

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

Nepal



Seed Collecting Guide

Please cite this guide as:
RBG Kew (2015) Nepal Seed Collecting Guide

NOTE: This guide has been abridged owing to copyright restrictions for selected images and/or datasets. Full, unabridged guides are only available from the Kew Millennium Seed Bank Library Archive. To request access to a full, unabridged guide, please contact the Seed Bank Librarian at msbplib@kew.org.

The content of this collecting guide is intended only as a general reference for future collecting missions; the contents and data within are not guaranteed to be complete, correct, timely, current or up-to-date at the time of publishing. For general information and resources on collecting crop wild relatives, visit cwrdiversity.org.

Cover photos

TOP LEFT: Rice, CREDIT: Neil Palmer/CIAT;

TOP RIGHT: Finger millet, CREDIT: RBG Kew;

BOTTOM LEFT: Pigeonpea pods, CREDIT: Swathi Sridharan/ICRISAT;

BOTTOM RIGHT: *Malus baccata*, CREDIT: D.E. Herman/USDA-NRCS PLANTS Database.

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/

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.

This work is licenced by RBG Kew (2015) under the Creative Commons CC BY-NC-ND 4.0 Licence. To view a copy of the licence visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>. If use in any further context is required please contact RBG Kew for permission. Copyright restrictions for the datasets and images used in the compilation remain as stated at their primary sources.

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



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



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 data set 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:

Ruth Harker
Collecting Guide Compiler
Conservation Science Department
Herbarium, Library Art & Archives
Royal Botanic Gardens, Kew
Richmond, Surrey,
TW9 3AB, United Kingdom
Email: r.harker@kew.org

Dr Ruth Eastwood
Crop Wild Relatives Project Co-ordinator
Millennium Seed Bank Partnership
Conservation Science Department
Royal Botanic Gardens, Kew
Wakehurst Place, Ardingly
West Sussex RH17 6TN, United Kingdom
Email: R.Eastwood@kew.org

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.

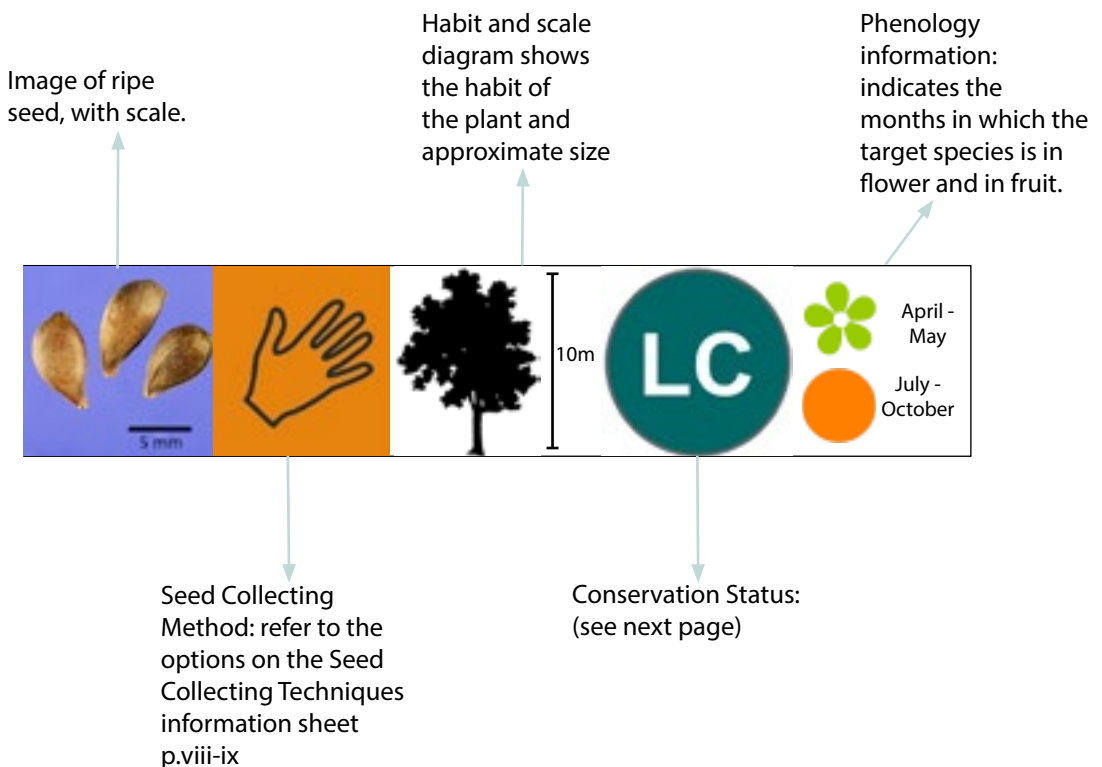
The species included in this guide are a selection of the wild relatives of the 29 key crops which this project covers (African rice, Alfalfa, Apple, Aubergine, Bambara groundnut, Banana, Barley, Bread wheat, Butter bean, Carrot, Chickpea, Common bean, Cowpea, Faba bean, Finger millet, Grasspea, Lentil, 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 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.

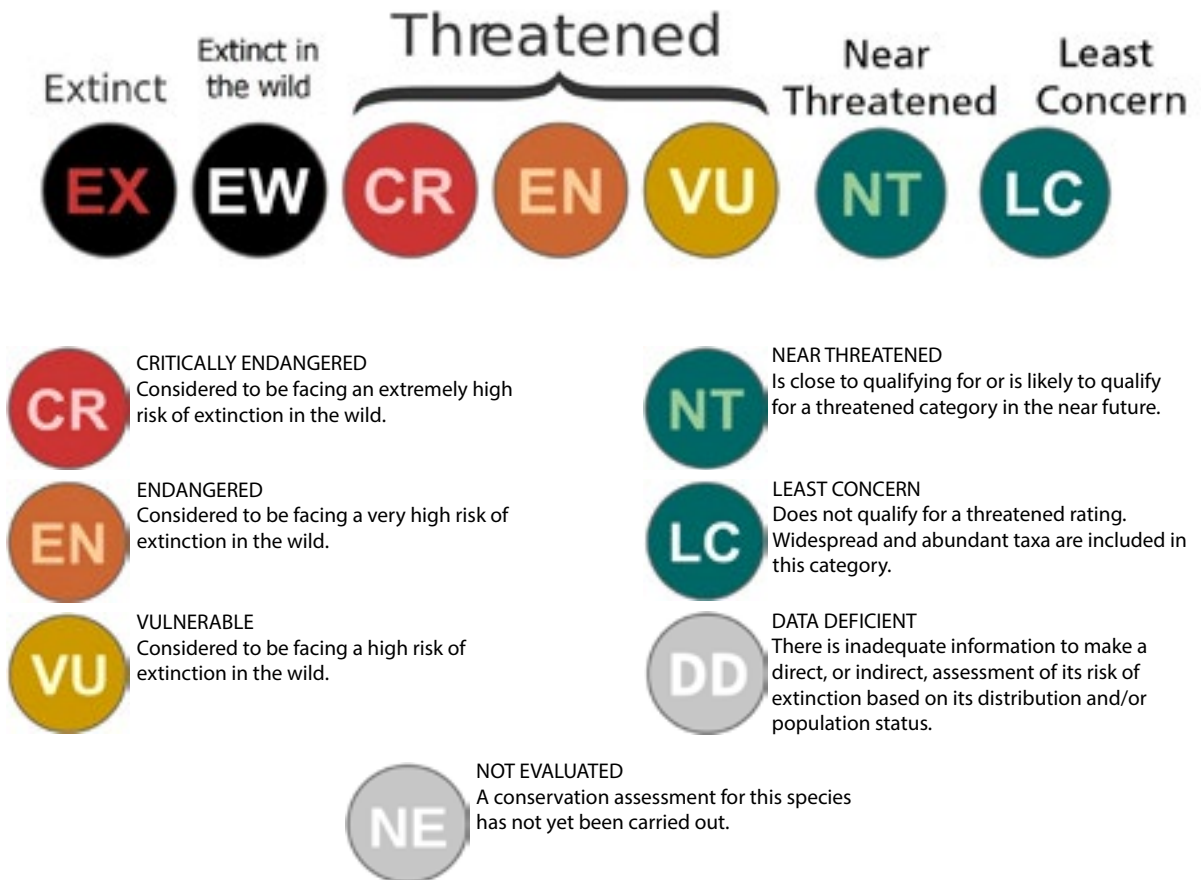
On each species profile, there is a collection of images to help identify the target species, accompanied by a series of symbols :



Conservation Assessments

Conservation Status:

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



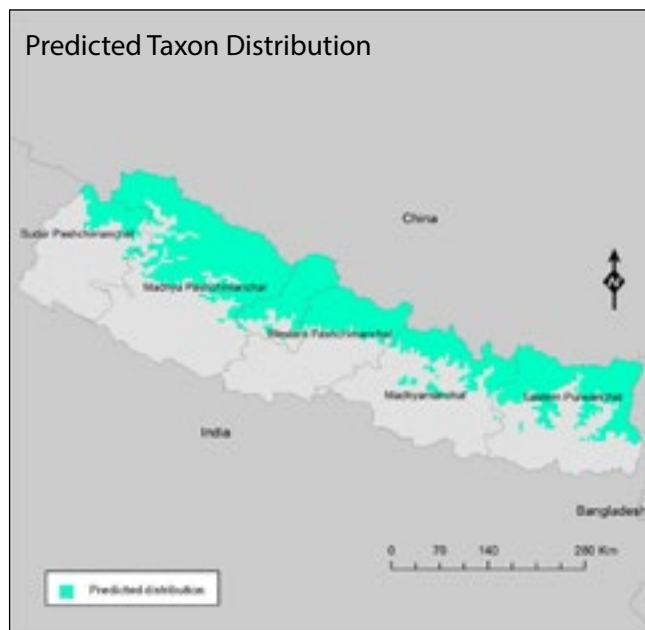
Where a full conservation assessment has not been completed, a preliminary conservation rating may be indicated. Preliminary assessments are produced using specimen locality data and GIS, which calculates two parameters accepted by IUCN as suitable measures of range: namely extent of occurrence (EOO) 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.



This data is also available online at www.cwrdiversity.org/distribution-map

Useful resources

These 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/sites/default/files/02-Assessing%20potential%20collection%20web.pdf>

- Post-harvest handling of seed collections:

http://www.kew.org/sites/default/files/04-Post%20harvest%20handling%20web_0.pdf

Other sheets covering the following topics are available from

<http://www.kew.org/science-conservation/research-data/resources/millennium-seed-bank-resources>

- 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

Seed Conservation: turning science into practice

Smith, R.D., Dickie, J.B., Linington, S.H., Pritchard, H.W., Probert, R.J. eds., 2003. Seed Conservation: Turning Science Into Practice. Royal Botanic Gardens, Kew, UK.

Collecting plant genetic diversity: Technical guidelines (Bioversity)

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

e-monocot

An online resource for monocot plants: www.e-monocot.org

For more information about the project, and to access the Harlan and de Wet Crop Wild Relatives inventory and Crop Wild Relatives Global Atlas please visit the website:

www.cwrdiversity.org

Identification Keys

Interactive identification keys can be accessed using the links below.

Kew Grassbase interactive identification key

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

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 seed-heads 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.

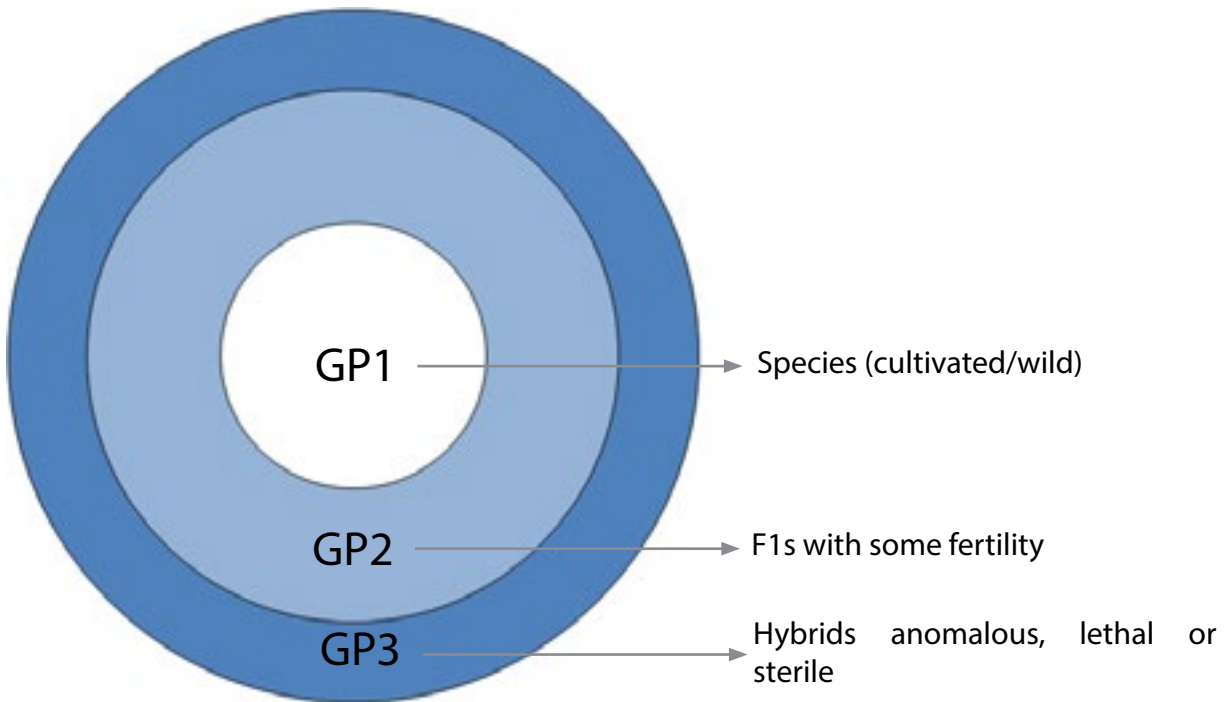
Label all seed containers inside and out with a unique collection number, and seal them securely. It is best to prepare sufficient labels before filling the containers.

How we define crop wild relatives

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

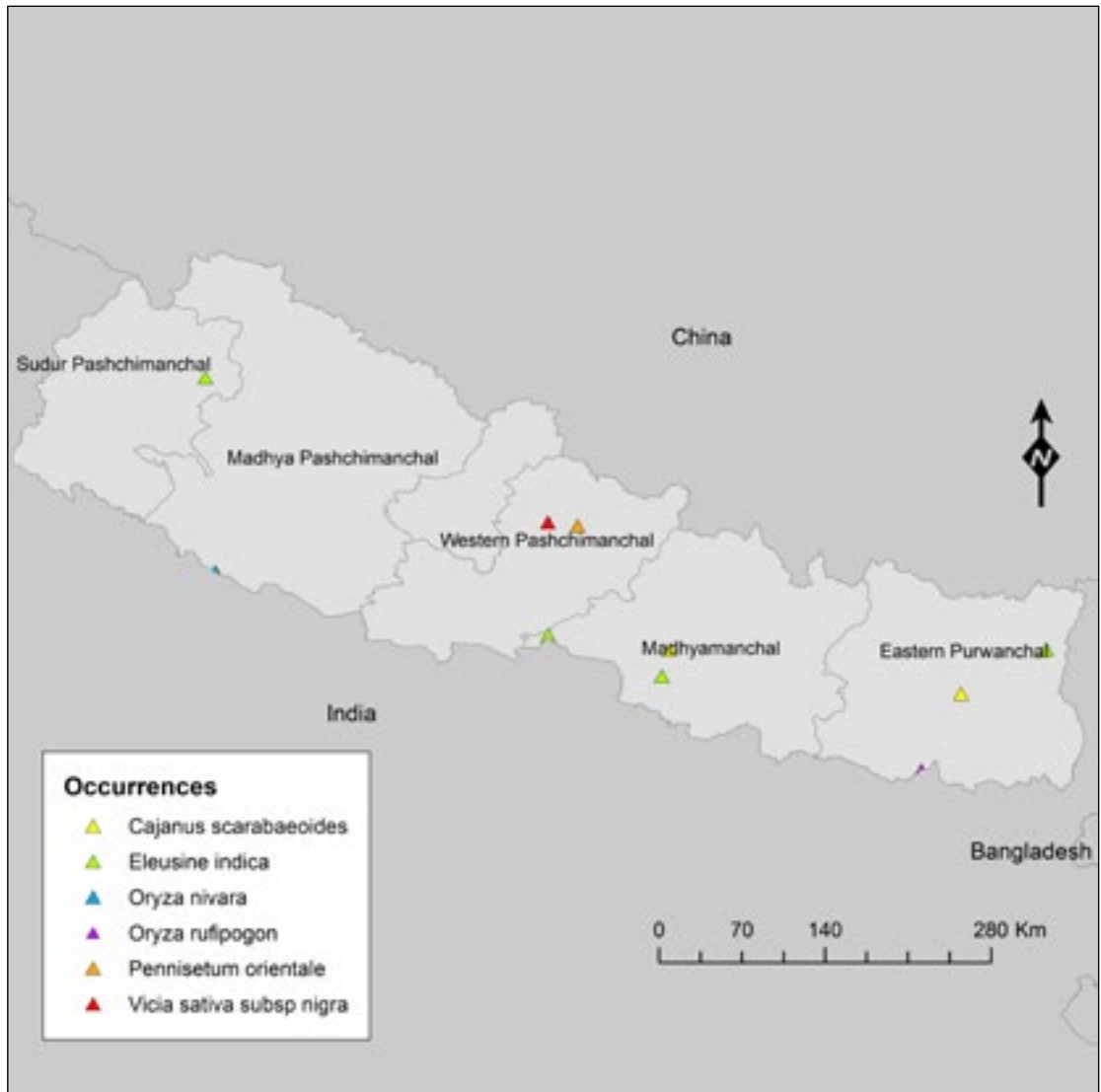
Taxon Group 2 – species in same series/section as crop

Taxon Group 3 – species in same subgenus as crop

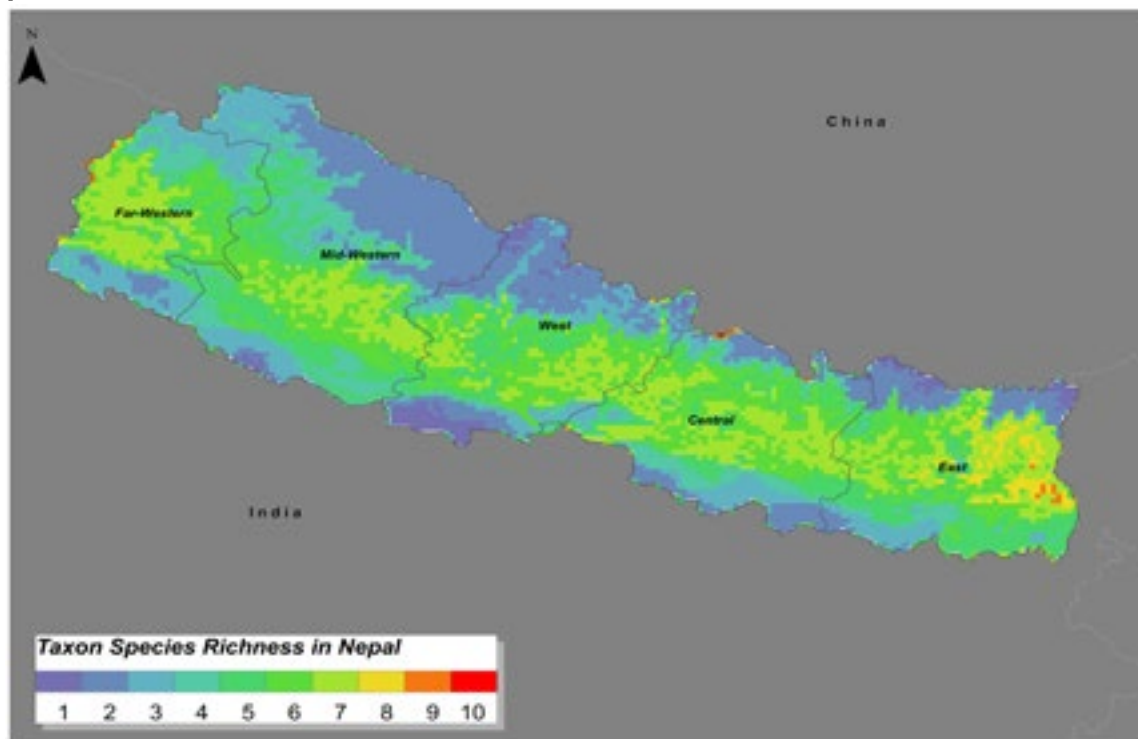
Harlan, J. and J. de Wet (1971). Towards a rational classification of cultivated plants. *Taxon* 20: 509-517.

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.

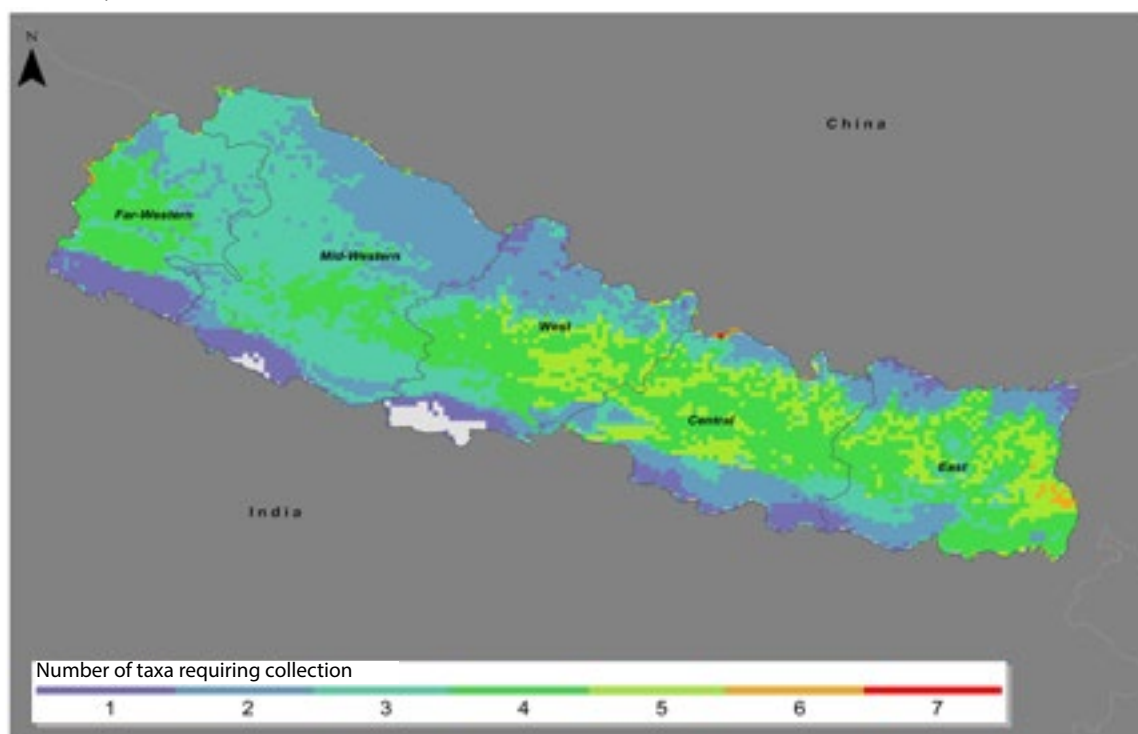
Occurrence data in Nepal



Species Richness



Priority Areas for Collection



Species in this guide

Species profiles are arranged alphabetically according to Family and Taxa.

Family	Taxon	Genepool	Collection Priority	Sheet
Apiaceae	<i>Daucus carota</i> subsp. <i>carota</i> L.	Carrot	Low	1
Convolvulaceae	<i>Ipomoea cairica</i> (L.) Sweet	Sweet potato	Low	2
Leguminosae	<i>Cajanus platycarpus</i> (Benth.) Maesen	Pigeon pea	Low	3
Leguminosae	<i>Cajanus scarabaeoides</i> (L.) Thouars	Pigeon pea	Low	4
Leguminosae	<i>Cicer microphyllum</i> Royle	Pigeon pea	Low	5
Leguminosae	<i>Medicago sativa</i> subsp. <i>falcata</i> (L.) Arcang.	Alfalfa	High	6
Leguminosae	<i>Phaseolus lunatus</i> L.	Bean	Low	7
Leguminosae	<i>Vigna nepalensis</i> Tateishi & Maxted	Cowpea	Low	8
Leguminosae	<i>Vicia sativa</i> L. subsp. <i>nigra</i> (L.) Ehrh.	Vetch	Low	9
Musaceae	<i>Ensete glaucum</i> (Roxb.) Cheesman	Banana	Low	10
Musaceae	<i>Musa balbisiana</i> var. <i>balbisiana</i> Colla	Banana	Low	11
Poaceae	<i>Avena barbata</i> Pott ex Link	Oat	Low	12
Poaceae	<i>Avena fatua</i> L.	Oat	Low	13
Poaceae	<i>Avena hybrida</i> Peterm.	Oat	Low	14
Poaceae	<i>Eleusine indica</i> (L.) Gaertn.	Finger millet	High	15
Poaceae	<i>Hordeum brevisubulatum</i> Link	Barley	High	16
Poaceae	<i>Hordeum vulgare</i> L. subsp. <i>spontaneum</i> (K. Koch) Thell.	Barley	Low	17
Poaceae	<i>Oryza meyeriana</i> var. <i>granulata</i> (Watt) Duist.	Rice	Low	18
Poaceae	<i>Oryza nivara</i> S.D.Sharma & Shastry Baill.	Rice	Low	19
Poaceae	<i>Oryza officinalis</i> Wall.	Rice	Low	20
Poaceae	<i>Oryza rufipogon</i> Griff.	Rice	Low	21
Poaceae	<i>Pennisetum orientale</i> Rich.	Pearl millet	High	22
Rosaceae	<i>Malus rockii</i> Rehder	Apple	Low	23
Rosaceae	<i>Malus sikkimensis</i> (Wenz.) Koehne ex C.K.Schneid.	Apple	High	24
Solanaceae	<i>Solanum campylacanthum</i> Hochst.	Eggplant	High	25
Solanaceae	<i>Solanum virginianum</i> L.	Eggplant	Low	26

Phenology table

Taxon	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<i>Daucus carota</i> subsp. <i>carota</i>					Green				Orange			
<i>Ipomoea cairica</i>					Orange	Green	Green				Green	Orange
<i>Cajanus platycarpus</i>							Green		Orange	Orange	Green	
<i>Cajanus scarabaeoides</i>										Orange		Orange
<i>Cicer microphyllum</i>												
<i>Medicago sativa</i> subsp. <i>falcata</i>						Green			Orange			
<i>Phaseolus lunatus</i>												
<i>Vigna nepalensis</i>							Green					
<i>Vicia sativa</i> subsp. <i>nigra</i>						Green	Orange					
<i>Ensete glaucum</i>						Green	Orange					
<i>Musa balbisiana</i> var. <i>balbisiana</i>					Green	Orange	Green				Green	Orange
<i>Avena barbata</i>						Green	Orange					
<i>Avena fatua</i>							Green	Orange				
<i>Avena hybrida</i>											Green	
<i>Eleusine indica</i>						Green	Orange					
<i>Hordeum brevisubulatum</i>							Green	Orange				
<i>Hordeum vulgare</i> subsp. <i>spontaneum</i>							Green	Orange				

Taxon	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<i>Oryza meyeriana</i> var. <i>granulata</i>												
<i>Oryza nivara</i>												
<i>Oryza officinalis</i>												
<i>Oryza rufipogon</i>												
<i>Pennisetum orientale</i>												
<i>Malus rockii</i>												
<i>Malus sikkimensis</i>												
<i>Solanum campylacanthum</i>												
<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

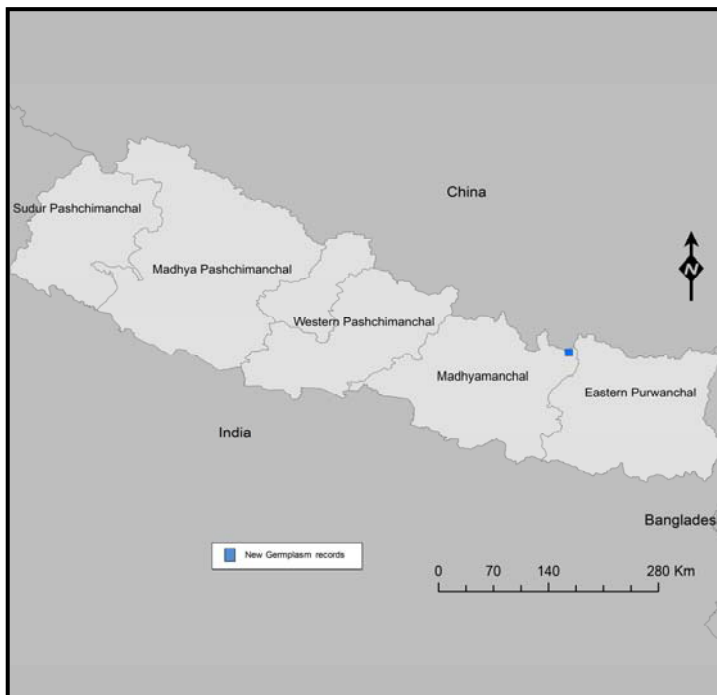
Daucus carota subsp. carota

May be confused with:

Daucus carota subsp. sativa

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

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



All populations priority
for collection.

References: Flora of China, Volume 14, p205 via www.efloras.org
http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200015518

APIACEAE

Primary Gene Pool relative of *Daucus carota* L.

Daucus carota subsp. *carota* L.
Queen Anne's Lace



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:

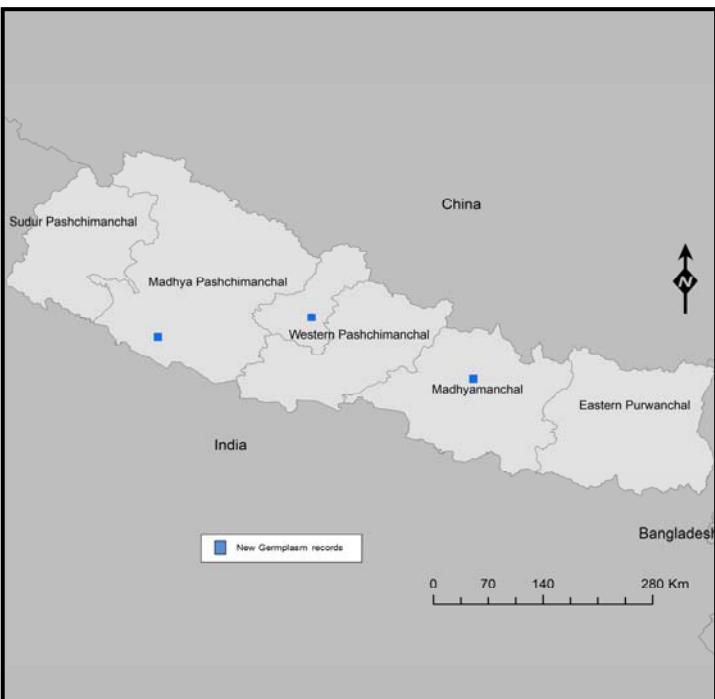
A common inhabitant of swampy grassland, riverine edges and roadsides, where it may cover extensive areas.

Distribution:

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

Altitude: Up to 1650 m

<i>Ipomoea cairica</i>	May be confused with: <i>Ipomoea batatas</i>
Deeply 5(-7)-lobed leaves. 	Leaves entire. 



All populations priority for collection.

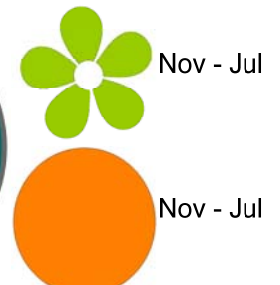
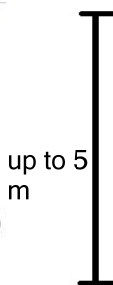
References: Hyde, M.A., Wursten, B.T., Ballings, P. & Dondeyne, S. (2013). Flora of Mozambique: Species information: *Ipomoea cairica* var. *cairica*. http://www.mozambiqueflora.com/speciesdata/species.php?species_id=147580, retrieved 22 May 2013; Thorp, J.R., Wilson, M, Weeds Australia - www.weeds.org.au

CONVOLVULACEAE

Wild relative of sweet potato

Ipomoea cairica (L.) Sweet

Morning glory, Mile-a-minute vine



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:

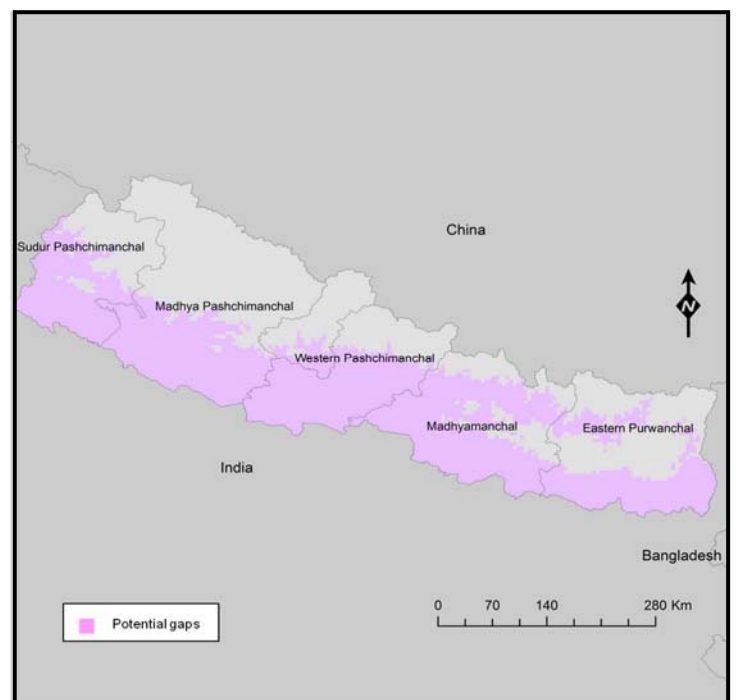
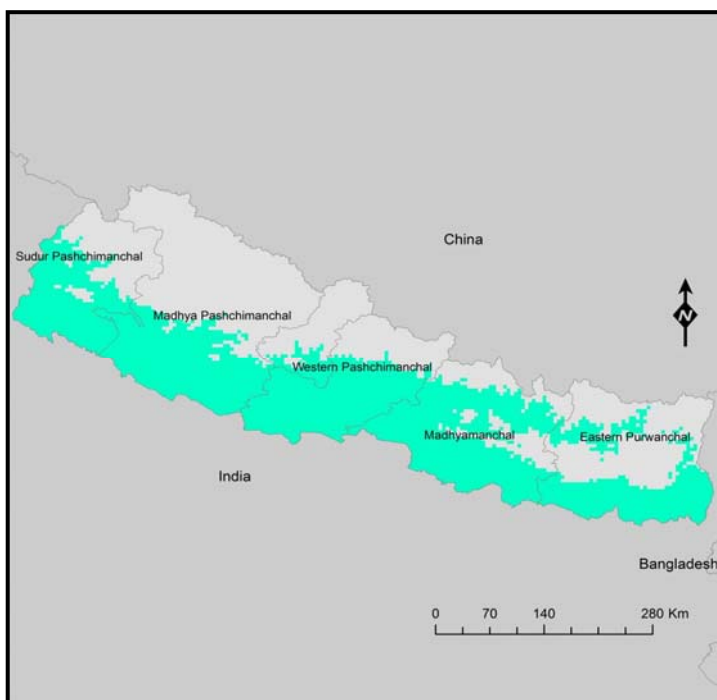
Usually associated with grasses, in grasslands, roadsides, pine forests and in crops.

Distribution:

Northwest and central India, Nepal, Pakistan, Java.

Altitude: 50 - 2600 m

<p><i>Cajanus platycarpus</i></p>	<p>May be confused with: <i>Cajanus scarabaeoides</i></p>
<p>Annual creepers; leaflets larger (3-8 cm long), ovate; pods broad (1-1.5 cm wide), flattened in cross section, papery.</p> 	<p>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.</p> 



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.



0.2-1 m

LC
PRELIM



Jul - Sep

Sep - Nov

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:

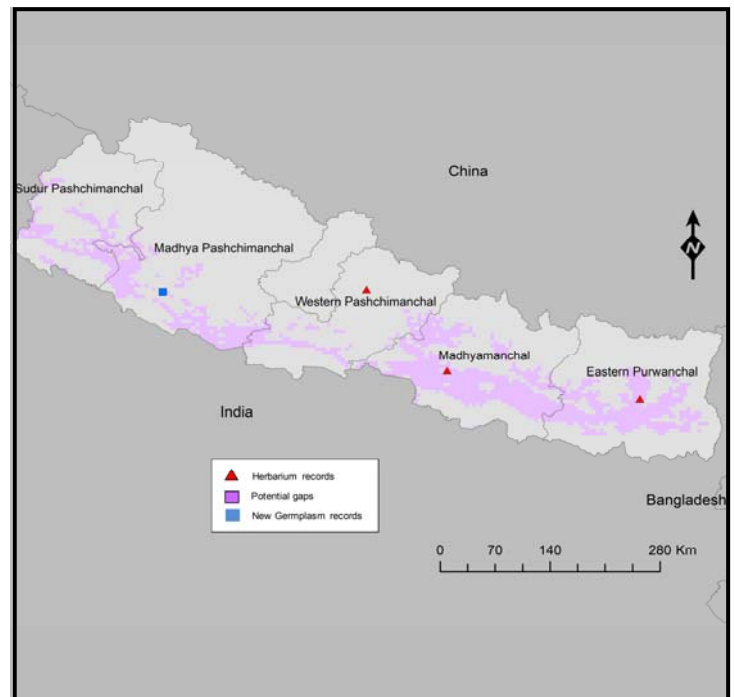
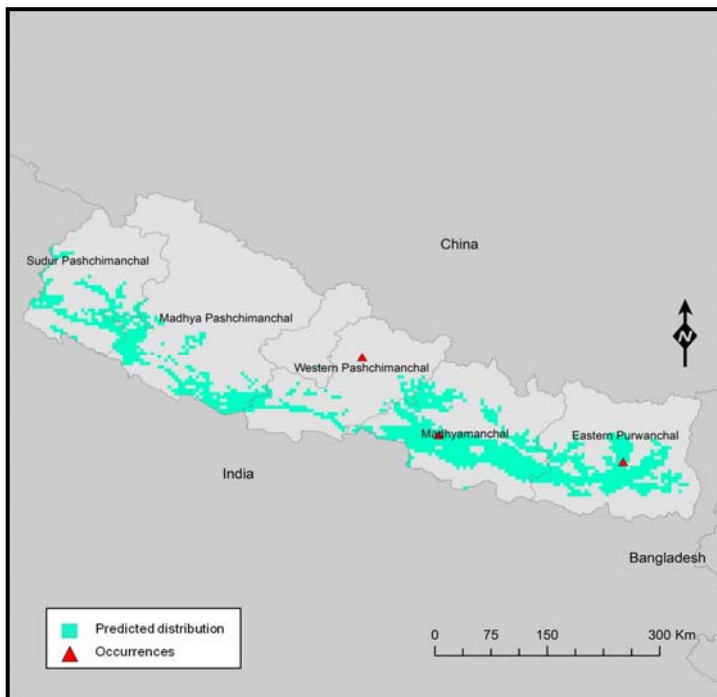
Fields, roadsides, grassy slopes, coastal areas.

Distribution:

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

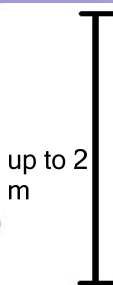
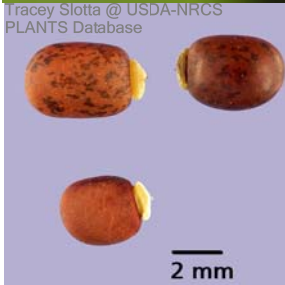
Altitude: 100 - 1500 m

<p><i>Cajanus scarabaeoides</i></p>	<p>May be confused with: <i>Cajanus platycarpus</i></p>
<p>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.</p> 	<p>Annual creepers; leaflets larger (3-8 cm long), ovate; pods broad (1-1.5 cm wide), flattened in cross section, papery.</p> 



References: Flora of China, Volume 10, p232 via www.efloras.org 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: 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

<i>Cicer microphyllum</i>	May be confused with: <i>Cicer arietinum</i>
Leaves with a terminal tendril, leaflets 6-15-paired, obovate-cuneate; corolla ca. 25 mm; seeds ca. 2.5 mm.	Leaves with a terminal leaflet, leaflets 3-8-paired, elliptic; corolla 8-10 mm; seeds 5-15 mm.



Reported from Nepal but no localities known

All populations priority for collection.

References: Flora of China. Volume 10, p546 via www.eFloras.org 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; 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.

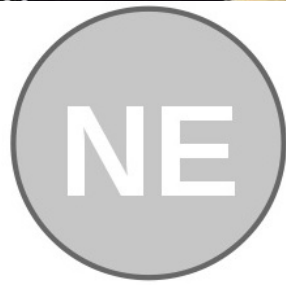
LEGUMINOSAE

Cicer microphyllum Royle

Wild relative of *Cicer arietinum* L.



0.15-0.4 m



Jun - Aug

Jun - Aug

LEGUMINOSAE

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

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

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 Nepal 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



0.4-1 m



Jun - Aug

Jul - Sep

HABIT: Usually perennial, woody, climbing vines with fibrous to somewhat fleshy rootstock. Stems pubescent or glabrous, 1-4.5 m long. Stipules triangular, persistent, 2-3.5 mm long.

LEAVES: Leaflets 3, variable in shape, but usually somewhat triangular-ovate, 5-12 cm long by 3-9 cm wide, base rounded or cuneate, apex acute or acuminate. Petiole 1.5-2 cm long, rachis 0.7-5 cm long, petiolules 3-5 mm long.

INFLORESCENCES: Axillary lax racemes, few-flowered, peduncle 1.5-30 cm long, rachis 1-7 cm long, bracts persistent, 1.5 mm long, bracteoles persistent, 1.5-2 mm long. Calyx campanulate, 2-3 mm, pubescent. Corolla white, yellowish, or pink; standard 5-10 mm long, apex emarginate; wings obovate; keel apex twisted for 1-2 turns. Ovary pubescent.

FRUIT: Pods oblong-falcate, 2-4-seeded, flattened, apex beaked.

SEEDS: Variable in colour, usually white or purple, reniform to rhomboid, longest dimension 1-1.5 cm, hilum whitish, 2.5-4 mm long.

Habitat:

Grasslands, forests, cultivated areas.

Distribution:

Native to tropical America, widely cultivated and naturalized throughout the rest of the tropics and subtropics.

Altitude: 0 - 2250 m

Phaseolus lunatus

May be confused with:
Phaseolus coccineus

Woody vines with fibrous rootstock; bracteoles very small, c.1.5 mm long; leaflets usually somewhat triangular-ovate, nearly glabrous; pod 5-10 cm x 1.5-2.5 cm; seed 12-13 mm x 8.5-9.5 mm.

Pubescent or glabrous on both sides; pods 16(-30) cm x 1.5 cm; seed 1.8-2.5 cm x 1.2-1.4 cm.

Reported from
Nepal but no
localities known

All populations priority
for collection.

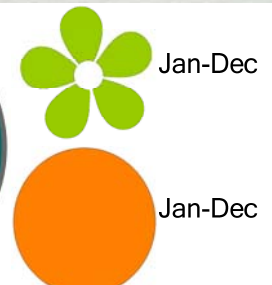
References: Freytag, G.F. & Debouck, D.G. (2002) Taxonomy, Distribution and Ecology of the Genus *Phaseolus* (Leguminosae-Papilionoideae) in North America, Mexico and Central America.



No seed image available



1 - 4.5 m



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.

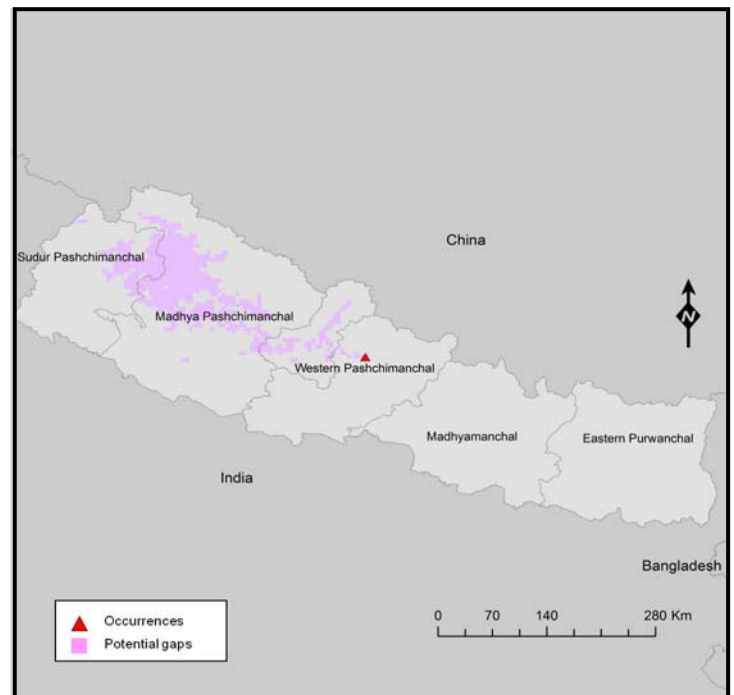
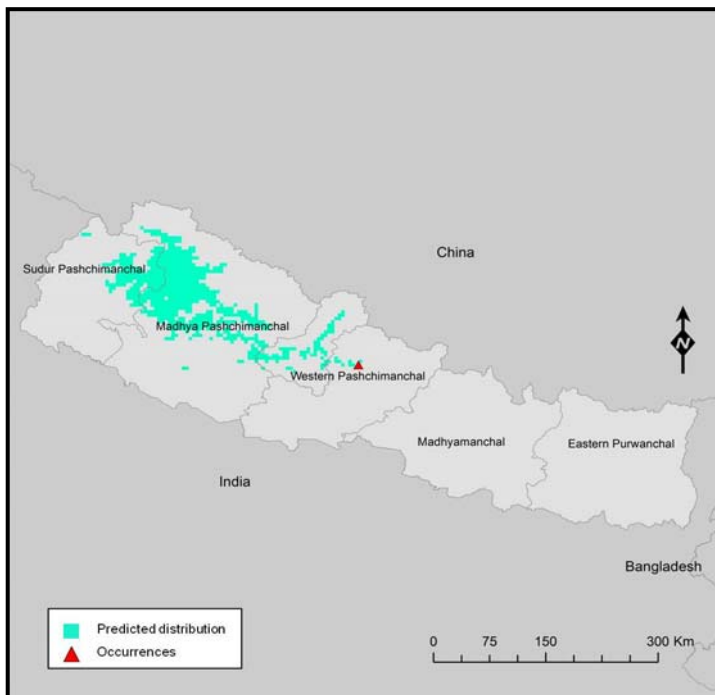
Altitude: 0 - 2900 m

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.

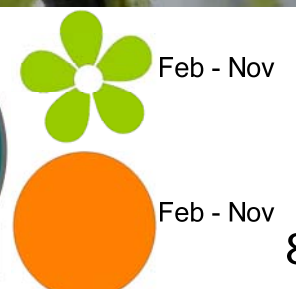
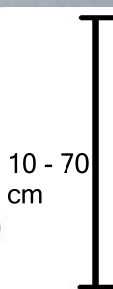


References: Maxted, N. (1995) An ecogeographical Study of *Vicia* subgenus *Vicia*.; FAO Grassland Species Profiles <http://www.fao.org/AG/agp/agpc/doc/Gbase/>; Davis, P.H. Flora of Turkey (3) p139

LEGUMINOSAE

Primary Gene Pool relative of *Vicia sativa* L.

Vicia sativa L. subsp. *nigra* (L.) Ehrh.
Black pod vetch



Primary Gene Pool relative of *Vigna angularis* (Willd.) Ohwi & Ohashi (and

HABIT: Twining herbs, stems slender, covered in white hairs 0.6-0.8 mm long. Stipules petiolate, narrowly elliptic, attenuate at apex, 8 mm long, margins ciliate.

LEAVES: Leaflets sparsely covered with white hairs, particularly on veins. Leaflets ovate or obliquely ovate, apex acuminate, rounded or truncate at base. Terminal leaflets 8-12 cm long, 5-9 cm wide, lateral leaflets 7-11 cm long by 4-8 cm wide. Stipels ovate, 2.5 x 1 mm.

INFLORESCENCES: 10-20-flowered, axillary, mostly glabrous, peduncles 4-5 cm long, rachis 1 cm long. Primary bract 4.5 x 4 mm, secondary bract 7 x 5 mm, bracteoles 4 x 1.5 mm. Flowers golden yellow; calyx campanulate, 4.5 mm long, tubular for lower 3.5 mm; all petals clawed for 2-2.5 mm; standard asymmetrical, emarginate at apex, 12.5 x 20 mm, with an appendage at the centre of inner surface.

FRUIT: Pods pendulous, glabrous, about 8 cm long by 0.5 cm wide, blackish at maturity. Seed oblong, pale brown flecked with black, testa smooth, hilum not protruding, linear, aril absent.

Habitat:

Disturbed habitats beside paths, edges of rice fields, forest margins, rocky areas near rivers.

Distribution:

Eastern Nepal, adjacent parts of India and Bhutan.

Altitude: 350 - 1650 m

<i>Vigna nepalensis</i>	May be confused with: <i>Vigna angularis</i> var <i>nipponensis</i>
Hilum 1.1 - 1.5 mm; bracteoles glabrous and flattened.	Hilum 2.2 - 2.8 mm; bracteoles pubescent and boat shaped.

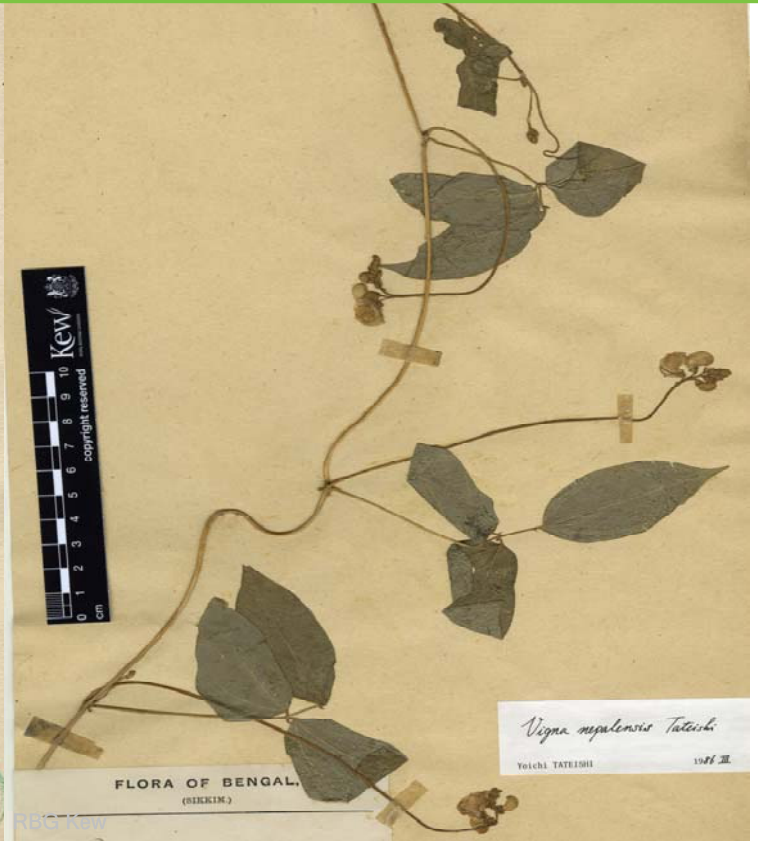
Reported from Nepal but no localities known

All populations priority for collection.

References:

Vigna nepalensis Tateishi & Maxted

Primary Gene Pool relative of *Vigna angularis* (Willd.) Ohwi & Ohashi (and



No seed image available



0.5 m



Sep - Oct

Taxon Group 4 relative of *Ensete ventricosum* (Welw.) Cheesm.

HABIT: Plants not stoloniferous, sap pale yellow-orange. Pseudostem yellow-green, with black-purple spots when old, cylindric, up to 5 m tall (measured to crown of leaves at maturity), base swollen and jarlike.

LEAVES: Petiole short; leaf blade oblong, 1.4-1.8 m × 50-60 cm, glabrous, base cuneate, apex caudate.

INFLORESCENCES: Cylindric, up to 2.5 m long. Bracts numerous, imbricate, persistent. Flowers 10-20 per bract. Compound tepal ca. 2.5 cm, apex 3-cleft; free tepal obcordate, shorter than compound tepal, apex with a large mucro.

FRUIT: Berries purplish black, glaucous, obovoid-oblong, ca. 9 × 3.5 cm, base acuminate, apex rounded and with persistent perianth.

SEED: Black, globose, ca. 1.2 cm in diam., smooth.

Habitat:

Mountainous regions

Distribution:

China, India, Indonesia, Myanmar, Nepal, New Guinea, Philippines, Thailand.

Altitude: 800 - 2700 m

<i>Ensete glaucum</i>	May be confused with: <i>Ensete superbum</i>
Slightly swollen at base.	Enormous swollen base of 2 -2.5 m in circumference at the base.

Reported from
Nepal but no
localities known

All populations priority
for collection.

References: Flora of China, Volume 24, p314 via www.efloras.org
http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200028234

MUSACEAE

Ensete glaucum (Roxb.) Cheesman

Taxon Group 4 relative of *Ensete ventricosum* (Welw.) Cheesm.



Tony Rodd via Flickr



Tony Rodd via Flickr



RBG Kew



RBG Kew

No seed
image
available



2-5
m



All year

All year

Primary Gene Pool relative of *Musa acuminata* Colla

HABIT: Pseudostems clumped, yellow-green, often with large, black markings, ca. 6 m. Petiole 60-75 cm, margin open, ca. 2 cm wide, often closed when young; leaf blade adaxially green and slightly pruinose or not, ovate-oblong, ca. 2.9 m × 90 cm, base auriculate, asymmetric.

INFLORESCENCES: Pendulous, ca. 2.5 m; peduncle and rachis glabrous. Bracts of bisexual and male flowers adaxially purple-red, abaxially brownish purple to yellow-green and pruinose, ovate to lanceolate, persistent, apex obtuse, reflexed after flowering; bracts of female flowers deciduous. Male flowers up to 20 per bract, in 2 rows. Compound tepal adaxially pale purple, abaxially pale purple-white, 4-5 cm, striate, teeth yellow to orange; free tepal milky white, translucent, obovate, ca. 1/2 as long as compound tepal, apex emarginate, shortly mucronate-apiculate.

INFRACTESCENCES: Pendulous, with ca. 8 clusters ('hands') each of 15 or 16 berries in 2 rows.

FRUIT: Grey-green, obovoid, ca. 13 × 4 cm, distinctly angled at maturity, base narrowed into a stalk ca. 2.5 cm, apex contracted or not into a short, angled column ca. 2 cm.

SEEDS: Numerous, brown, oblate, 5-10 mm in diam., minutely warty.

Habitat:

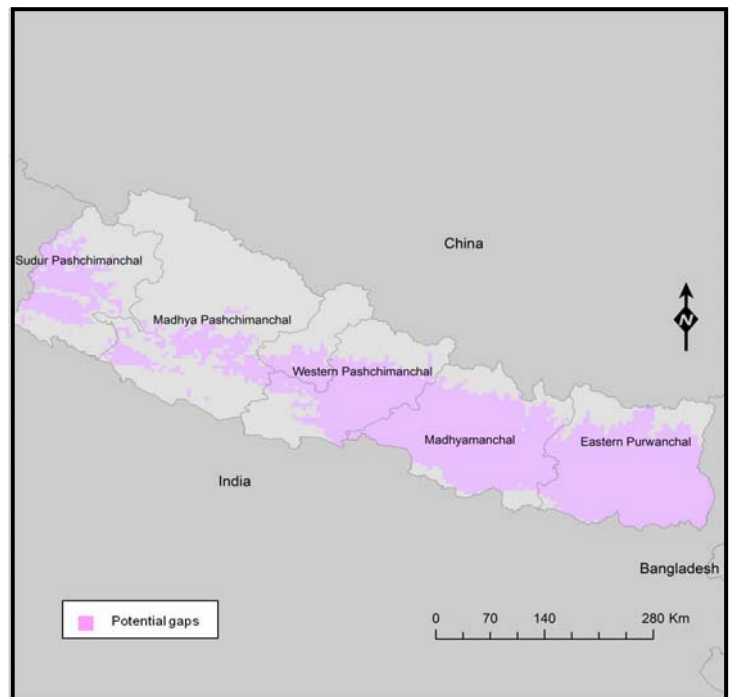
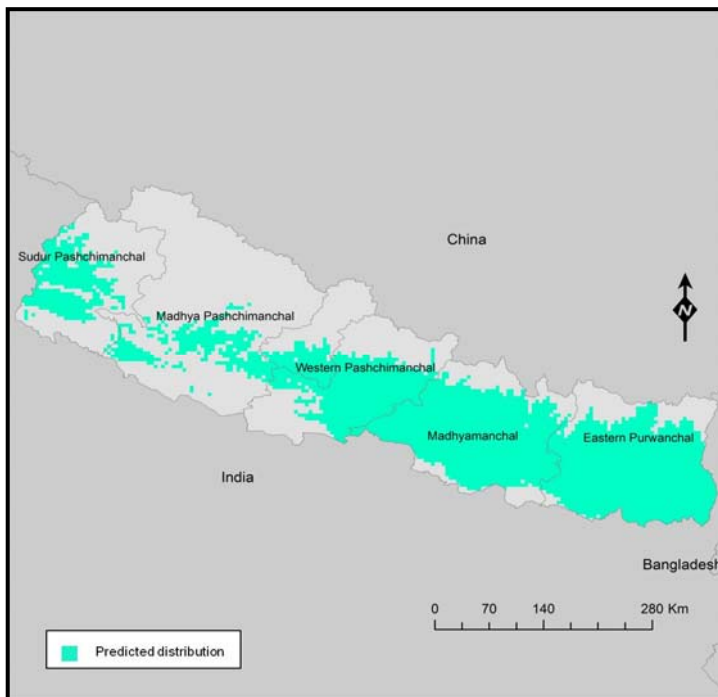
Ravines in evergreen forests

Distribution:

China, Papua New Guinea, Southcentral and Southeastern Asia.

Altitude: 0 -1100 m

<i>Musa balbisiana</i> var. <i>balbisiana</i>	May be confused with: <i>Musa balbisiana</i> var. <i>bakeri</i>
Up to 6m tall.	Up to 3 m tall.



References: Kuo, M.L. (ed.) (2012). Flora of Taiwan, ed. 2, Suppl.: 1-414. Editorial Committee of the Flora of Taiwan, Second Edition, National Taiwan University

Primary Gene Pool relative of *Musa acuminata* Colla



up to
6 m



Dec - May

Dec - May

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:**

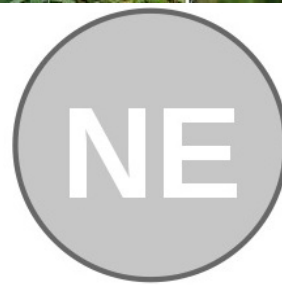
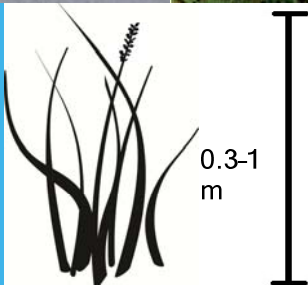
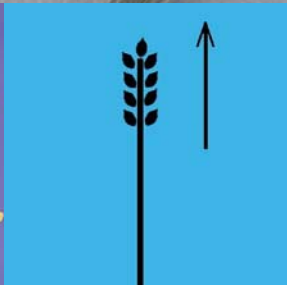
Disturbed sites, hillsides on shallow soils, shrublands, open grasslands, salt marshes, edges of paddy fields.

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.Reported from
Nepal but no
localities knownAll 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 geniculately 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.

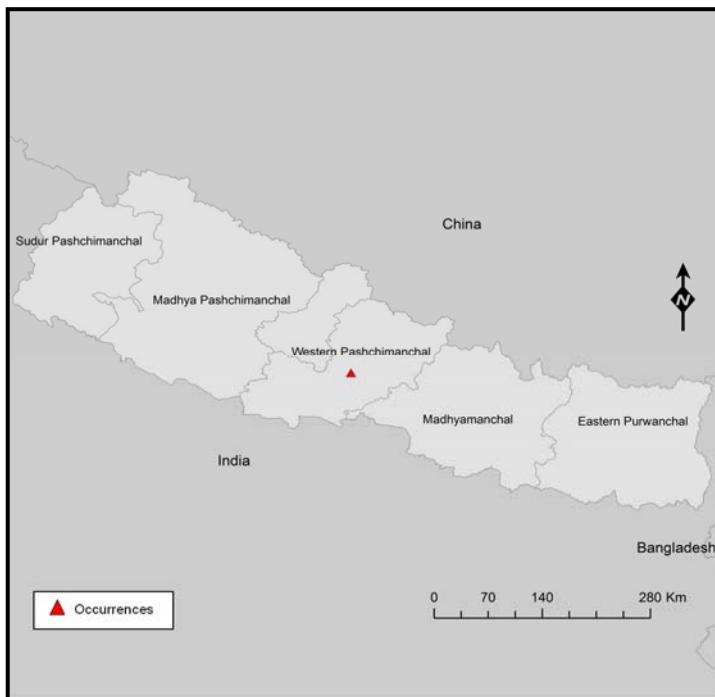
Distribution:

Distributed globally.

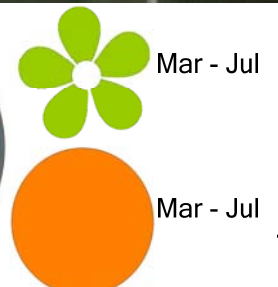
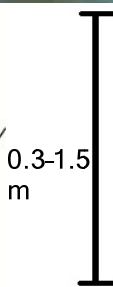
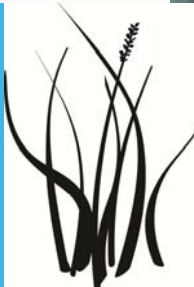
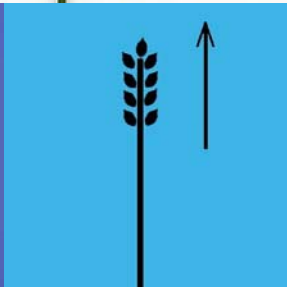
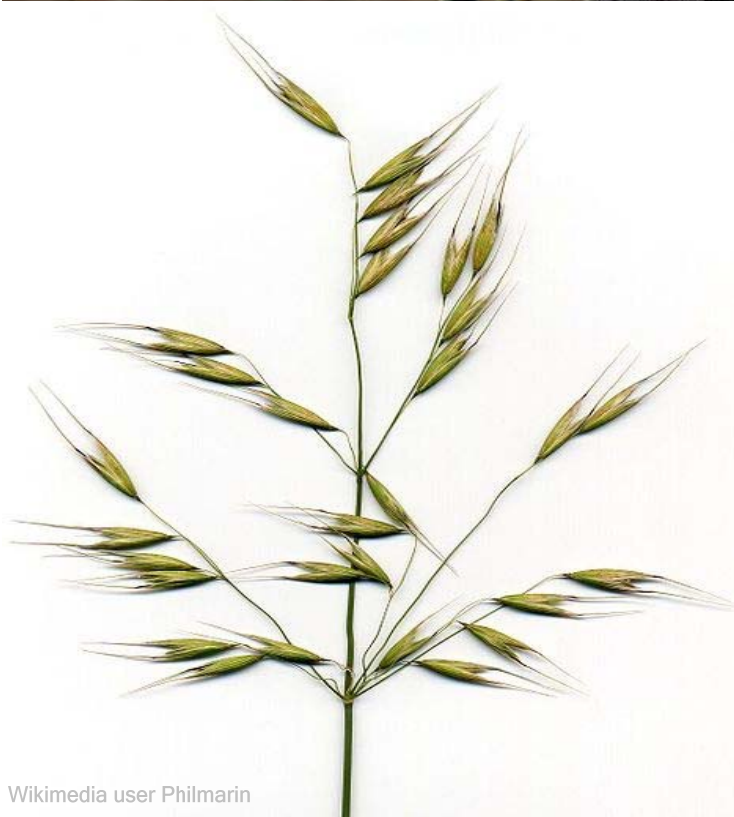
Altitude: 0 - 2400 m*Avena fatua*May be confused with:
Avena sterilis

Rhachilla disarticulating between each floret; every lemma with a basal callus.

Rhachilla disarticulating only below lowest floret; only lowest lemma with a basal callus.

All populations priority
for collection.

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:

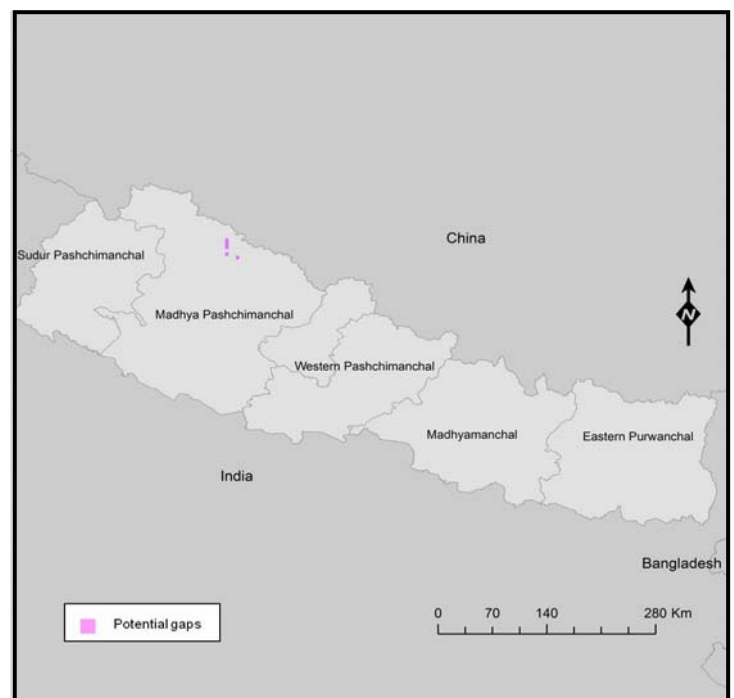
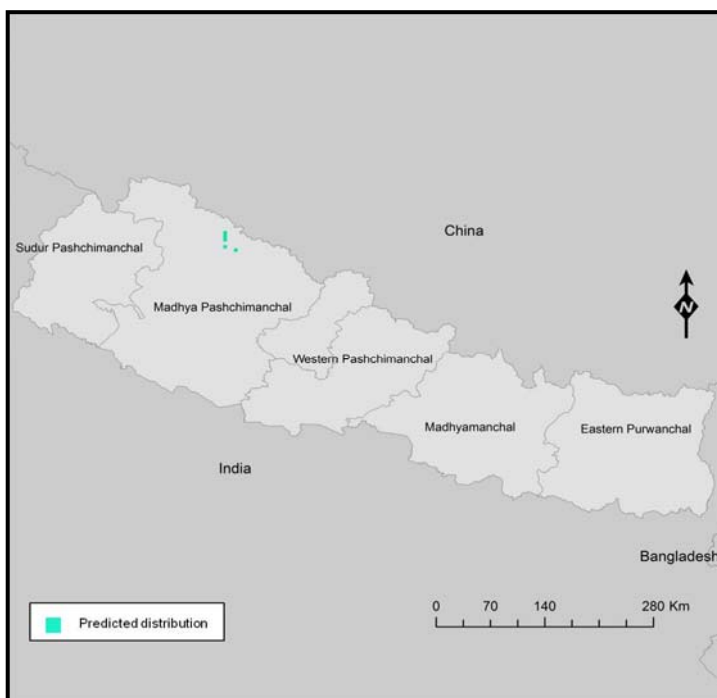
Mountain slopes, hills, valleys, clearings in *Quercus* forests, roadsides, as a weed in crops.

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.




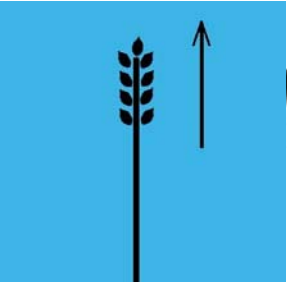
References: Baum, B.R. (1977). Oats: Wild and Cultivated. A Monograph of the Genus *Avena* L. (Poaceae). Biosystematics Research Institute Monograph No. 14. Supply and Services Canada, Ottawa.

Primary Gene Pool relative of *Avena sativa* L.





Wikimedia commons: Flora of Batava


No seed image available



0.8-1 m



Jul - Aug



Jul - Aug

14

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 rhachilla 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

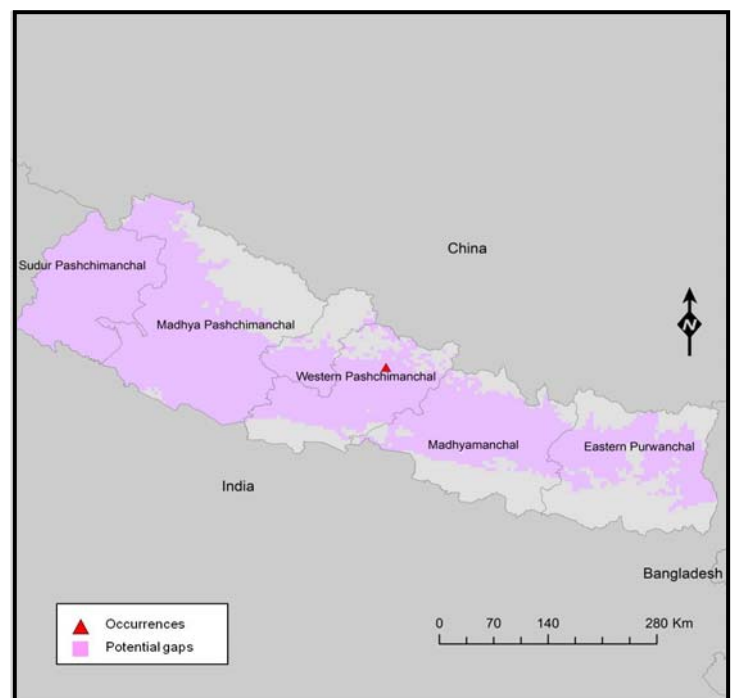
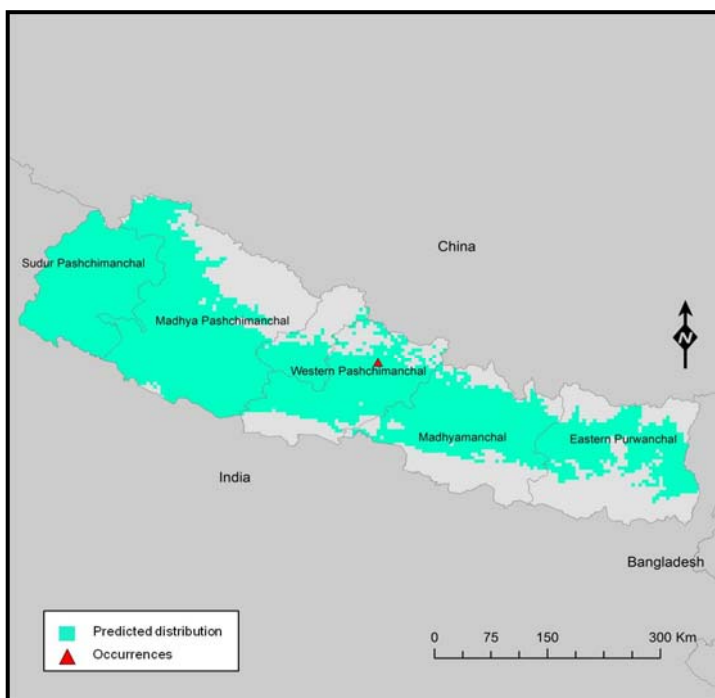
Cenchrus orientalis

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

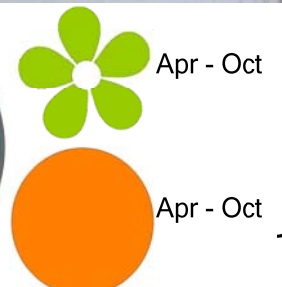
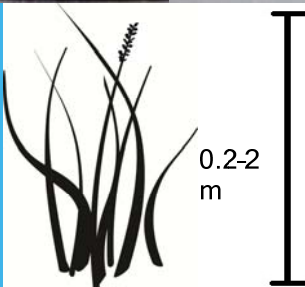
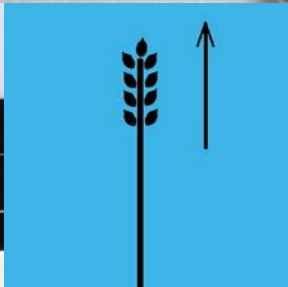
Panicle 4-200 cm long; 1-9 fertile spikelets per cluster, spikelets obovate, involucral bristles 2-7 mm long; glumes apparently 1 (the 2nd absent or obscure), apex obtuse or acute.



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>.

Cenchrus orientalis (Rich.) Morrone
Oriental fountain grass

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



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).

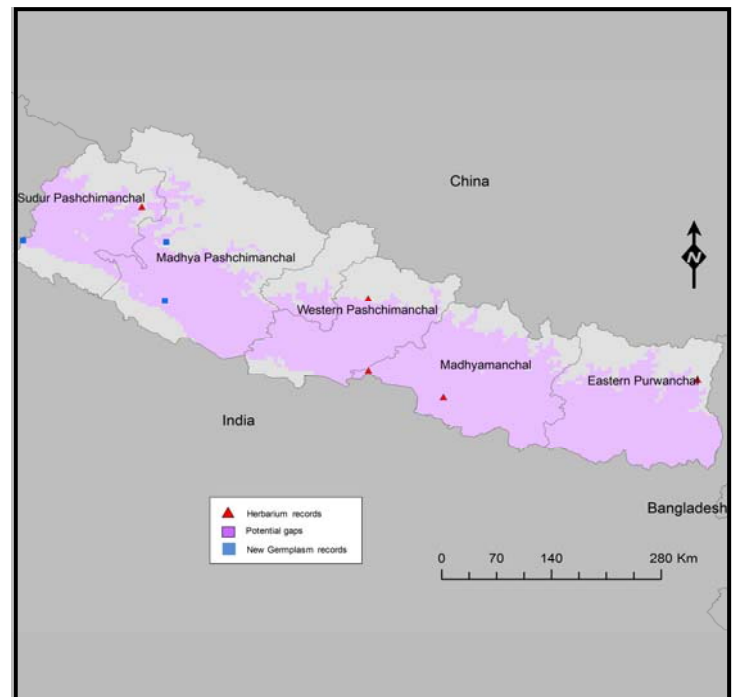
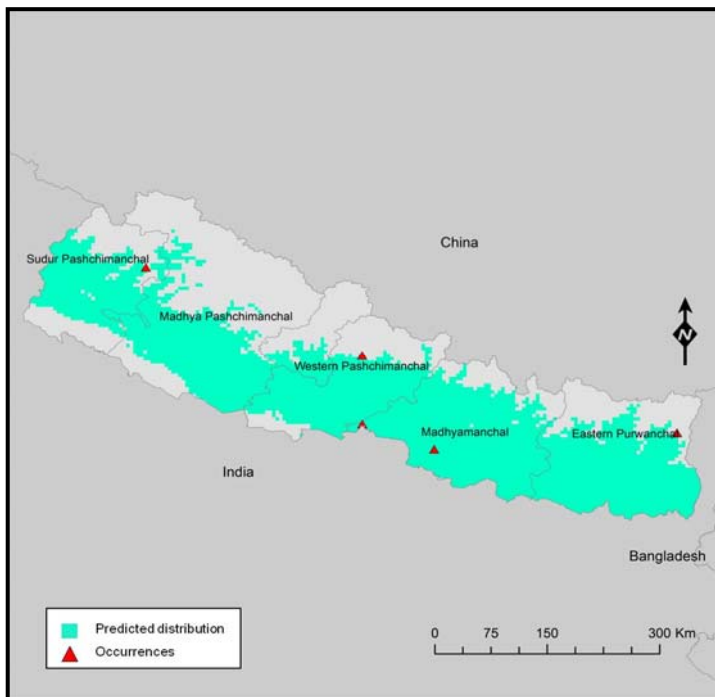
Altitude: 0 - 1200 m

Eleusine indica

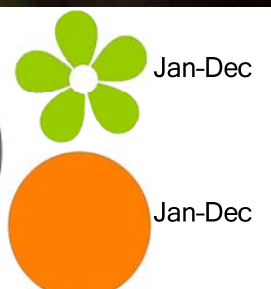
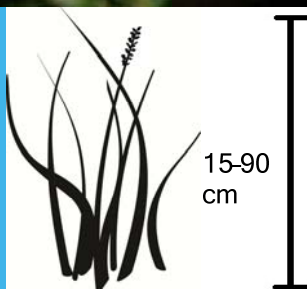
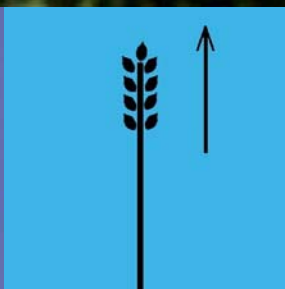
Spikes usually more than 3 cm long, usually less than 7 mm broad; backs of lemmas usually straight or very slightly curved towards apex.

May be confused with:
Eleusine tristachya

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:** Perennial, tufted or with short rhizomes. Culms usually erect, glabrous or densely pubescent at nodes.**LEAVES:** Leaf sheath usually fibrous at base, sometimes membranous, \pm pubescent; ligule 0.2-0.7 mm, auricles present or absent; leaf blade flat or sometimes involute, (3-) 5-150 (-175) \times (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) \times 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 \pm acute. Lodicules (0.6-)0.8-1.4 (-1.6) mm, \pm 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:**

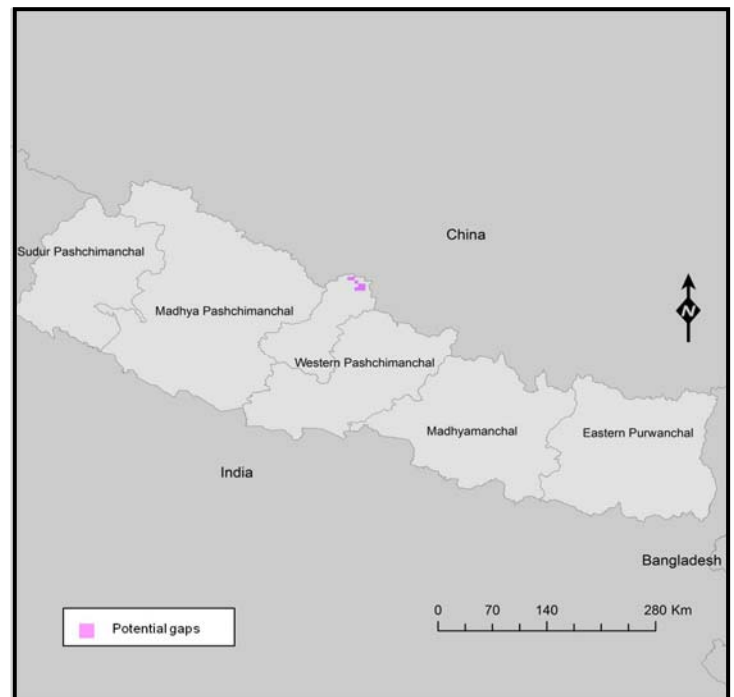
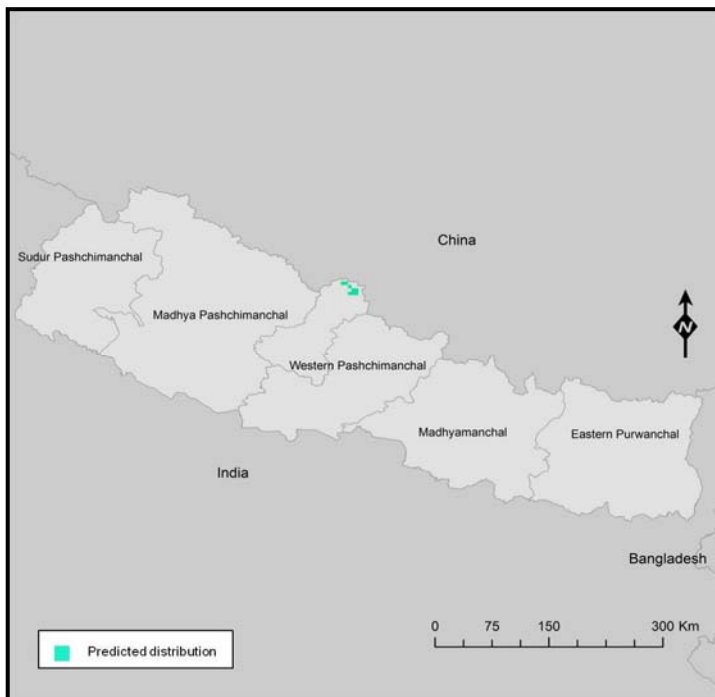
Steppe valleys at timberline, wet meadows, saline meadows, stream banks, salt steppes, dry valleys, dry stony slopes and other dry habitats, rarely as a weed.

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.

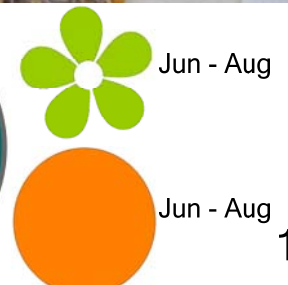
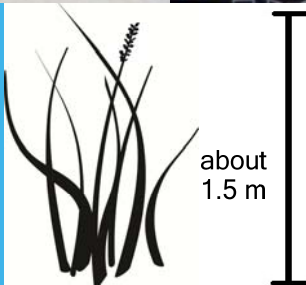
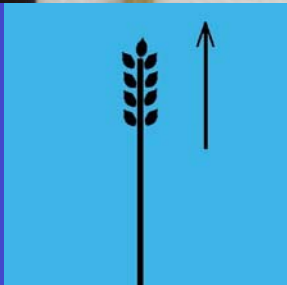


References: Flora of China, Volume 22, p396 via www.efloras.org
http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200025533

Tertiary Gene Pool relative of *Hordeum vulgare* L.



No seed image available




Hordeum vulgare L. subsp. *spontaneum* (K. Koch) Thell.Primary Gene Pool relative of *Hordeum vulgare* L.**HABIT:** Clump-forming perennial. Culms erect, or geniculately ascending, 35-70 cm long.**LEAVES:** Leaf-sheath oral hairs lacking, auricles falcate. Ligule an eciliate membrane. Leaf-blades 5-16 x 0.4-0.8 cm, surface smooth, or scabrous.**INFLORESCENCE:** Racemes solitary, linear, bilateral, 4-9 x 0.6-0.8 cm. Rhachis fragile at the nodes, flattened, margins ciliate, internodes oblong, 3.5-5 mm long, falling with spikelet above. Pedicels oblong. Spikelet packing broadside to rhachis, arranged in threes: one fertile, 2 sterile. Spikelets lanceolate, dorsally compressed, 12-14 mm long, falling entire, deciduous with accessory branch structures. Sterile spikelets well-developed, containing empty lemmas or anthers, lanceolate, dorsally compressed, 4-6 mm long, shorter than fertile spikelets, glumes subulate, lemmas 1, 7-9 mm long. Fertile spikelets with a barren rhachilla extension.**GLUMES:** Collateral, similar, equal in length, linear, or lanceolate, 4-6 mm long, surface pubescent, apex 1-awned, awn 10-15 mm long. Fertile lemma lanceolate or ovate, 12-14 mm long, coriaceous, not keeled, 5-veined, apex acuminate, 1-awned. Anthers 3, 2.5-3 mm long. Ovary pubescent on apex.**FRUIT:** Caryopsis with adherent pericarp, sulcate on hilar side, hairy at apex. Hilum linear.**Habitat:**

Grasslands, meadows, cultivated areas, often weedy.

Distribution:

Greece, Turkey, Egypt, South-west Asia from Iran through to Pakistan, northern India and Nepal.

Altitude: 0 - 4500 m

<i>Hordeum vulgare</i> subsp. <i>spontaneum</i>	May be confused with: <i>Hordeum vulgare</i> subsp. <i>vulgare</i>
Rachis brittle; spikelets 2-rowed. 	Rachis tough; spikelets 6-rowed.

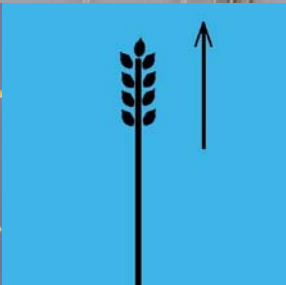
Reported from
Nepal but no
localities known

All populations priority
for collection.

References: Bothmer, R. von et al. (1991) An Ecogeographical Study of the Genus *Hordeum*. Systematic and Ecogeographic Studies on Crop Genepools 7. IBPGR, Rome.

Hordeum vulgare L. subsp. *spontaneum* (K. Koch) Thell.

Primary Gene Pool relative of *Hordeum vulgare* L.



HABIT: Perennial, loosely tufted or sometimes shortly stoloniferous. Culms erect or ascending, 0.3-0.7m tall.

LEAVES: Leaf sheaths shorter than internodes, auricles ciliate; leaf blades thin, 5-20 × 0.6-2 cm, inrolled when dry, abaxial surface smooth, adaxial surface scabrid along veins, margins scabrid, base rounded, narrowed at insertion, apex acuminate; ligule 1-2 mm.

INFLORESCENCES: Panicle narrow, erect, 3-15 cm; branches 2-5, inserted singly, 2-6 cm, unbranched, ascending, bearing few spikelets. Spikelets elliptic-oblong, 5-6.5 mm, length 2-3 times width, light green or gray; sterile lemmas narrowly lanceolate, slightly unequal, ca. 1 mm; fertile lemma irregularly granular, flanks sulcate, apex obtuse or shortly 3-toothed, awnless. Anthers 3.5-4.5 mm.

FRUIT: Caryopsis brown.

Habitat:

Hill forests, on well drained soils and damp places by streams.

Distribution:

China, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand

Altitude: 500 - 1000 m

<i>Oryza meyeriana</i> var. <i>granulata</i>	May be confused with: <i>Oryza meyeriana</i> var. <i>meyeriana</i>
Spikelets 5 - 6.5 mm; length 2-3 times width.	It has longer, (6-)7-10 mm spikelets, with length 3-6 × width.

Reported from Nepal but no localities known

All populations priority for collection.

Oryza meyeriana var. *granulata* (Watt) Duist.

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

Jungle rice



RBG Kew

No seed image available

0.3-0.7 m

NE

All year

All year

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

HABIT: Semierect plant about 1m tall with semierect leaves.

INFLORESCENCES: Panicle branches semi-spreading. Spikelets appressed, solitary, large (6-10.4 mm long by 1.9-3.4 mm wide), with strong awn (4-10 cm long), 2 basal florets sterile, 1 floret fertile. Anthers 1.5-3 mm long.

FRUIT: Kernels often red.

Habitat:

Found in swampy areas, at edges of ponds and tanks, beside streams, in ditches in or around ricefields. Usually grows in shallow water up to 0.3 m, seasonally dry; in open habitats.

Distribution:

Native to Bangladesh, Cambodia, India, Laos, Myanmar, Sri Lanka, Thailand and Vietnam.

Altitude: 0 - 700 m

<i>Oryza nivara</i>	May be confused with: <i>Oryza rufipogon</i>
Annual. Tufted herb, anthers <3mm.	Perennial. Anthers usually >3mm.

Reported from
Nepal but no
localities known

All populations priority
for collection.

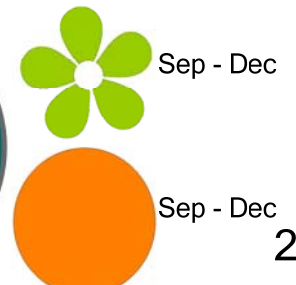
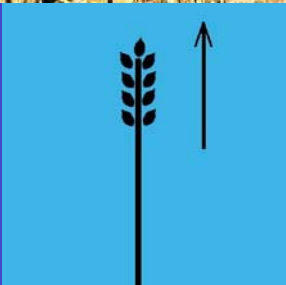
References: Vaughan, D. (1994) The Wild Relatives of Rice- A Genetic Resources Handbook. IRRI.

Oryza nivara S.D.Sharma & Shastry Bail.

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



No seed image available



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

HABIT: Perennial. Culms erect or creeping and rooting at lower nodes, 1.5-3 m tall, 7-10 mm in diam.
LEAVES: Leaf sheaths more than 3 times internode length, auricles inconspicuous; leaf blades thick, 30-50 × 2-3 cm, abaxial surface and margins scabrous, adaxial surface scattered villous, midrib stout, lateral veins inconspicuous, base narrowed, puberulous, apex acuminate; ligule 1-4 mm.
INFLORESCENCE: Panicle loosely contracted, 30-50 cm, base often included in terminal sheath; branches 3-5 at lowest node, axils bearded, longest 10-25 cm, naked in lower half, apices of lowermost branches drooping. Spikelets broadly ovate-oblong, 4-5 mm, length 1.5-2 times width, yellowish green or tinged brownish black, deciduous; sterile lemmas linear-lanceolate, 1.5-2 mm, apex acuminate; fertile lemma papillose, keel and marginal veins with hard glassy hairs; awn 5-10(-25) mm, slender, scabrid. Anthers 1.5-2.5 mm.
FRUIT: Caryopsis reddish brown

Habitat:

Low hills, alluvial plains, ditch banks.

Distribution:

China, Bhutan, Cambodia, India, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam.

Altitude: 0 - 1000 m

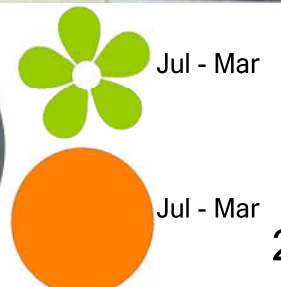
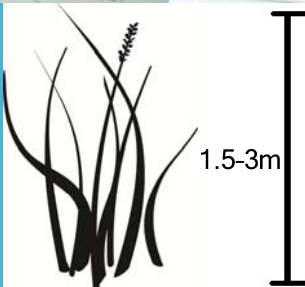
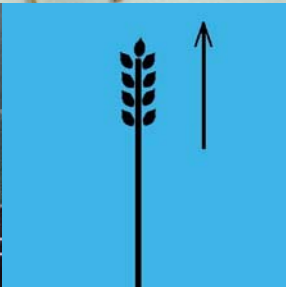
<i>Oryza officinalis</i>	May be confused with: <i>Oryza minuta</i>
Lower panicle branches naked in lower half, and branches drooping. Spikelet length 1.5 - 2 x width.	Differs only slightly morphologically, the lowermost panicle branches having a shorter naked portion and ascending at the tip. It also has proportionately narrower spikelets with length 2-2.7 × width.

Reported from
Nepal but no
localities known

All populations priority
for collection.

References: Flora of China http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200025785

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



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

HABIT: Perennial, aquatic, tufted or stoloniferous. Culms decumbent, rooting and tillering at nodes, sometimes floating, lower part spongy, 0.7-1.5 m tall.

LEAVES: Leaf sheaths slightly inflated below, upper sheaths tight, glabrous, auricles conspicuous, glabrous or ciliate; leaf blades up to 40 × 1-2 cm, margins and midrib scabrid, apex acuminate; ligule up to 17 mm.

INFLORESCENCES: Panicle spreading, 12-30 cm, eventually nodding; branches 1-5 at lowest node, longest 2.5-12 cm, axils bearded or glabrous. Spikelets oblong, 8-11 mm, length 2.7-4.5 times width, yellowish green with reddish apex, deciduous; sterile lemmas lanceolate, ca. 2.5 mm, apex acuminate; fertile lemma finely reticulate with scattered short glassy hairs, flanks slightly sulcate, keel stiffly ciliate, apex acuminate; awn 5-40 mm or more, stout, scaberulous. Anthers 4-6 mm.

FRUIT: Caryopsis reddish brown, 5-7 mm.

Habitat:

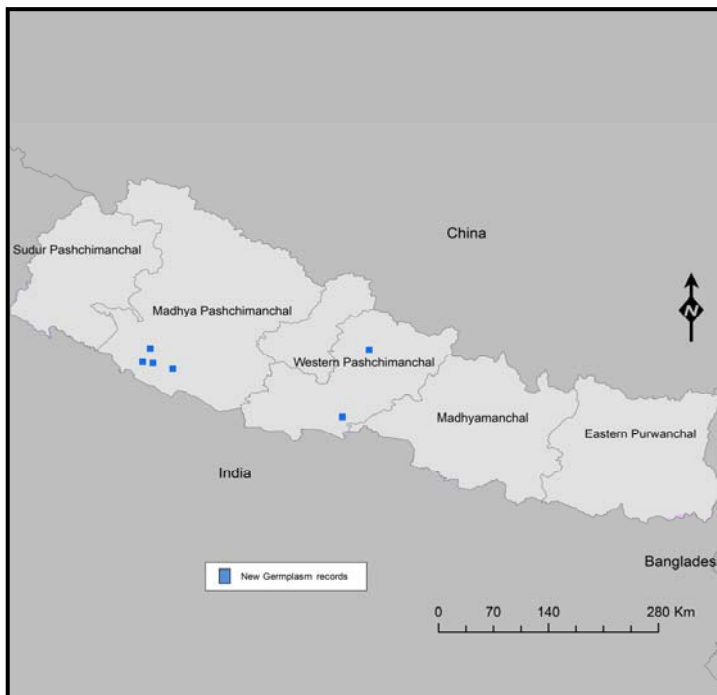
Riversides, ponds, streams, lotus ponds, rice fields, ditches, marshes.

Distribution:

China, Bangladesh, Cambodia, India, Indonesia, Malaysia, Myanmar, New Guinea, Sri Lanka, Philippines, Thailand, Vietnam; Australia.

Altitude: 0 - 700 m

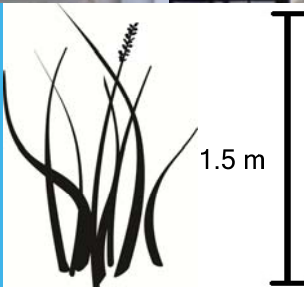
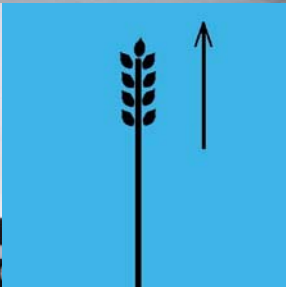
<i>Oryza rufipogon</i>	May be confused with: <i>Oryza nivara</i>
Perennial. Anthers usually >3mm.	Annual. Tufted herb, anthers <3mm.



All populations priority
for collection.

References: Flora of China http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200025788

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



Confirmed use as graftstock for *Malus domestica* Borkh.

HABIT: Trees 8-10 m tall, pendulous. Branchlets dark brown, terete, villous when young, glabrescent; buds reddish brown, ovoid, subglabrous or scales puberulous at margin. Stipules caducous, lanceolate, 5-6 mm, membranous, subglabrous. **LEAVES:** petiole 2-4 cm, villous; leaf blade elliptic, ovate-elliptic, or oblong-ovate, 6-12 × 3.5-7 cm, abaxially puberulous along midvein and lateral veins, adaxially sparsely pubescent along midvein, base rounded or broadly cuneate, margin irregularly adpressed serrulate, apex acuminate. **INFLORESCENCES:** Corymbs umbel-like, 4-6 cm in diam., 4-8-flowered; bracts caducous, lanceolate, membranous, margin sparsely glandular serrate, apex acuminate. Pedicel 2-4 cm, pubescent. Flowers 2.5-3 cm in diam. Hypanthium campanulate, densely villous. Sepals triangular-lanceolate, 5-7 mm, slightly longer than or ca. as long as hypanthium, abaxially sparsely pubescent or subglabrous, adaxially densely pubescent, margin entire, apex acute or acuminate. Petals white, obovate, 1.2-1.5 cm, base shortly clawed, apex rounded. Stamens 25, unequal, shorter than petals. Ovary 4- or 5-loculed, with 2 ovules per locule, styles 4 or 5, slightly longer than stamens, villous basally. **FRUIT:** Pome red, ovoid or subglobose, 1-1.5 cm in diam. with a small scar at apex; sepals caducous; fruiting pedicel 2-4 cm, puberulous.

Habitat:

Mixed forests in valleys.

Distribution:

Nepal, Bhutan and China.

Altitude: 2400 - 3800 m

<i>Malus rockii</i>	May be confused with: <i>Malus sikkimensis</i>
Leaf blade abaxially pubescent; styles basally pubescent or glabrous, pome subglobose, not punctate.	Leaf blade abaxially densely tomentose; styles basally glabrous, pome obovoid or pyriform, white punctate.

Reported from Nepal but no localities known

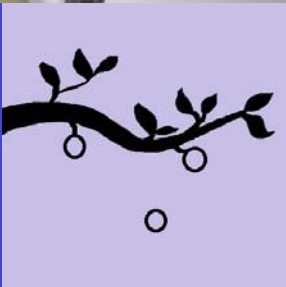
All populations priority for collection.

References: Flora of China, Volume 9 p182, via www.efloras.org
http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200010914

Confirmed use as graftstock for *Malus domestica* Borkh.



No seed image available



8 - 10 m



Secondary Gene Pool relative of *Malus domestica* Borkh.

HABIT: Trees small, 6-8 m tall. Branchlets reddish brown when young, blackish brown when old, terete, gray tomentose when young, subglabrous when old; buds reddish brown, ovoid; scales tomentose at margin. **STIPULES:** caducous, lanceolate, 6-8 mm, membranous, glandular at margin, apex acuminate.

LEAVES: petiole 2-3 cm, initially densely tomentose, glabrescent; leaf blade elliptic, ovate, or ovate-lanceolate, 5-7 × 2-3 cm, abaxially gray tomentose, densely so along veins, later subglabrous, adaxially glabrous, base rounded or broadly cuneate, margin sharply serrate, apex acuminate or caudate-acuminate.

INFLORESCENCE: Corymbs 5-9 cm in diam., 6-10-flowered; bracts caducous, lanceolate, membranous, margin entire or serrate, apex acuminate. Pedicel 1.5-5 cm, tomentose, later subglabrous.

FLOWERS: 2.5-3 cm in diam. Hypanthium campanulate, adaxially tomentose, later subglabrous. Sepals ovate-lanceolate, 5-6 mm, longer than hypanthium, tomentose, later subglabrous, margin entire, apex acuminate. Petals white adaxially, pink abaxially, suborbicular, 1.2-1.5 cm, base shortly clawed, apex rounded. Stamens 25-30, unequal, ca. 1/2 as long as petals. Ovary 5-loculed, with 2 ovules per locule; styles 5, longer than stamens, glabrous. **FRUIT:** Pome dark red, white punctate, obovoid or pyriform, 1-1.8 cm in diam. with a small scar at apex; fruiting pedicel 2-2.8 cm, slightly tomentose or subglabrous; sepals caducous.

Habitat:

Open forests on slopes, mixed forests in valleys.

Distribution:

Native to China, Bhutan, India and Nepal.

Altitude: 2500 - 3000

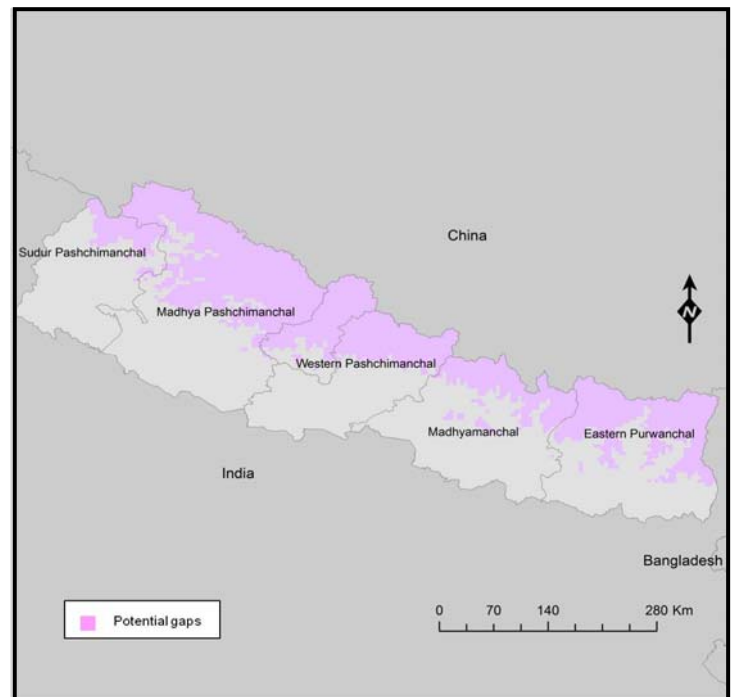
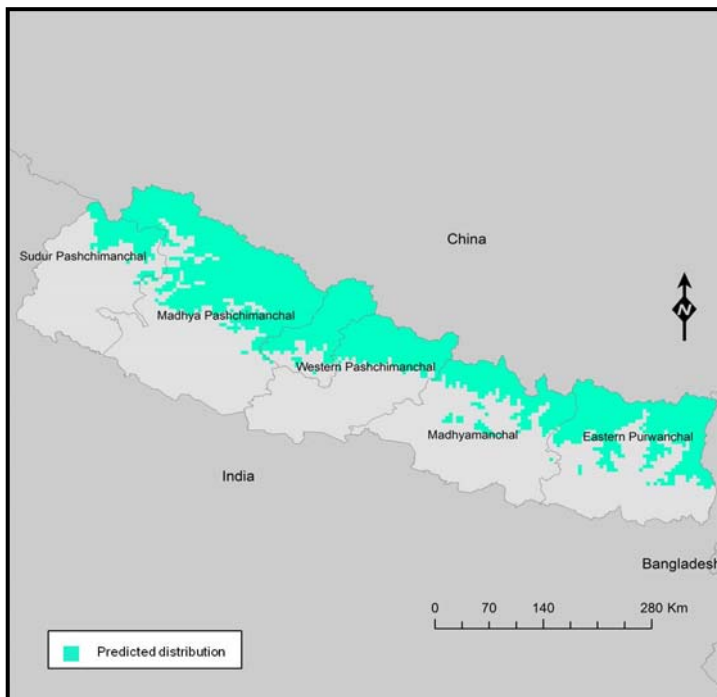
Malus sikkimensis

Smaller tree: 6-8 m tall; Slightly bigger fruit: 1-1.8 cm; undersurface of leaves grey tomentose, densely so along veins.



May be confused with:
Malus baccata

Larger tree: 10 - 14 m tall; But fruit smaller: 0.8-1.0 cm; leaves glabrous.



References: Flora of China, Volume 9, p182 via www.efloras.org
http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=242411011

Malus sikkimensis (Wenz.) Koehne ex C.K.Schneid.

Secondary Gene Pool relative of *Malus domestica* Borkh.



RBG Kew/ Ruth Harker



Wikimedia Commons user Kurt Stueber



Wikimedia Commons user Kurt Stueber



RBG Kew/ Ruth Harker

No seed
image
available



8 m



May-Jul

Sep-Oct

Secondary Gene Pool relative of Eggplant - *Solanum melongena* L.

HABIT: Erect shrub up to 1.5 m, prickly or unarmed. Young stems erect, robust, moderately to densely stellate-pubescent and prickly or unarmed, with porrect, sessile or variously stalked trichomes; bark of older stems moderately stellate-pubescent, green-brown to red-brown.

LEAVES: Entire, sometimes lobed, the blades 3.5-17(-40) cm long, 0.6-10(-19) cm wide, 1.5-4 times longer than wide, ovate to elliptic or lanceolate, chartaceous, moderately to densely stellate-pubescent on both surfaces, with porrect, sessile or stalked trichomes.

INFLORESCENCE: Terminal or lateral, 2-11 cm long and the plants andromonoecious, with 1-3(5) long-styled flowers at the base of the inflorescence.

FLOWER: Flowers (4-)5(-6)-merous, heterostylous. Calyx 7-15 mm long in long-styled flowers, 5-10 mm long in short-styled flowers. Corolla 2.5-4.5 cm in diameter in long-styled flowers, 1.8-4 cm in diameter in short-styled flowers, pale mauve to dark mauve, stellate.

FRUIT: A spherical berry, 1-2(-4) per infructescence, 1.5-3 cm in diameter, the pericarp smooth, dark green with pale green and cream markings when young, yellow at maturity; fruiting pedicels woody, pendulous, with 0-10 prickles.

SEEDS: ca. 30-150 per berry, 2.7-3.2 mm long, 1.9-2.6 mm wide, flattened-reniform, dull yellow to orange-brown.

Habitat:

Roadsides, abandoned cultivation, savanna, bushland, dunes, forest edges.

Distribution:

Found throughout Eastern Africa and distributed as far north as Sudan.

Altitude: 0 - 2300 m

<i>Solanum campylacanthum</i>	May be confused with: <i>Other prickly Solanums</i>
Extremely widespread and variable, recognised by mauve flowers, big bright yellow fruits, a long taproot, and leaves that are usually big (up to 17 cm long) and entire.	Other <i>Solanums</i> in this area do not have this combination of characters.

Reported from
Nepal but no
localities known

All populations priority
for collection.

References: Vorontsova, M. & Knapp, S. *Solanum campylacanthum*. In *Solanaceae Source*. <http://solanaceaesource.org/content/solanum-campylacanthum> [Downloaded 18th April 2013.]

Solanum campylacanthum Hochst. ex A.Rich.

Secondary Gene Pool relative of Eggplant - *Solanum melongena* L.



0.2-1.5 m



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

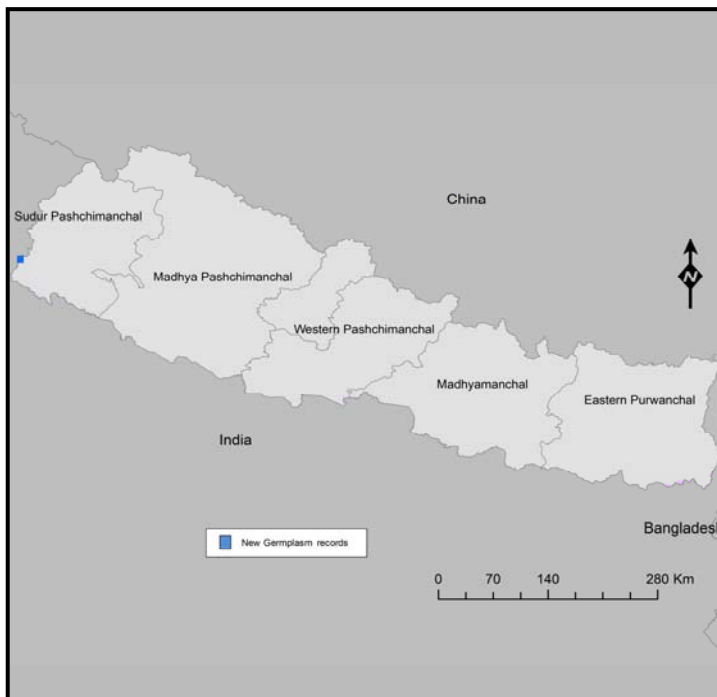
Solanum virginianum

May be confused with:
Solanum violaceum

Prickles straight and needle-like.
Berry pale yellow.



Prickles recurved. Berry orange.



All populations priority
for collection.

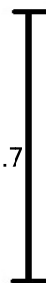
References: Flora of China http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200020613



Gemma Toothill (c) Board of Trustees RBG Kew



0.5-0.7 m



Nov - May

Jun - Sep

Appendix - Synonyms

Taxon	Sheet	Synonyms
<i>Daucus carota</i> subsp. <i>carota</i> L.	1	
<i>Ipomoea cairica</i> (L.) Sweet	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 platycarpus</i> (Benth.) Maesen	3	<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> (L.) Thouars	4	<i>Dolichos scarabaeoides</i> L.; <i>Atylosia pauciflora</i> (Wight & Arnott) Druce; <i>Atylosia scarabaeoides</i> (Linnaeus) Benth.; <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 microphyllum</i> Royle	5	None known
<i>Medicago sativa</i> subsp. <i>falcata</i>	6	<i>Medicago falcata</i> L.
<i>Phaseolus lunatus</i> L.	7	<i>Dolichos tonkinensis</i> Bui-Quang-Chieu; <i>Phaseolus bipunctatus</i> Jacq.; <i>Phaseolus ilocanus</i> Blanco; <i>Phaseolus inamoenus</i> L.; <i>Phaseolus limensis</i> Macfad.; <i>Phaseolus lunatus</i> var. <i>lunatus</i> ; <i>Phaseolus lunatus</i> var. <i>macrocarpus</i> (Moench) Benth.; <i>Phaseolus macrocarpus</i> Moench; <i>Phaseolus portoricensis</i> Spreng.; <i>Phaseolus puberulus</i> Kunth; <i>Phaseolus rosei</i> Piper; <i>Phaseolus saccharatus</i> Macfad.; <i>Phaseolus tunkinensis</i> Lour.; <i>Phaseolus vexillatus</i> "sensu Blanco, non L."; <i>Phaseolus viridis</i> Piper; <i>Phaseolus vulgaris</i> "sensu Blanco, non L."; <i>Phaseolus xuaresii</i> Zuccagni
<i>Vigna nepalensis</i> Tateishi & Maxted	8	None known
<i>Vicia sativa</i> subsp. <i>nigra</i> (L.) Ehrh.	9	<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 & 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.
<i>Ensete glaucum</i> (Roxb.) Cheesman	10	<i>Ensete agharkarii</i> (Chakravorti) Hore, B.D.Sharma & G.Pandey; <i>Ensete calospermum</i> (F.Muell.) Cheesman; <i>Ensete giganteum</i> (Kuntze) Nakai; <i>Musa agharkarii</i> Chakravorti; <i>Musa calosperma</i> F.Muell. [Invalid]; <i>Musa gigantea</i> Kuntze; <i>Musa glauca</i> Roxb.; <i>Musa nepalensis</i> Wall.; <i>Musa troglodytarum</i> var. <i>dolioformis</i> Blanco
<i>Musa balbisiana</i> var. <i>balbisiana</i>	11	<i>Musa dechangensis</i> J. L. Liu & M. G. Liu; <i>Musa lushanensis</i> J. L. Liu; <i>Musa luteola</i> J. L. Liu; <i>Musa paradisiaca</i> Linnaeus subsp. <i>seminifera</i> (Loureiro) Baker; <i>Musa seminifera</i> Loureiro.

Appendix - Synonyms

Taxon	Sheet	Synonyms
Avena barbata Pott ex Link	12	Avena agadiriana B.R.Baum & G.Fedak; Avena alba var. barbata (Link) Maire & Weiller; Avena almeriensis Gand.; Avena atheranthera C.Presl; Avena atlantica B.R.Baum & G.Fedak; Avena canariensis B.R.Baum, Rajhathy & D.R.Sampson; Avena cypria Sibth.; Avena damascena Rajhathy & B.R.Baum; Avena hirsuta Roth; Avena hirtula Lag.; Avena hoppeana Scheele; Avena lagascae Sennen; Avena lusitanica (Tab. Morais) B.R.Baum; Avena malzevii Tzvelev; Avena matritensis B.R.Baum; Avena maxima C.Presl; Avena sallentiana Pau; Avena sativa var. barbata (Pott ex Link) Fiori; Avena serrulatiglumis Sennen & Mauricio; Avena wiestii Steud.
Avena fatua L.	13	Anelytrum avenaceum Hack.; Avena ambigua Schoenb.; Avena cultiformis (Malzev) Malzev; Avena fatua f. deserticola Hausskn.; Avena fatua f. subcontracta Yamag.; Avena fatua subsp. brevopilosa Kiec; Avena fatua subsp. cultiformis Malzev; Avena fatua subsp. glabrata (Peterm.) Piper & Beattie; Avena fatua subsp. meridionalis Malzev; Avena fatua subsp. septentrionalis (Malzev) Malzev; Avena fatua subvar. naniformis Yamag.; Avena fatua subvar. pseudonana Yamag.; Avena fatua subvar. pumila Yamag.; Avena fatua subvar. zine Yamag.; Avena fatua var. acidophila Kiec; Avena fatua var. alcaliphila Kiec; Avena fatua var. alta Kiec; Avena fatua var. altissima Kiec; Avena fatua var. elongata Malzev; Avena fatua var. glabrata Peterm.; Avena fatua var. glabrescens Coss. & Durieu; Avena fatua var. gravis Kiec; Avena fatua var. hyugaensis Yamag.; Avena fatua var. intermedia (T.Lestib.) Lej. & Courtois; Avena fatua var. leiocarpa Malzev; Avena fatua var. levis Kiec; Avena fatua var. longiflora Malzev; Avena fatua var. longispiculata Malzev; Avena fatua var. mollis Keng; Avena fatua var. nipponica Yamag.; Avena fatua var. pilosa Syme; Avena fatua var. pilosiformis Yamag.; Avena fatua var. pilosissima Gray; Avena fatua var. pseudoculta Malzev; Avena fatua var. vilis (Wallr.) Hausskn.; Avena hybrida Peterm.; Avena intermedia Lindgr.; Avena intermedia T.Lestib.; Avena japonica Steud.; Avena lanuginosa Gilib.; Avena ludoviciana subvar. glabrescens (Durieu ex Godr.) Husn.; Avena ludoviciana var. glabrescens Durieu ex Godr.; Avena meridionalis (Malzev) Roshev.; Avena meridionalis var. grandis Roshev.; Avena nigra Wallr.; Avena occidentalis Durieu; Avena patens St.-Lag.; Avena pilosa Scop.; Avena sativa subsp. fatua (L.) Fiori; Avena sativa var. fatua (L.) Fiori; Avena sativa var. sericea Hook.f.; Avena septentrionalis Malzev; Avena sterilis Delile ex Boiss.; Avena sterilis subvar. glabrescens (Durieu ex Godr.) Husn.; Avena sterilis var. glabrescens (Durieu ex Godr.) Malzev; Avena vilis Wallr.
Avena hybrida Peterm.	14	Avena fatua var. hybrida (Peterm.) Aschers.; Avena intermedia Lestib.; Avena fatua var. intermedia (Lestib.) Lej. et Court; Avena vilis Wallr.; Avena intermedia Lindgr.; Avena japonica Steud.; Avena fatua var. glabra Ducomm.; Avena fatua var. intermedia (Lindgr.) Ducomm.; Avena fatua var. contracta Hausskn.; Avena fatua var. villis (Wallr.) Hausskn.; Avena fatua var. intermedia (Lindgr.) Husnot; Avena fatua var. glabrescens Tourlet; Avena septentrionalis Malz.; Avena fatua ssp. fatua f. hybrida (Peterm.) Thell.; Avena fatua ssp. fatua f. intermedia (Lestib.) Thell.; Avena fatua ssp. meridionalis Malz.; Avena fatua ssp. septentrionalis (Malz.) Malz.; Avena fatua ssp. fatua var. vilis (Wallr.) Malz.; Avena fatua ssp. meridionalis var. elongata Malz.; Avena fatua ssp. meridionalis var. grandis Malz.; Avena fatua ssp. meridionalis var. grandis subv. scabriuscula Malz.; Avena fatua ssp. meridionalis var. longiflora Malz.; Avena fatua ssp. meridionalis var. longispiculata Malz.; Avena fatua ssp. septentrionalis var. glabella Malz.; Avena fatua ssp. septentrionalis var. glabripaleata Malz.; Avena fatua ssp. septentrionalis var. sparsepilosa Malz.; Avena fatua ssp. septentrionalis var. valdepilosa Malz. Avena meridionalis (Malz.) Roshev. [Synonymy from Baum (1977); The Plant List considers this species to be a synonym of Avena fatua L.]

Appendix - Synonyms

Taxon	Sheet	Synonyms
Eleusine indica (L.) Gaertn.	16	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 brevisubulatum Link	17	Critesion brevisubulatum (Trin.) Á.Löve; Critesion brevisubulatum subsp. nevskianum (Bowden) Á.Löve; Critesion brevisubulatum subsp. turkestanicum (Nevski) Á.Löve; Critesion iranicum (Bothmer) Á.Löve; Critesion nevskianum (Bowden) Tzvelev; Critesion turkestanicum (Nevski) Tzvelev; Critesion violaceum (Boiss. & Hohenacker) Á.Löve; Hordeum brevisubulatum var. hirtellum Z.S.Qin & S.D.Zhao; Hordeum brevisubulatum subsp. iranicum Bothmer; Hordeum brevisubulatum subsp. nevskianum (Bowden) Tzvelev; Hordeum brevisubulatum var. nevskianum (Bowden) Tzvelevonym; Hordeum brevisubulatum var. nevskianum (Bowden) C. Yen & J.L. Yang; Hordeum brevisubulatum var. puberulum (Krylov) Melderis; Hordeum brevisubulatum subsp. turkestanicum (Nevski) Tzvelev; Hordeum brevisubulatum var. turkestanicum (Nevski) P.C.Kuo; Hordeum brevisubulatum subsp. violaceum (Boiss. & Huet) Tzvelev; Hordeum iranicum (Bothmer) Tzvelev; Hordeum macilentum Steud.; Hordeum nevskianum Bowden; Hordeum secalinum subsp. brevisubulatum (Trin.) Krylov; Hordeum secalinum var. brevisubulatum Trin.; Hordeum secalinum f. puberulum Krylov; Hordeum turkestanicum Nevski; Hordeum turkestanicum var. iranicum (Bothmer) C. Yen & J.L. Yang; Hordeum violaceum Boiss. & Hohen.
Hordeum vulgare subsp. spontaneum (K. Koch) Thell.	18	None known
Oryza meyeriana var. granulata (Watt) Duist.	19	None known
Oryza nivara S.D.Sharma & Shastry Baill.	20	[Many sources consider this species to be a synonym of Oryza rufipogon Griff.]
Oryza officinalis Wall.	21	Oryza latifolia Desvaux var. silvatica Camus; Oryza minuta Presl var. silvatica (Camus) Veldkamp.
Oryza rufipogon Griff.	22	Oryza sativa Linnaeus subsp. rufipogon (Griffith) de Wet; Oryza sativa var. rufipogon (Griffith) G. Watt.
Cenchrus orientale (Rich.) Morrone	22	Pennisetum orientale Rich.; 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.

Appendix - Synonyms

d

Taxon	Sheet	Synonyms
<i>Malus rockii</i> Rehder	23	<i>Malus baccata</i> subsp. <i>himalaica</i> (Maxim.) Likhonos; <i>Malus baccata</i> var. <i>himalaica</i> (Maxim.) C.K.Schneid.; <i>Pyrus baccata</i> var. <i>himalaica</i> Maxim.
<i>Malus sikkimensis</i> (Wenz.) Koehne ex C.K.Schneid	24	<i>Malus baccata</i> subsp. <i>sikkimensis</i> (Wenz.) Likhonos; <i>Pyrus pashia</i> var. <i>sikkimensis</i> Wenz.; <i>Pyrus sikkimensis</i> (Wenz.) Hook. f.
<i>Solanum campylacanthum</i> Hochst.	25	<i>Solanum antidotum</i> Dammer; <i>Solanum astrochlaenoides</i> Dammer; <i>Solanum benguelense</i> Peyr.; <i>Solanum bojeri</i> Dunal, in DC.; <i>Solanum bojeri</i> var. <i>deckenii</i> (Dammer) Bitter; <i>Solanum bojeri</i> var. <i>houyanum</i> Bitter; <i>Solanum bojeri</i> var. <i>integrum</i> Bitter; <i>Solanum bojeri</i> var. <i>sinuatorepandum</i> Dunal, in DC.; <i>Solanum bussei</i> Dammer; <i>Solanum cufodontii</i> Lanza; <i>Solanum deckenii</i> Damme; <i>Solanum delagoense</i> var. <i>astrochlaenoides</i> (Dammer) Bitter; <i>Solanum delagoense</i> var. <i>benguelense</i> (Peyr.) Bitter; <i>Solanum delagoense</i> var. <i>fischeri</i> (Dammer) Bitter; <i>Solanum delpierrei</i> De Wild.; <i>Solanum endlichii</i> Dammer; <i>Solanum fischeri</i> Dammer; <i>Solanum goniocalyx</i> Lanza; <i>Solanum himatacanthum</i> Dammer; <i>Solanum iodes</i> Dammer; <i>Solanum macrosepalum</i> Dammer; <i>Solanum magdalenae</i> Dammer; <i>Solanum malacochlamys</i> Bitter; <i>Solanum malacochlamys</i> var. <i>transgrediens</i> Bitter; <i>Solanum maranguense</i> Bitter; <i>Solanum melongenifolium</i> Lanza; <i>Solanum merkeri</i> Dammer; <i>Solanum merkeri</i> subsp. <i>militans</i> Bitter; <i>Solanum merkeri</i> var. <i>endastrophorum</i> Bitter; <i>Solanum merkeri</i> var. <i>intermontanum</i> Bitter; <i>Solanum merkeri</i> var. <i>mediidominans</i> Bitter; <i>Solanum merkeri</i> var. <i>ruandense</i> Bitter; <i>Solanum merkeri</i> var. <i>tobleri</i> Bitter; <i>Solanum mesomorphum</i> Bitter; <i>Solanum neumannii</i> Dammer; <i>Solanum neumannii</i> var. <i>schoense</i> Bitter; <i>Solanum pembae</i> Bitter; <i>Solanum psilostylum</i> Dammer; <i>Solanum repandifrons</i> Bitter; <i>Solanum secedens</i> Dammer; <i>Solanum sennii</i> Chiov.; <i>Solanum suaveolens</i> Bojer; <i>Solanum ukerewense</i> Bitter; <i>Solanum urbanianum</i> Dammer; <i>Solanum verbascifrons</i> Bitter; <i>Solanum volkensii</i> Dammer; <i>Solanum volkensii</i> var. <i>himatiacanthum</i> (Dammer) Bitter
<i>Solanum virginianum</i> L.	26	<i>Solanum surattense</i> Burm. f.; <i>Solanum xanthocarpum</i> Schrad.