aspx?flora\\_id=2&taxon\\_id=200025533](http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200025533)

Tertiary Gene Pool relative of *Hordeum vulgare* L.



No seed image available



about 1.5 m



Jun - Aug

Jun - Aug

**HABIT:** Annual, culms solitary, or caespitose. Culms 10-40 cm long, 3-4-noded.

**LEAVES:** Leaf-sheath auricles absent, or falcate. Ligule an eciliate membrane, 0.5-1 mm long. Leaf-blades 1.5-8 cm long, 1-3.5 mm wide.

**INFLORESCENCE:** Racemes single, oblong, or ovate, bilateral, 2-6 cm long. Rhachis fragile at the nodes, flattened. Spikelet packing broadside to rhachis, internodes oblong, falling with spikelet above. Spikelets in threes. Fertile spikelets sessile, 1 per cluster. Companion sterile spikelets pedicelled, 2 per cluster, well-developed, containing empty lemmas, lanceolate, dorsally compressed, 3-5 mm long, shorter than fertile, deciduous with the fertile. Companion sterile spikelet glumes markedly unequal in width, subulate, 8-26 mm long, winged on margins (upper glume), lemmas 1, exserted from glumes, 3-5 mm long, 1-awned. Fertile spikelets comprising 1 fertile florets, without rhachilla extension.

**GLUMES:** Collateral, similar; gaping. Florets Fertile lemma ovate, 6-8 mm long, coriaceous, 5 -veined.

**FLOWER:** Ovary apex pubescent.

**FRUIT:** Caryopsis with adherent pericarp; ellipsoid, sulcate on hilar side; hairy at apex. Embryo 0.2 length of caryopsis. Hilum linear, 1 length of caryopsis.

**Habitat:**

Inland or coastal marshes, meadows and river beds, as a weed in pastures and on waste ground.

**Distribution:**

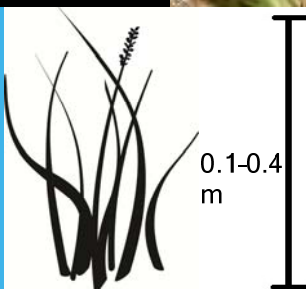
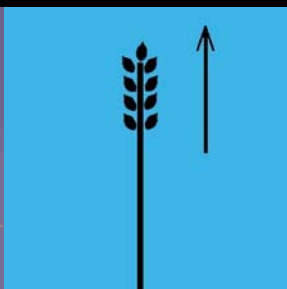
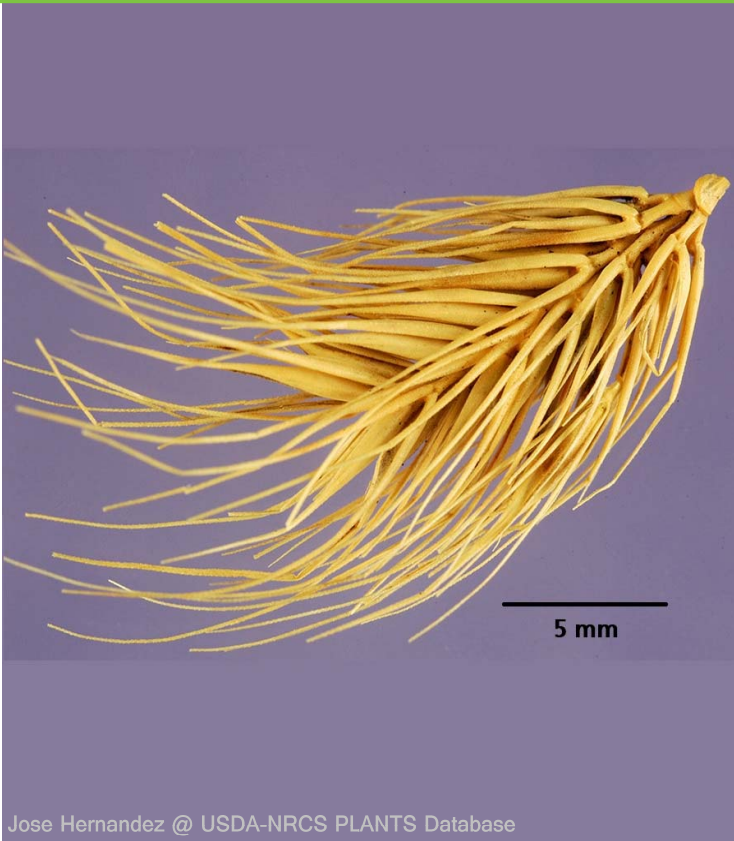
Distributed globally.

**Altitude:** 0 - 130 m

<i>Hordeum marinum</i>	May be confused with: <i>Hordeum depressum</i>
Awns of lateral spikelet 5-10 mm long.	Awns of lateral spikelet absent or no more than 1-2 mm long.

Reported from  
Pakistan but no  
localities known

All populations priority for  
collection



**HABIT:** Annual, culms 5-50 cm high, tufted or solitary, erect or geniculate ascending.

**LEAVES:** Leaf-blades up to 20 cm long, 2-8 mm wide, glabrous or sparsely pubescent.

**INFLORESCENCE:** Spike oblong, strongly compressed, 2-7(-12) cm long, green or tinged with purple, rachis sparsely ciliate on the margins, fragile. Central spikelet sessile or with a pedicel up to 1.8 mm long.

**GLUMES:** Lanceolate, long-awned, up to 26 mm long including the awn, fringed with hairs below, lemma lanceolate, 7-12 mm long, scabrid towards the tip, awn 18-50 mm long, anthers 0.2-1.4 mm long. Lateral spikelets well-developed, male or barren, pedicellate, glumes slightly dissimilar, the inner lanceolate, ciliate below, the outer setaceous, both long-awned, 16-30 mm long including the awn, lemma 7-11 mm long, with an awn 10-40 mm long, rhachilla extension slender or stout.

**FRUIT:** Caryopsis with adherent pericarp, ellipsoid, sulcate on hilar side, hairy at apex. Hilum linear, equalling length of caryopsis.

**Habitat:**

Found as a weed in disturbed habitats and cultivated land, but probably originally native to coastal areas, sandy riversides and grazed areas in wetlands.

**Distribution:**

Distributed globally.

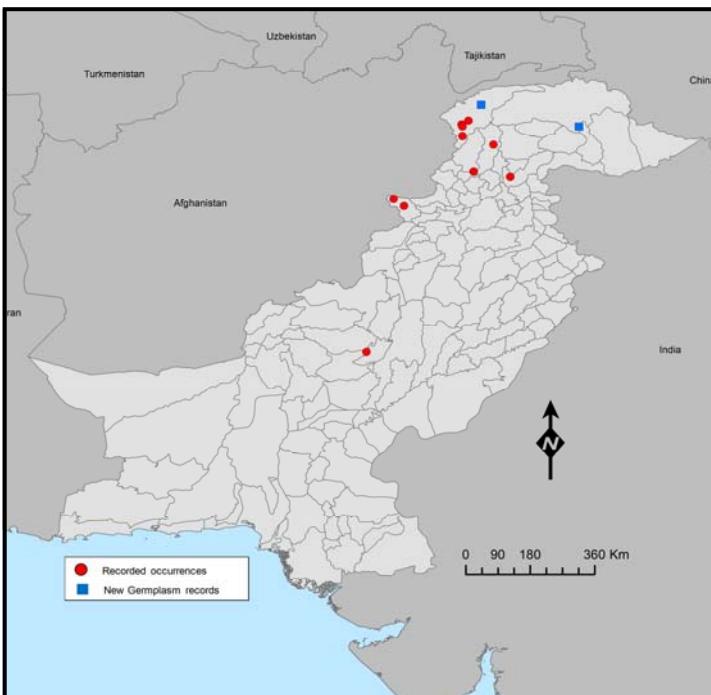
**Altitude:** 0 - 1700 m

*Hordeum murinum*

May be confused with:  
*Hordeum vulgare*

Central spikelet pedicellate to subsessile, less than 2 mm wide; awn 2-4 cm long.

Central spikelet sessile, at least 3 mm wide; awn if present 5-15 cm long.

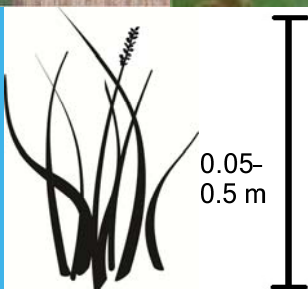
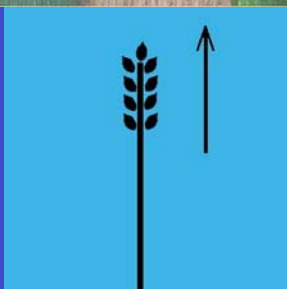


All populations priority for collection

**References:** Bothmer, R. von et al. (1991) An Ecogeographical Study of the Genus *Hordeum*. IBPGR, Rome.; Flora of Pakistan p635 via efloras.org



No seed image available



Tertiary Gene Pool relative of *Oryza sativa* L. and *Oryza glaberrima* Steud.

**HABIT:** Perennial, sturdy, 1.2-1.8 m tall with sturdy, creeping, smooth, branching rhizome. Stalks erect, branching, round, glabrous (at nodes also), smooth at lower nodes, sometimes with adventitious roots.

**LEAVES:** Leaf sheaths open, somewhat longer than internodes, leathery, glabrous, smooth, shiny, with distinct reticulate venation as in aquatic plants. Leaves widely linear, long and thinly tapered, up to 45 cm long and 12 mm wide, flat, leathery, erect, with both sides glabrous, hard thorn like indentations along edge. Ligules very short, blunt, ciliated.

**INFLORESCENCE :** Panicle 10-17 cm long, erect, compressed, narrowly lanceolate. Axis ribbed. Spikelets erect, oblique-oblong, somewhat compressed from sides, thin, leathery, 11-17 mm long and 3-3.5 mm wide, placed somewhat imbricate on branches.

**GLUMES:** Flowering glumes about 10-15 mm and 0.25-2.5 mm wide (in folded form), leathery.

**FRUIT:** Oblong-lanceolate, dark brown, more or less orbicular in section.

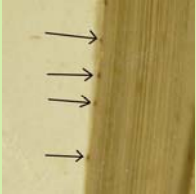
**Habitat:**

Riverbanks, sometimes brackish water.

**Distribution:**

Bangladesh, India, Pakistan and Myanmar.

**Altitude:** unknown

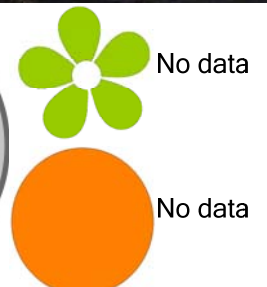
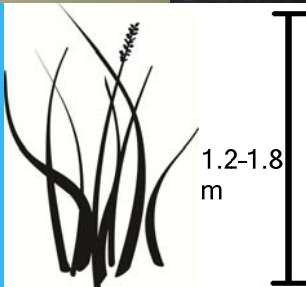
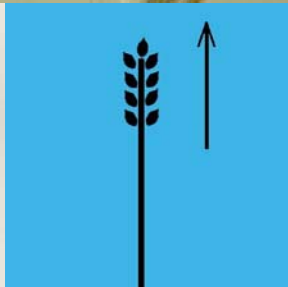
<i>Oryza coarctata</i>	May be confused with: <i>Other wild Oryza species</i>
Branched stalk, +- leathery leaves with small thorn like teeth, non flattened fruit.	



All populations priority for collection

**References:** [http://archive.gramene.org/species/oryza\\_species/o\\_coarctata.html](http://archive.gramene.org/species/oryza_species/o_coarctata.html)

Tertiary Gene Pool relative of *Oryza sativa* L. and *Oryza glaberrima* Steud.





**HABIT:** Annuals, Stems tufted,, erect or ascending, 50-120 cm tall, smooth, completely glabrous or sparsely to densely pilose below spike.

**LEAVES:** Leaf sheaths glabrous or villous. Leaf blades (3-)4-12 mm wide, flat or rolled, glaucous, glabrous or sparsely pilose, scabrid.

**INFLORESCENCE:** Spike simple, laterally compressed, erect, 4.5-13 cm long. Rachis fragile, sometimes tough basally, shortly ciliate along margins. Spikelets solitary at each node, 2(-3)-flowered.

**GLUMES:** Linear-subulate, 9-12 mm long, keels shortly scabrid-ciliate, acuminate or awned, awn if present up to 5 mm long, lemmas lanceolate, 8-12 mm long, keeled, rigid spines on the keel, awned, awn 2-7 cm long.

**Habitat:**

A common weed of grain crops.

**Distribution:**

Caucasus: Armenia, Western Asia: Afghanistan, Iraq, Iran, Indian Subcontinent: Pakistan.

**Altitude:** 1700 - 2700 m

<i>Secale cereale</i> subsp. <i>afghanicum</i>	May be confused with: <i>Secale montanum</i>
Annuals, usually glabrous; awns of lemmas much longer than lemma length.	Perennials, stems pilose below spike; awns of lemmas shorter than or equally lemma length.

Reported from  
Pakistan but no  
localities known

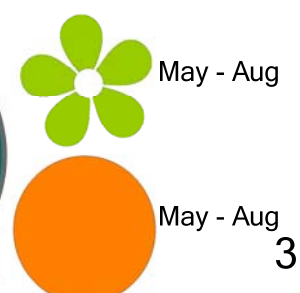
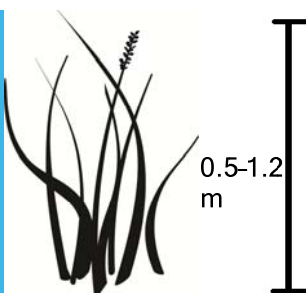
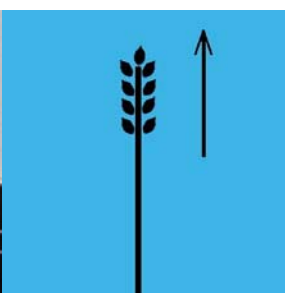
All populations priority for  
collection



RBG Kew herbarium material



RBG Kew



**HABIT:** Perennial with vigorous spreading rhizomes. Culms 0.5-1.5 m long, 4-6 mm in diameter, nodes puberulous.  
**LEAVES:** Leaf sheaths glabrous, blades linear or linear-lanceolate, 25-80 × 1-4 cm, glabrous, ligule 0.5-1 mm, glabrous.  
**INFLORESCENCE:** Panicle lanceolate to pyramidal in outline, 20-40 cm, soft white hairs in basal axil; primary branches solitary or whorled, spreading, lower part bare, upper part branched, the secondary branches tipped by racemes, racemes fragile, composed of 2-5 spikelet pairs. Sessile spikelet elliptic, 4-5 mm, callus obtuse, bearded, lower glume sub-leathery, often pale yellow or yellowish brown at maturity, shortly pubescent or glabrescent, 5-7-veined, veins distinct in upper part, apex 3-denticulate, upper lemma acute and mucronate or 2-lobed and awned, awn 1-1.6 cm. Pedicelled spikelet staminate, narrowly lanceolate, 4.5-7 mm, often violet-purple.

**Habitat:**

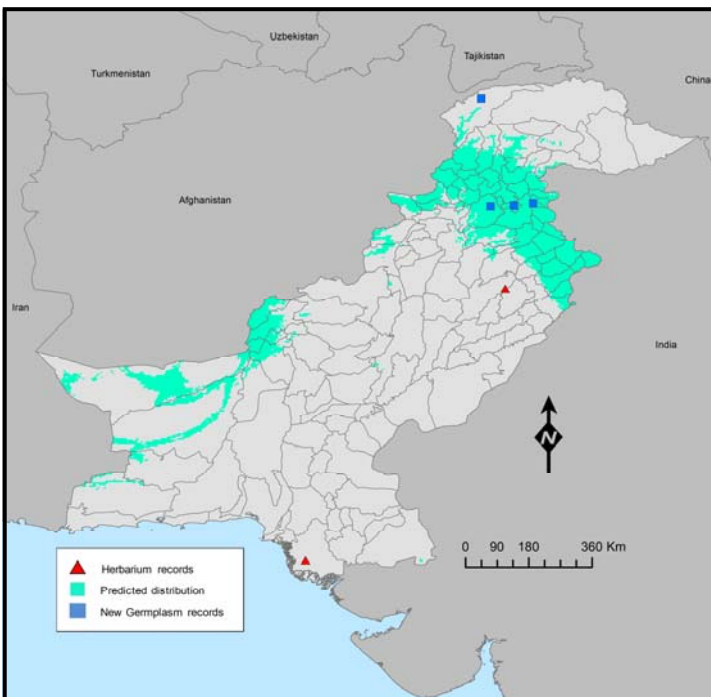
Streams, valleys, waste ground, and as a weed in fields.

**Distribution:**

Native to North Africa, South-central and Western Asia.

**Altitude:** unknown

<i>Sorghum halepense</i>	May be confused with: <i>Sorghum arundinaceum</i>
Leaves 1 to 4 cm wide.	Leaves narrower, 0.5 to 0.7 mm wide.



All populations priority for  
collection

**References:** Flora of China, Volume 22, pp 600-601.



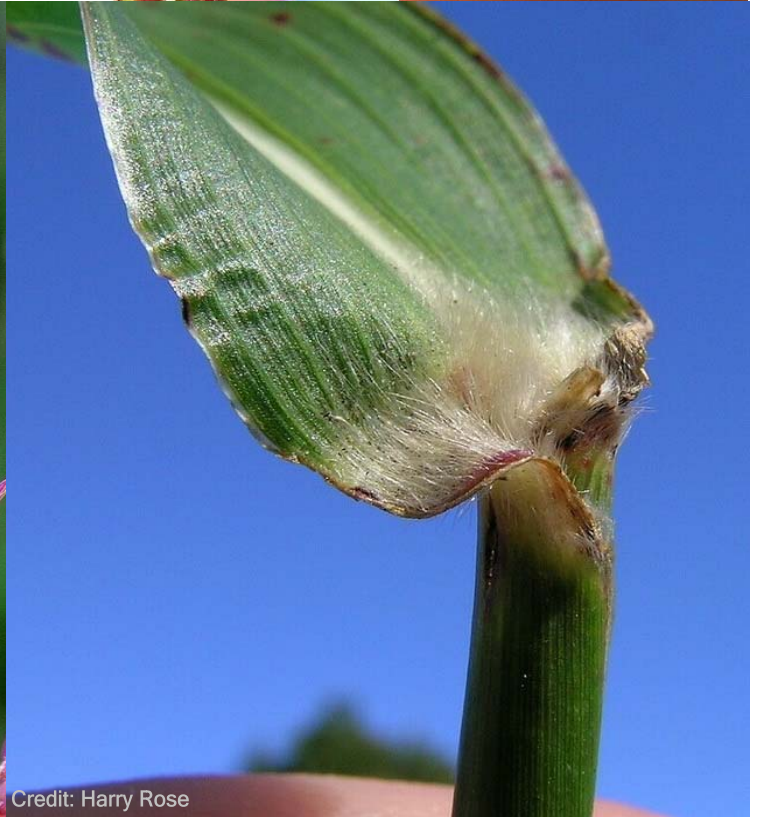
Credit: Forest and Kim Starr



Credit: Harry Rose



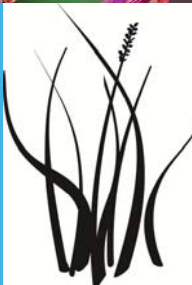
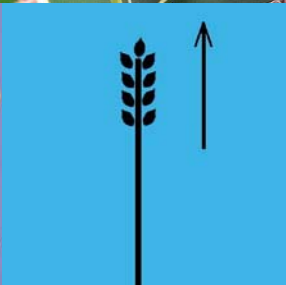
Credit: José María Escolano



Credit: Harry Rose



2 mm



0.5-1.5 m



May - Oct

May - Oct

Tertiary Gene Pool relative of *Sorghum bicolor* (L.) Moench

**HABIT:** Perennial forming loose tufts. Culms erect, 0.6-2 m tall; nodes bearded with pale spreading hairs. Leaf sheaths glabrous or pilose.

**LEAVES:** Leaf blades linear, 10-40(-50) × 0.4-1 cm, glabrous to hispid, bearded at base; ligule 1-1.5 mm.

**INFLORESCENCE:** Panicle lanceolate in outline, 15-30 cm, glabrous but with soft hairs at the nodes; primary branches whorled, simple, flexuous, 2-5 cm, lower part bare; racemes borne at branch ends, fragile, composed of 2-4 spikelet pairs; internodes and pedicels brown-ciliate. Sessile spikelet ovate-lanceolate, 3.5-5 mm; lower glume leathery, black-brown at maturity, glossy, glabrous below middle, upper part and margins hispid with brown hairs; upper lemma awnless or awned; awn 1-1.5 cm. Pedicelled spikelet usually staminate, elliptic, 3-3.7 mm, papery, light brown.

**Habitat:**

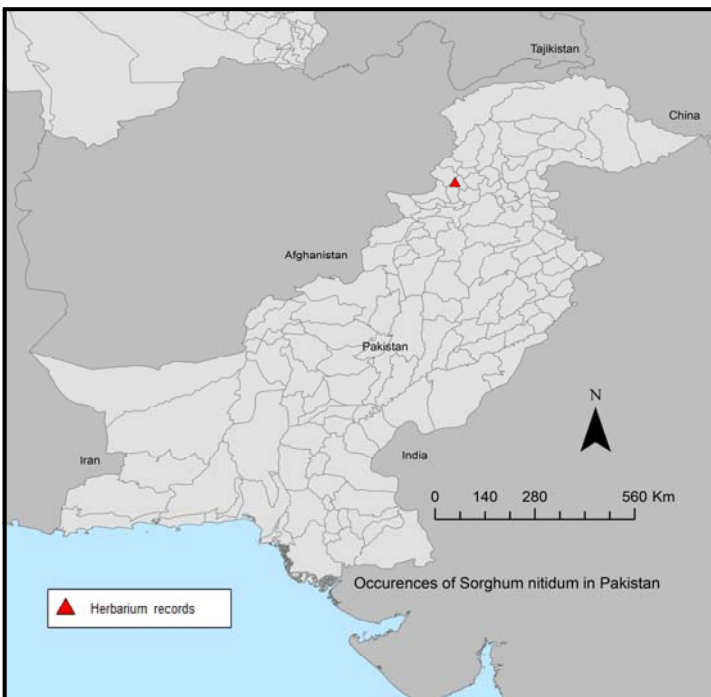
Meadows, grassy hillsides.

**Distribution:**

Native to Australia &amp; New Zealand, Eastern Asia, Melanesia, Southcentral Asia and Southeastern Asia.

**Altitude:** 300-1400 m

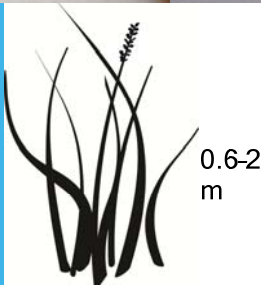
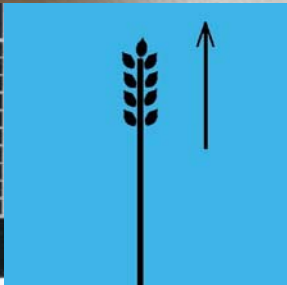
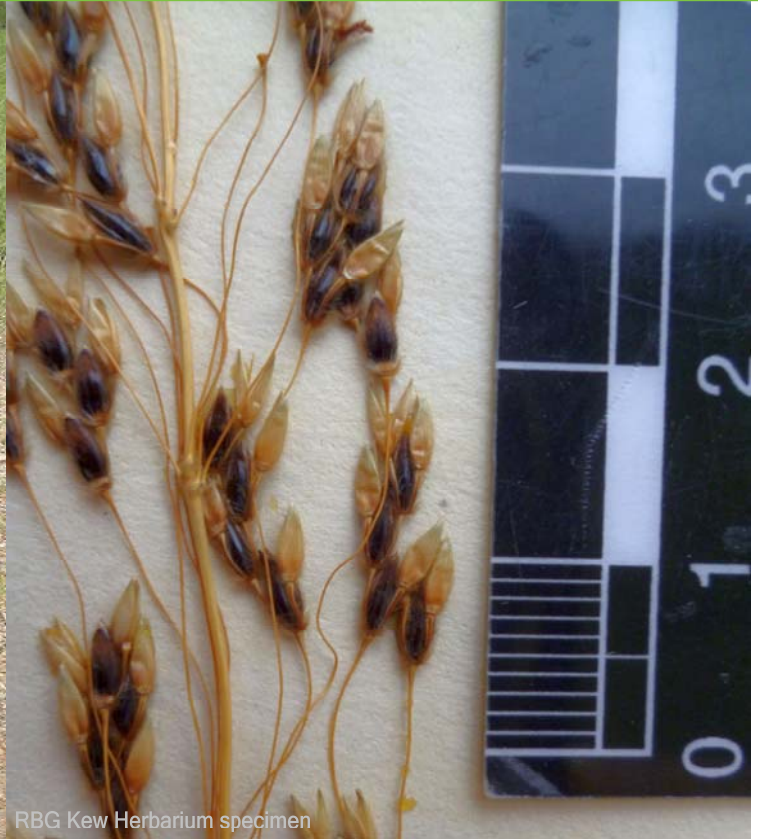
<i>Sorghum nitidum</i>	May be confused with: <i>Sorghum bicolor</i>
Up to 2 m tall.	3-5 m tall.



All populations priority for collection

**References:** Flora of China, Volume 22, p600.

Tertiary Gene Pool relative of *Sorghum bicolor* (L.) Moench



**HABIT:** Perennials, often with creeping rhizomes. Stems 40-80 cm, usually glabrous, sometimes minutely pubescent on nodes.

**LEAVES:** Usually flat, somewhat glaucous, 2-6 mm wide, scabrid, often sparsely long-pilose on upper surface, glabrous below, closely and prominently veined, sheaths long-ciliate.

**INFLORESCENCE:** Spicate, 10-20 cm, erect, dense or lax, rachis spinulose-ciliate on angles. Spikelets with 4-6 florets, compressed laterally. Glumes 5-8.5 mm, subequal, oblong or lanceolate-oblong, usually 5-veined, scabrid on keel towards apex, apex usually obtuse or truncate, sometimes with a small mucro. Lemma 8-11 mm, keeled at apex, apex obtuse or mucronate. Palea ciliate on keels.

**GILUMES:** Oblong, weakly keeled distally, glabrous and mostly smooth or strigose with 1-1.5 mm hairs, hairs usually evenly distributed, keels scabrous, at least distally, midvein usually more prominent and longer than the lateral veins, margins not hyaline or hyaline near the apices.

**FLOWER:** Anthers 5-7 mm.

**Habitat:**

Temperate mixed forest.

**Distribution:**

Native to central Europe, the Balkans, and Asia Minor.

**Altitude:** 500 - 3000 m

<i>Thinopyrum intermedium</i>	May be confused with:

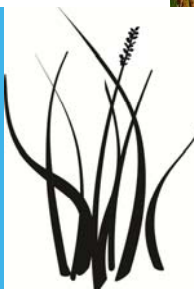
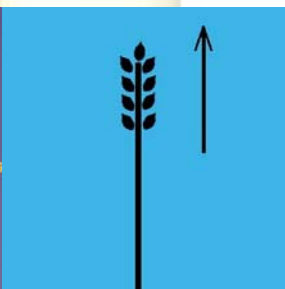
Reported from Pakistan  
but no localities known

All populations priority for  
collection

*Thinopyrum intermedium* (Host) Barkworth & D.R.Dewey

Tertiary Gene Pool relative of *Triticum aestivum* L.

Intermediate wheatgrass





Secondary relative of *Malus domestica* Borkh.

**HABIT:** Shrub or tree, up to 10(-15) m tall, unarmed. Branches purplish brown, densely tomentose becoming glabrescent. Stipules linear, 3-5(-10) mm, tomentose, usually caducous. Petioles 1.5-3 cm, tomentose.

**LEAVES:** Leaf blade usually elliptic to ovate, 2.5-10 x 2-5.5 cm, base rounded to broadly cuneate, apex obtuse or acute to acuminate, margin crenate to serrate, tomentose on both surfaces becoming glabrescent adaxially.

**INFLORESCENCE:** Corymbose or umbellate, 3-7 flowered, pedicels (0.5-)1-2.5 cm long, tomentose, bracts caducous, linear-lanceolate, tomentose.

**FLOWER:** White or tinged pink, deep pink abaxially, hypanthium 4-5(-8) mm, densely tomentose, campanulate. Sepals triangular-ovate to lanceolate, 5-8 mm, densely tomentose to glabrescent on both surfaces, apex acuminate. Petals obovate to elliptic, 1-2 x 0.7-1.2 cm, shortly clawed. Stamens 20(-30), ca. half as long as petals. Stylodia 5, slightly longer than stamens, tomentose at base. Pomes sublobose to ovate-ellipsoid or obovate-ellipsoid, usually impressed at apex and base, (2-)3-8 x 2.5-7 cm, red, yellow or green at maturity, thickly fleshy, floral parts persistent.

**Habitat:**

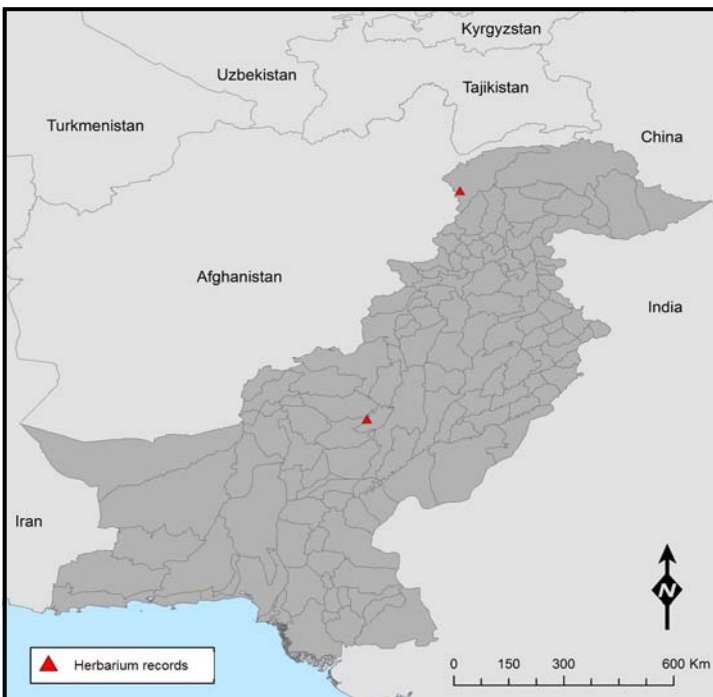
Growing among cedars in no way cultivated, owned or near land cultivated in the past.

**Distribution:**

Native to Pakistan, SW Asia and Europe.

**Altitude:** 2200 - 2500 m

<i>Malus chitralensis</i>	May be confused with:



All populations priority for collection


**References:**

Secondary relative of *Malus domestica* Borkh.

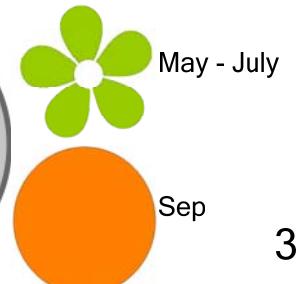


Royal Botanic Gardens Edinburgh E00010842

No seed image available



Up to 10 m



May - July  
Sep

Primary Gene Pool relative of *Solanum melongena*

**HABIT:** Erect, rhizomatous perennial shrub, 0.5-1.5 m high. Branchlets brown or green. Branchlet prickles curved, broad-based, 3-7 mm long.

**LEAVES:** Ovate or broadly ovate, shallowly lobed throughout. Leaves 3.5-8.5 cm long, 2.3-5 cm wide, Upper leaf surface grey-green; Lower leaf surface green or greenish-white or white, grey.

**INFLORESCENCE:** Supra-axillary, solitary or sessile (rachis very short or absent). 1-3-flowered, with one bisexual flower, the rest male.

**FLOWER:** 5-merous, markedly dimorphic, with larger pricklier basal flower(s). Corolla purple, 9-12 mm long, rotate, inner surface sparsely stellate-hairy.

**FRUIT:** Fruit a spherical berry, 1 per infructescence, 1.5-3 cm in diameter, the pericarp smooth, dark green with pale green and cream markings when young, yellow at maturity, glabrous; fruiting pedicels 1.5-2.2 cm long, 1.5-3 mm in diameter at base, woody, pendulous, with 0-5 prickles; fruiting calyx lobes elongating to 9-15 mm long, 1/4-1/3 the length of the mature fruit, reflexed, with 2-30 prickles.

**SEEDS:** ca. 50-150 per berry, 2.4-2.8 mm long, 1.8-2.2 mm wide, flattened-reniform, orange-brown.

**Habitat:**

Usually found in moist habitats, sometimes associated with disturbance, degraded scrubland and secondary vegetation.

**Distribution:**

Native to Southcentral Asia: Afghanistan, India and Pakistan.

**Altitude:** 0 - 500 m

<i>Solanum insanum</i>	May be confused with: <i>Solanum incanum</i>
Prickles 0.5-5 mm at the base; leaves 2.5-12 cm long by 1.3-8 cm wide.	Prickles 1.5-6 mm at the base; leaves 6-22 cm long by 4-15 cm wide.

Reported from Pakistan  
but no localities known

All populations priority for  
collection

Primary Gene Pool relative of *Solanum melongena*



RBG Kew



RBG Kew



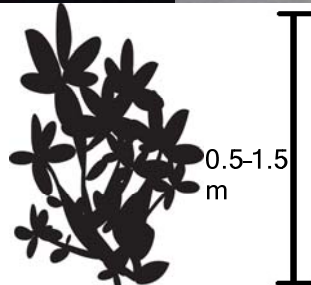
RBG Kew



RBG Kew



RBG Kew



Jan - Dec

Jan - Dec

**HABIT:** Herbs erect or creeping, sometimes woody at base, 0.5-0.7 m tall, copiously armed with sturdy, needlelike, broad-based prickles 0.5-2 cm × 0.5-1.5 mm, pubescent with 7-9-rayed stellate hairs, overall glabrescent.

**LEAVES:** Unequal paired; petiole 2-3.5 cm, prickly, with sessile stellate hairs; leaf blade ovate-oblong, 4-9 × 2-4.5 cm, pubescent and prickly along veins, glabrescent, base subcordate or unequal, margin usually 5-9-lobed or pinnately parted, lobes unequal, sinuate, apex acute.

**INFLORESCENCE:** Elongate racemes 4-7 cm, peduncle unbranched, copiously armed. Pedicel ca. 1 cm.

**FLOWER:** Calyx campanulate, ca. 1 cm in diam.; lobes oblong, pubescent, prickly. Corolla blue-purple, rotate, 1.4-1.6 × 2.5 cm; lobes ovate-deltate, 6-8 mm, densely pubescent with stellate hairs. Filaments ca. 1 mm; anthers ca. 8 mm. Style ca. 1 cm.

**FRUIT:** Fruiting pedicel 2-3.6 cm, with prickles and sparse stellate hairs. Fruiting calyx prickly, sparsely pubescent. Berry pale yellow, 1.3-2.2 cm in diam.

**SEEDS:** Subreniform, ca. 1.5 mm in diam.

**Habitat:**

Sandy river beaches.

**Distribution:**

China, Afghanistan, India, S Japan, Malaysia, Nepal, Sri Lanka, Thailand, Vietnam; Africa, SW Asia, Pacific Islands.

**Altitude:** 100 -1300 m

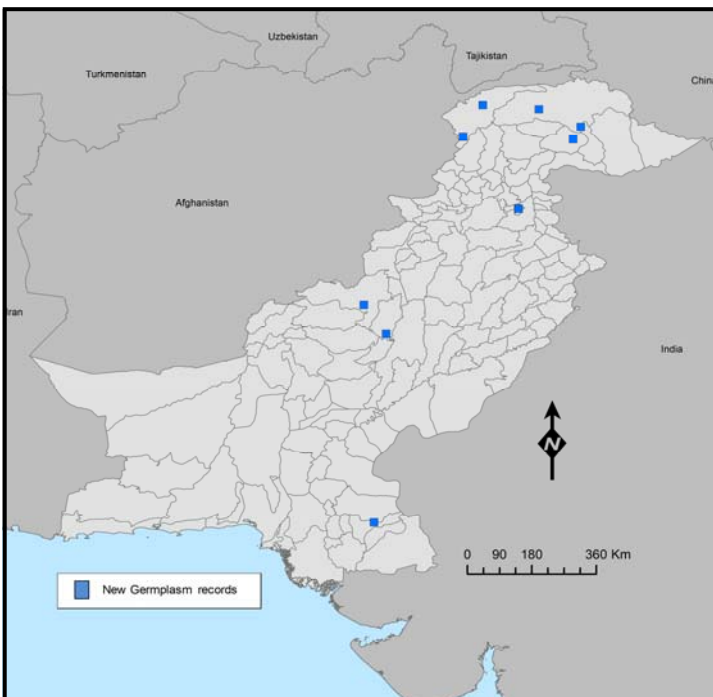
*Solanum virginianum*

May be confused with:  
*Solanum violaceum*

Prickles straight and needle-like.  
Berry pale yellow.



Prickles recurved. Berry orange.



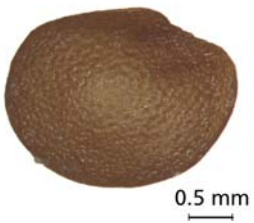
All populations priority for  
collection

**References:** Flora of China [http://www.efloras.org/florataxon.aspx?flora\\_id=2&taxon\\_id=200020613](http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200020613)

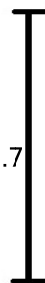
Tertiary Gene Pool relative of *Solanum melongena* L.



Gemma Toothill (c) Board of Trustees RBG Kew



0.5-0.7 m



Nov - May

Jun - Sep

# Appendix - Synonyms

Taxon		Synonyms
<i>Daucus carota</i> subsp. <i>carota</i>	1	No Synonyms
<i>Ipomoea caracea</i>	2	<i>Batatas cavanillesii</i> (Roem. & Schult.) G. Don; <i>Batatas senegalensis</i> G. Don; <i>Convolvulus cairicus</i> L.; <i>Convolvulus cavanillesii</i> (Roem. & Schult.) Spreng.; <i>Convolvulus limphaticus</i> Vell.; <i>Ipomoea cavanillesii</i> Roem. & Schult.; <i>Ipomoea funaria</i> Larrañaga; <i>Ipomoea heptaphylla</i> Griseb.; <i>Ipomoea pentaphylla</i> Cav.; <i>Ipomoea rosea</i> var. <i>pluripartita</i> Hassl.; <i>Ipomoea senegalensi</i> Lam.; <i>Ipomoea vesiculosa</i> P. Beauv.
<i>Cajanus crassus</i>	3	<i>Atylosia crassa</i> Prain ex King; <i>Atylosia volubilis</i> (Blanco) Gamble; <i>Cantharospermum volubile</i> (Blanco) Merr.; <i>Cantharospermum volubilis</i> (Blanco) Merr.
<i>Cajanus mollis</i>	4	<i>Atylosia mollis</i> "Benth., p.p. B"; <i>Cantharospermum molle</i> (Benth.) Taub.; <i>Cantharospermum molle</i> (Benth.) Taub. ; <i>Collaea mollis</i> Wall.
<i>Cajanus platycarpus</i>	5	<i>Atylosia geminiflora</i> Dalz.; <i>Atylosia platycarpa</i> Benth.; <i>Cantharospermum distans</i> Royle ex Baker; <i>Cantharospermum geminiflorum</i> (Dalz.) Raiz.; <i>Cantharospermum platycarpum</i> (Benth.) Raiz.
<i>Cajanus scarabaeoides</i>	6	<i>Dolichos scarabaeoides</i> L.; <i>Atylosia pauciflora</i> (Wight & Arnott) Druce; <i>Atylosia scarabaeoides</i> (Linnaeus) Bentham; <i>Atylosia scarabaeoides</i> var. <i>argyrophyllus</i> Y. T. Wei & S. K. Lee; <i>Cajanus scarabaeoides</i> var. <i>argyrophyllus</i> (Y. T. Wei & S. K. Lee) Y. T. Wei & S. K. Lee; <i>Cantharospermum pauciflorum</i> Wight & Arnott; <i>Cantharospermum scarabaeoides</i> (Linnaeus) Baillon; <i>Dolichos medicagineus</i> Roxburgh; <i>Dolichos minutus</i> Wight & Arnott; <i>Rhynchosia biflora</i> Candolle; <i>Rhynchosia scarabaeoides</i> (Linnaeus) Candolle; <i>Stizolobium scarabaeoides</i> (Linnaeus) Sprengel
<i>Cicer acanthophyllum</i>	7	<i>Cicer garanicum</i> Boriss.
<i>Cicer macracanthum</i>	8	<i>Cicer songaricum</i> (DC.) Bunge var. <i>spinosum</i> Aitch.
<i>Cicer microphyllum</i>	9	No Synonyms
<i>Cicer nuristanicum</i>	10	No Synonyms
<i>Lathyrus hirsutus</i>	11	No Synonyms
<i>Lens culinaris</i> subsp. <i>orientalis</i>	12	<i>Ervum orientale</i> Boiss.; <i>Lens orientalis</i> (Boiss.) Hand. Mazz.
<i>Medicago sativa</i> L. subsp. <i>falcata</i>	13	<i>Medicago falcata</i> L.

# Appendix - Synonyms

<p><i>Vicia sativa</i> L. subsp. <i>nigra</i></p>	<p>14</p>	<p><i>Vicia angustifolia</i> L.; <i>Vicia angustifolia</i> subsp. <i>angustifolia</i> L.; <i>Vicia angustifolia</i> subsp. <i>pusilla</i> Boiss.; <i>Vicia angustifolia</i> var. <i>segetalis</i> (Thuill.) Arcang.; <i>Vicia angustifolia</i> subsp. <i>segetalis</i> (Thuill.) Arcang.; <i>Vicia angustifolia</i> var. <i>uncinata</i> (Desv.) Rouy; <i>Vicia bobartii</i> E.Forst.; <i>Vicia bobartii</i> Koch; <i>Vicia canadensis</i> Zuccagni; <i>Vicia cuneata</i> Guss.; <i>Vicia debilis</i> Perez Lara; <i>Vicia heterophylla</i> C.Presl; <i>Vicia lanciformis</i> Lange; <i>Vicia maculata</i> C.Presl; <i>Vicia pilosa</i> M.Bieb.; <i>Vicia sativa</i> var. <i>angustifolia</i> (L.) Wahlb.; <i>Vicia sativa</i> var. <i>angustifolia</i> L.; <i>Vicia sativa</i> subsp. <i>angustifolia</i> (L.) Gaudin; <i>Vicia sativa</i> subsp. <i>angustifolia</i> (L.) Batt.; <i>Vicia sativa</i> subsp. <i>consobrina</i> (Pomel) Quezel &amp; Santa; <i>Vicia sativa</i> subsp. <i>cordata</i> (Hoppe) Batt.; <i>Vicia sativa</i> subsp. <i>cuneata</i> (Guss.) Maire; <i>Vicia sativa</i> subsp. <i>heterophylla</i> (C.Presl) J.Duvign.; <i>Vicia sativa</i> var. <i>minor</i> (Bertol.) Ohwi; <i>Vicia sativa</i> var. <i>nigra</i> L.; <i>Vicia segatalis</i> Thuill.</p>
<p><i>Aegilops cylindrica</i></p>	<p>15</p>	<p><i>Aegilops cylindrica</i> Host subsp. <i>pauciaristata</i> Eig; <i>Cylindropyrum cylindricum</i> (Host) A. Love; <i>Cylindropyrum cylindricum</i> (Host) A. Love subsp. <i>pauciaristatum</i> (Eig) A. Love; <i>Triticum cylindricum</i> (Host) Ces.</p>
<p><i>Aegilops tauschii</i></p>	<p>16</p>	<p><i>Aegilops squarrosa</i> L. misapplied by Cav.; <i>Aegilops squarrosa</i> L. var. <i>anathera</i> Eig; <i>Aegilops squarrosa</i> L. var. <i>meyeri</i> Griseb.; <i>Aegilops squarrosa</i> L. subsp. <i>salinum</i> Zhuk.; <i>Aegilops squarrosa</i> L. subsp. <i>strangulata</i> Eig; <i>Aegilops tauschii</i> Coss. var. <i>anathera</i> (Eig) K. Hammer; <i>Aegilops tauschii</i> Coss. var. <i>meyerii</i> (Griseb.) Tzvelev; <i>Aegilops tauschii</i> Coss. subsp. <i>strangulata</i> (Eig) Tzvelev; <i>Aegilops tauschii</i> Coss. subsp. <i>tauschii</i>; <i>Patropyrum tauschii</i> (Coss.) A.Love; <i>Patropyrum tauschii</i> (Coss.) A. Love subsp. <i>salinum</i> (Zhuk.) A.Love; <i>Patropyrum tauschii</i> (Coss.) A. Love subsp. <i>strangulata</i> (Eig) A.Love; <i>Triticum tauschii</i> (Coss.) Schmalh.</p>
<p><i>Aegilops triuncialis</i> var. <i>triuncialis</i></p>	<p>17</p>	<p><i>Aegilopodes triuncialis</i> (L.) A.Love; <i>Aegilops elongata</i> Lam.; <i>Aegilops squarrosa</i> L.; <i>Aegilops triuncialis</i> L. var. <i>assyriaca</i> Eig; <i>Aegilops triuncialis</i> L. subsp. <i>triuncialis</i>; <i>Triticum triunciale</i> (L.) Raspail</p>
<p><i>Avena barbata</i></p>	<p>18</p>	<p><i>Avena agadiriana</i> B.R.Baum &amp; G.Fedak; <i>Avena alba</i> var. <i>barbata</i> (Link) Maire &amp; Weiller; <i>Avena almeriensis</i> Gand.; <i>Avena atheranthera</i> C.Presl; <i>Avena atlantica</i> B.R.Baum &amp; G.Fedak; <i>Avena canariensis</i> B.R.Baum, Rajhathy &amp; D.R.Sampson; <i>Avena cypria</i> Sibth.; <i>Avena damascena</i> Rajhathy &amp; B.R.Baum; <i>Avena hirsuta</i> Roth; <i>Avena hirtula</i> Lag.; <i>Avena hoppeana</i> Scheele; <i>Avena lagascae</i> Sennen; <i>Avena lusitanica</i> (Tab.Morais) B.R.Baum; <i>Avena malzevii</i> Tzvelev; <i>Avena matritensis</i> B.R.Baum; <i>Avena maxima</i> C.Presl; <i>Avena sallentiana</i> Pau; <i>Avena sativa</i> var. <i>barbata</i> (Pott ex Link) Fiori; <i>Avena serrulatiglumis</i> Sennen &amp; Mauricio; <i>Avena wiestii</i> Steud; <i>Avena matritensis</i> B.R.Baum; <i>Avena lusitanica</i> (Tab. Morais) B.R.Baum</p>



# Appendix - Synonyms

<p><i>Avena fatua</i></p>	<p>19</p>	<p><i>Anelytrum avenaceum</i> Hack.; <i>Avena ambigua</i> Schoenb.; <i>Avena cultiformis</i> (Malzev) Malzev; <i>Avena fatua</i> subsp. <i>brevipilosa</i> Kiec; <i>Avena fatua</i> subsp. <i>cultiformis</i> Malzev; <i>Avena fatua</i> subsp. <i>glabrata</i> (Peterm.) Piper &amp; Beattie; <i>Avena fatua</i> subsp. <i>meridionalis</i> Malzev; <i>Avena fatua</i> subsp. <i>septentrionalis</i> (Malzev) Malzev; <i>Avena fatua</i> subvar. <i>naniformis</i> Yamag.; <i>Avena fatua</i> subvar. <i>pseudonana</i> Yamag.; <i>Avena fatua</i> subvar. <i>pumila</i> Yamag.; <i>Avena fatua</i> subvar. <i>zine</i> Yamag.; <i>Avena fatua</i> var. <i>acidophila</i> Kiec; <i>Avena fatua</i> var. <i>alcaliphila</i> Kiec; <i>Avena fatua</i> var. <i>alta</i> Kiec; <i>Avena fatua</i> var. <i>altissima</i> Kiec; <i>Avena fatua</i> var. <i>elongata</i> Malzev; <i>Avena fatua</i> var. <i>glabrata</i> Peterm.; <i>Avena fatua</i> var. <i>glabrescens</i> Coss. &amp; Durieu; <i>Avena fatua</i> var. <i>gravis</i> Kiec; <i>Avena fatua</i> var. <i>hyugaensis</i> Yamag.; <i>Avena fatua</i> var. <i>intermedia</i> (T.Lestib.) Lej. &amp; Courtois; <i>Avena fatua</i> var. <i>leiocarpa</i> Malzev; <i>Avena fatua</i> var. <i>levis</i> Kiec; <i>Avena fatua</i> var. <i>longiflora</i> Malzev; <i>Avena fatua</i> var. <i>longispiculata</i> Malzev; <i>Avena fatua</i> var. <i>mollis</i> Keng; <i>Avena fatua</i> var. <i>nipponica</i> Yamag.; <i>Avena fatua</i> var. <i>pilosa</i> Syme; <i>Avena fatua</i> var. <i>pilosiformis</i> Yamag.; <i>Avena fatua</i> var. <i>pilosissima</i> Gray; <i>Avena fatua</i> var. <i>pseudoculta</i> Malzev; <i>Avena fatua</i> var. <i>vilis</i> (Wallr.) Hausskn.; <i>Avena hybrida</i> Peterm.; <i>Avena intermedia</i> Lindgr.; <i>Avena intermedia</i> T.Lestib.; <i>Avena japonica</i> Steud.; <i>Avena lanuginosa</i> Gilib.; <i>Avena ludoviciana</i> subvar. <i>glabrescens</i> (Durieu ex Godr.) Husn.; <i>Avena ludoviciana</i> var. <i>glabrescens</i> Durieu ex Godr.; <i>Avena meridionalis</i> (Malzev) Roshev.; <i>Avena meridionalis</i> var. <i>grandis</i> Roshev.; <i>Avena nigra</i> Wallr.; <i>Avena occidentalis</i> Durieu; <i>Avena patens</i> St.-Lag.; <i>Avena pilosa</i> Scop.; <i>Avena sativa</i> subsp. <i>fatua</i> (L.) Fiori; <i>Avena sativa</i> var. <i>fatua</i> (L.) Fiori; <i>Avena sativa</i> var. <i>sericea</i> Hook.f.; <i>Avena septentrionalis</i> Malzev; <i>Avena sterilis</i> Delile ex Boiss.; <i>Avena sterilis</i> subvar. <i>glabrescens</i> (Durieu ex Godr.) Husn.; <i>Avena sterilis</i> var. <i>glabrescens</i> (Durieu ex Godr.) Malzev; <i>Avena vilis</i> Wallr.</p>
<p><i>Avena hybrida</i></p>	<p>20</p>	<p><i>Avena fatua</i> var. <i>hybrida</i> (Peterm.) Aschers.; <i>Avena intermedia</i> Lestib.; <i>Avena fatua</i> var. <i>intermedia</i> (Lestib.) Lej. et Court; <i>Avena vilis</i> Wallr.; <i>Avena intermedia</i> Lindgr.; <i>Avena japonica</i> Steud.; <i>Avena fatua</i> var. <i>glabra</i> Ducomm.; <i>Avena fatua</i> var. <i>intermedia</i> (Lindgr.) Ducomm.; <i>Avena fatua</i> var. <i>contracta</i> Hausskn.; <i>Avena fatua</i> var. <i>villis</i> (Wallr.) Hausskn.; <i>Avena fatua</i> var. <i>intermedia</i> (Lindgr.) Husnot; <i>Avena fatua</i> var. <i>glabrescens</i> Tourlet; <i>Avena septentrionalis</i> Malz.; <i>Avena fatua</i> ssp. <i>fatua</i> f. <i>hybrida</i> (Peterm.) Thell.; <i>Avena fatua</i> ssp. <i>fatua</i> f. <i>intermedia</i> (Lestib.) Thell.; <i>Avena fatua</i> ssp. <i>meridionalis</i> Malz.; <i>Avena fatua</i> ssp. <i>septentrionalis</i> (Malz.) Malz.; <i>Avena fatua</i> ssp. <i>fatua</i> var. <i>vilis</i> (Wallr.) Malz.; <i>Avena fatua</i> ssp. <i>meridionalis</i> var. <i>elongata</i> Malz.; <i>Avena fatua</i> ssp. <i>meridionalis</i> var. <i>grandis</i> Malz.; <i>Avena fatua</i> ssp. <i>meridionalis</i> var. <i>grandis</i> subv. <i>scabriuscula</i> Malz.; <i>Avena fatua</i> ssp. <i>meridionalis</i> var. <i>longiflora</i> Malz.; <i>Avena fatua</i> ssp. <i>meridionalis</i> var. <i>longispiculata</i> Malz.; <i>Avena fatua</i> ssp. <i>septentrionalis</i> var. <i>glabella</i> Malz.; <i>Avena fatua</i> ssp. <i>septentrionalis</i> var. <i>glabripaleata</i> Malz.; <i>Avena fatua</i> ssp. <i>septentrionalis</i> var. <i>sparsepilosa</i> Malz.; <i>Avena fatua</i> ssp. <i>septentrionalis</i> var. <i>valdepilosa</i> Malz. <i>Avena meridionalis</i> (Malz.) Roshev. [Synonymy from Baum (1977); The Plant List considers this species to be a synonym of <i>Avena fatua</i> L.]</p>

# Appendix - Synonyms

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Avena sterilis	21	Avena fatua var. sterilis (L.) Fiori & Paol.; Avena macrocarpa Moench; Avena nutans St.-Lag.; Avena sativa var. sterilis (L.) Fiori; Avena sterilis subsp. macrocarpa Briq.
Avena trichophylla	22	Most sources consider this name to be a synonym of Avena sterilis subsp. ludoviciana (Durieu) Gillet & Magne
Cenchrus orientalis	23	Pennisetum orientale (Rich.) Willd.; Alopecurus hordeiformis Willd. ex Steud.; Cenchrus orientalis (Pers.) Willd. ex Kunth; Cenchrus orientalis (Rich.) Morrone; Panicum orientale (Rich.) Willd.; Pennisetum fasciculatum Trin.; Pennisetum griffithii Munro ex Hook.f.; Pennisetum orientale var. fasciculatum (Trin.) Leeke; Pennisetum orientale var. triflorum (Nees ex Steud.); Pennisetum persicum Boiss. & Buhse; Pennisetum phalariforme Steud.; Pennisetum setaceum subsp. orientale (Rich.) Maire; Pennisetum setaceum var. orientale (Rich.) Maire; Pennisetum sinaicum Decne.; Pennisetum tenue Fig. & De Not.; Pennisetum triflorum Nees ex Steud.; Pennisetum variabile Fig. & De Not.
Chloris flagellifera	24	Eleusine arabica Hochst. ex Steud.; Eleusine caespitosa A.Rich.; Eleusine compressa (Forssk.) Asch. & Schweinf. ex C.Chr.; Eleusine flagellifera Nees; Eleusine stolonifera R.Br.; Ochthochloa dactyloides Edgew.; Panicum compressum Forssk.; Ochthochloa compressa (Forssk.) Hilu
Eleusine indica	25	Agropyron geminatum Schult. & Schult.f.; Chloris repens Steud.; Cynodon indicus (L.) Raspail; Cynosurus ara Buch.-Ham. ex Wall.; Cynosurus indicus L.; Cynosurus pectinatus Lam.; Eleusine distachya Trin. ex Steud.; Eleusine distans Link; Eleusine distans Moench; Eleusine domingensis Sieber ex Schult.; Eleusine glabra Schumach.; Eleusine gonantha Schrank; Eleusine gouinii E.Fourn.; Eleusine inaequalis E.Fourn.; Eleusine indica var. major E.Fourn.; Eleusine indica var. monostachya F.M.Bailey; Eleusine indica var. oligostachya Honda; Eleusine indica var. sandaensis Vanderyst; Eleusine japonica Steud.; Eleusine macrosperma Stokes; Eleusine marginata Lindl.; Eleusine polydactyla Steud.; Eleusine rigidifolia E.Fourn.; Eleusine scabra E.Fourn.; Eleusine textilis Welw.; Juncus loureiroana Schult. & Schult.f.; Leptochloa pectinata (Lam.) Kunth; Paspalum dissectum Kniph.; Poa spicata Willd. ex Steud.; Triticum geminatum Spreng.
Hordeum bogdanii	26	Critesion bogdanii (Wilensky) Á.Löve; Hordeum secalinum var. bogdanii (Wilensky) Roshev.

# Appendix - Synonyms

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<p><i>Hordeum brevisubulatum</i></p>	<p>27</p>	<p><i>Critesion brevisubulatum</i> (Trin.) Á.Löve; <i>Critesion brevisubulatum</i> subsp. <i>nevskianum</i> (Bowden) Á.Löve; <i>Critesion brevisubulatum</i> subsp. <i>turkestanicum</i> (Nevski) Á.Löve; <i>Critesion iranicum</i> (Bothmer) Á.Löve; <i>Critesion nevskianum</i> (Bowden) Tzvelev; <i>Critesion turkestanicum</i> (Nevski) Tzvelev; <i>Critesion violaceum</i> (Boiss. &amp; Hohenacker) Á.Löve; <i>Hordeum brevisubulatum</i> var. <i>hirtellum</i> Z.S.Qin &amp; S.D.Zhao; <i>Hordeum brevisubulatum</i> subsp. <i>iranicum</i> Bothmer; <i>Hordeum brevisubulatum</i> subsp. <i>nevskianum</i> (Bowden) Tzvelev; <i>Hordeum brevisubulatum</i> var. <i>nevskianum</i> (Bowden) Tzvelevonym; <i>Hordeum brevisubulatum</i> var. <i>nevskianum</i> (Bowden) C. Yen &amp; J.L. Yang; <i>Hordeum brevisubulatum</i> var. <i>puberulum</i> (Krylov) Melderis; <i>Hordeum brevisubulatum</i> subsp. <i>turkestanicum</i> (Nevski) Tzvelev; <i>Hordeum brevisubulatum</i> var. <i>turkestanicum</i> (Nevski) P.C.Kuo; <i>Hordeum brevisubulatum</i> subsp. <i>violaceum</i> (Boiss. &amp; Huet) Tzvelev; <i>Hordeum iranicum</i> (Bothmer) Tzvelev; <i>Hordeum macilentum</i> Steud.; <i>Hordeum nevskianum</i> Bowden; <i>Hordeum secalinum</i> subsp. <i>brevisubulatum</i> (Trin.) Krylov; <i>Hordeum secalinum</i> var. <i>brevisubulatum</i> Trin.; <i>Hordeum secalinum</i> f. <i>puberulum</i> Krylov; <i>Hordeum turkestanicum</i> Nevski; <i>Hordeum turkestanicum</i> var. <i>iranicum</i> (Bothmer) C. Yen &amp; J.L. Yang; <i>Hordeum violaceum</i> Boiss. &amp; Hohen.</p>
<p><i>Hordeum marinum</i></p>	<p>28</p>	<p><i>Hordeum berterioanum</i> É.Desv.; <i>Hordeum caudatum</i> V.Jirásek; <i>Hordeum marinum</i> subsp. <i>marinum</i>; <i>Hordeum marinum</i> var. <i>pubescens</i> (Guss.) Nevski; <i>Hordeum maritimum</i> Stokes [Illegitimate]; <i>Hordeum maritimum</i> var. <i>annuum</i> (Lange) Maire &amp; Weiller; <i>Hordeum maritimum</i> var. <i>pubescens</i> (Guss.) Woods; <i>Hordeum pratense</i> var. <i>annuum</i> Lange; <i>Hordeum pubescens</i> Guss.; <i>Hordeum rigidum</i> Roth; <i>Hordeum winkleri</i> Hack.; <i>Zeocriton rigidum</i> (Roth) P.Beauv.</p>
<p><i>Hordeum murinum</i></p>	<p>29</p>	<p><i>Critesion murinum</i> (L.) Á.Löve; <i>Critesion murinum</i> subsp. <i>murinum</i>; <i>Hordeum boreale</i> Gand.; <i>Hordeum coleophorum</i> Phil.; <i>Hordeum delphicum</i> Gand.; <i>Hordeum depilatum</i> Gand.; <i>Hordeum dilatatum</i> Gand.; <i>Hordeum elongatum</i> Gand.; <i>Hordeum flexicaule</i> Gand.; <i>Hordeum hohenackeri</i> Gand.; <i>Hordeum microcladum</i> Gand.; <i>Hordeum murinum</i> var. <i>glaucescens</i> Zapal.; <i>Hordeum murinum</i> var. <i>leptostachys</i> Trab.; <i>Hordeum murinum</i> var. <i>majus</i> Godr.; <i>Hordeum murinum</i> f. <i>montanum</i> Hack.; <i>Hordeum murinum</i> subsp. <i>montanum</i> (Hack.) H.Scholz &amp; Raus; <i>Hordeum murinum</i> subsp. <i>murinum</i>; <i>Hordeum murinum</i> subsp. <i>setarium</i> H.Scholz &amp; Raus; <i>Hordeum murinum</i> var. <i>simulans</i> Bowden; <i>Hordeum neglectum</i> Gand.; <i>Hordeum pseudomurinum</i> Tapp. ex W.D.J.Koch; <i>Hordeum rubens</i> Willk.; <i>Hordeum vaginatum</i> K.Koch; <i>Triticum murale</i> Salisb. [Illegitimate]; <i>Zeocriton murinum</i> (L.) P.Beauv.</p>
<p><i>Oryza coarctata</i></p>	<p>30</p>	<p><i>Indoryza coarctata</i> (Roxb.) A.N.Henry &amp; B.Roy; <i>Oryza triticoides</i> Griff.; <i>Porteresia coarctata</i> (Roxb.) Tateoka; <i>Sclerophyllum coarctatum</i> (Roxb.) Griff.</p>

# Appendix - Synonyms

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Secale cereale subsp. afghanicum	31	Secale afghanicum (Vavilov) Roshev.; Secale ancestrale var. afghanicum (Vavilov) IVAN & Yakovlev; Secale segetale subsp. afghanicum (Vavilov) Bondar ex Korovina; Secale segetale var. afghanicum (Vavilov) Tzvelev
Sorghum halepense	32	Andropogon controversus Steud.; Andropogon halepensis (L.) Brot.; Andropogon miliformis Schult.; Andropogon miliaceus Roxb.; Holcus sorghum L. var. exiguus (Forssk.) Hitchc.; Holcus exiguus Forssk.; Andropogon halepensis (L.) Brot. var. anatherus Piper; Holcus halepensis L.; Holcus halepensis L. var. miliformis (Schult.) Hitchc.; Sorghum miliaceum (Roxb.) Snowden; Sorghum miliaceum (Roxb.) Snowden var. parvispicula Snowden; Sorghum controversum (Steud.) Snowden
Sorghum nitidum	33	Andropogon serratus Thunb.; Holcus fulvus R. Br.; Holcus nitidus Vahl; Sorghum fulvum (R. Br.) P. Beauv. ex Rendle.
Thinopyrum intermedium	34	Agropyron aucheri Boiss., Agropyron barbulatum Schur, Agropyron glaucum (Desf.) Roem. & Schult., Agropyron intermedium (Host) Beauv., Agropyron intermedium (Host) Beauv. var. trichophorum (Link) Halac., Agropyron intermedium (Host) P. Beauv., Agropyron intermedium var. trichophorum (Link) Hal., Agropyron trichophorum (Link) K. Richt., Agropyron trichophorum (Link) Richter, Elymus hispidus (Opiz) Melderis, Elymus hispidus (Opiz) Melderis ssp. barbulatus (Schur) Melderis, Elymus hispidus (Opiz) Melderis var. ruthenicus (Griseb.) Dorn, Elymus hispidus subsp. barbulatus (Schur) Melderis, Elymus hispidus subsp. hispidus, Elytrigia intermedia (Host) Nevski, Elytrigia intermedia (Host) Nevski ssp. barbulata (Schur) A. L?ve, Elytrigia intermedia (Host) Nevski ssp. trichophora (Link) Tzel, Elytrigia intermedia (Host) Nevski subsp. intermedia, Elytrigia intermedia subsp. barbulata (Schur). Love, Elytrigia trichophora (Link) Nevski, Thinopyrum intermedium (Host) Barkworth & D. R. Dewey, Thinopyrum intermedium (Host) Barkworth & D.R. Dewey ssp. barbulatum (Schur) Barkworth & D.R. Dewey, Thinopyrum intermedium subsp. barbulatum (Schur) Barkworth & D. R. Dewey, Triticum intermedium Host [basionym], Triticum trichophorum Link
Malus chitralensis	35	Malus pumila
Solanum insanum	36	No Synonyms
Solanum virginianum	37	Solanum xanthocarpum Schrad.; Solanum surattense Burm. f.