

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

Georgia



Seed Collecting Guide



MILLENNIUM
SEED BANK
PARTNERSHIP

Royal Botanic Gardens
Kew



**CROP
TRUST**

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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: Mount Shkhara CREDIT: Global Water Partnerships/Flickr;

TOP RIGHT: *Medicago marina*, CREDIT: Jean Tosti/Wikimedia;

BOTTOM LEFT: *Malus orientalis*, CREDIT: Łukasz Szczurowski/Wikimedia;

BOTTOM RIGHT: Caucasus mountains, Whl.travel/Flickr

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 programs 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

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

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International Center for Tropical Agriculture
Since 1967 *Science to cultivate change*

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.

This collecting guide has been compiled by:

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

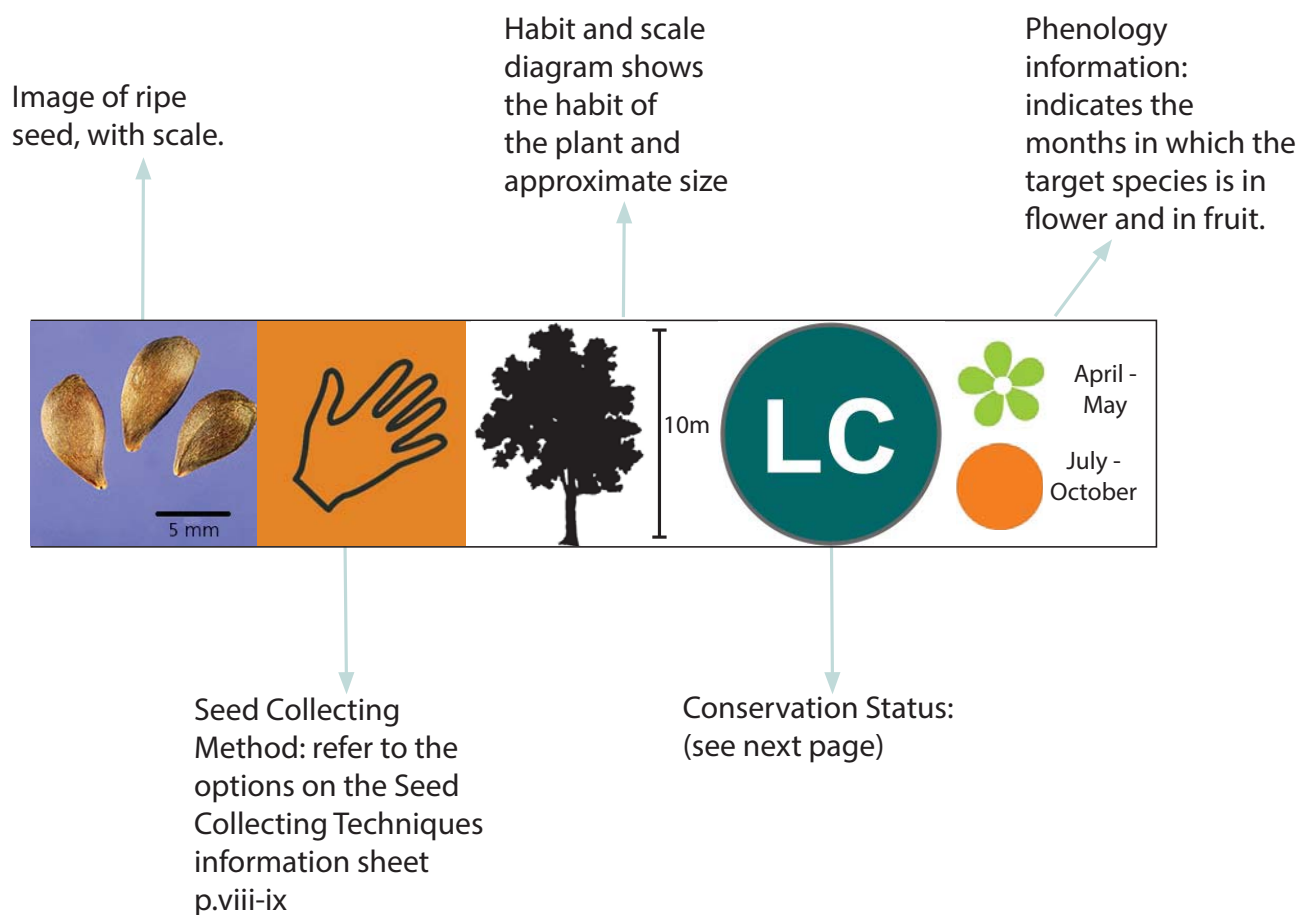
The species included in this guide are a selection of the wild relatives of the 29 key crops which this project covers. It is not a definitive guide to the Crop Wild Relatives in this country.

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

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

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

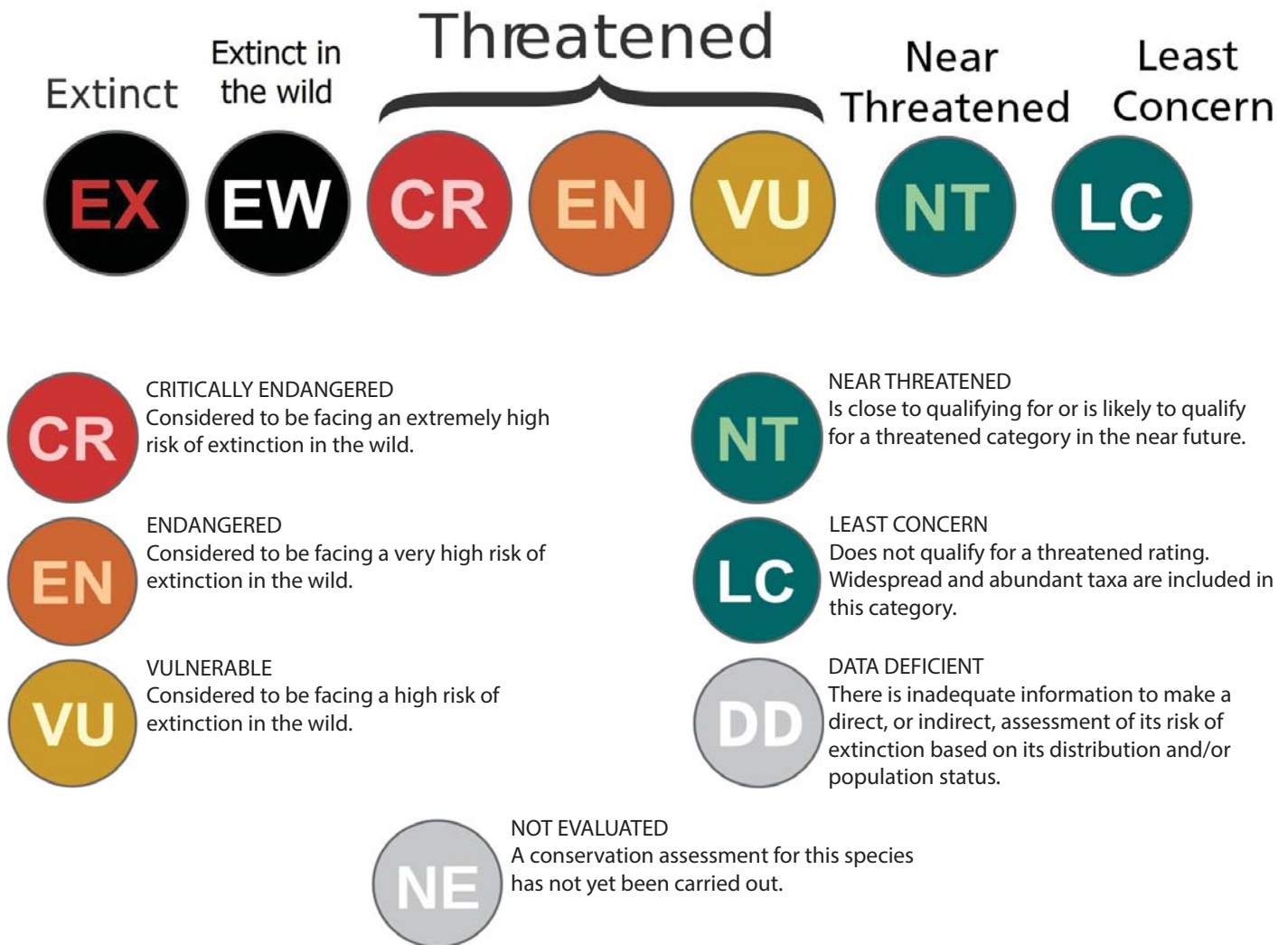
On each species profile, there is a collection of images to help identify the target species, accompanied by a series of symbols :



Conservation Assessments

Conservation Status:

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



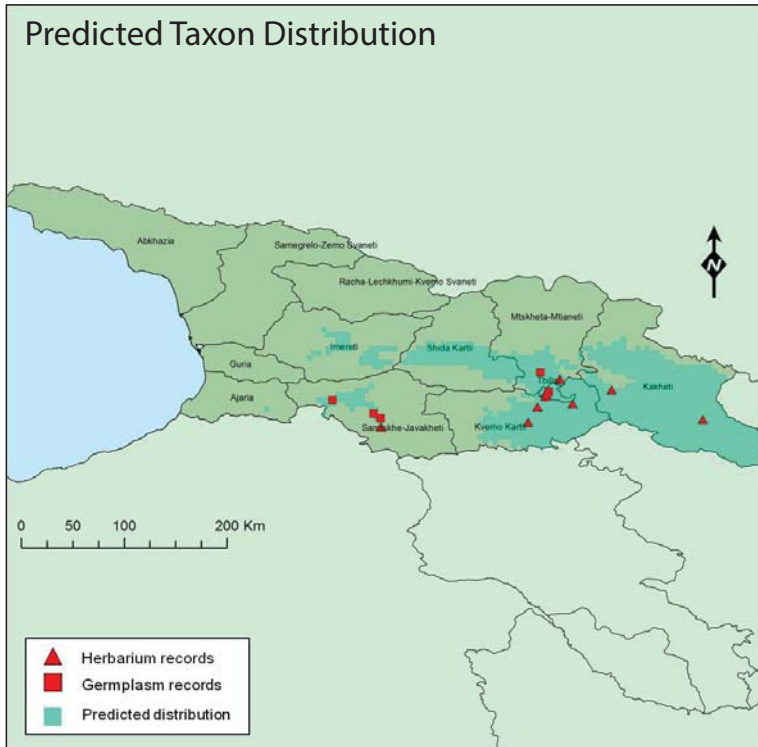
Where a full conservation assessment has not been completed, a preliminary conservation rating may be indicated. Preliminary assessments are produced using specimen locality data and GIS, which calculates two parameters accepted by IUCN as suitable measures of range: namely extent of occurrence (EOO)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

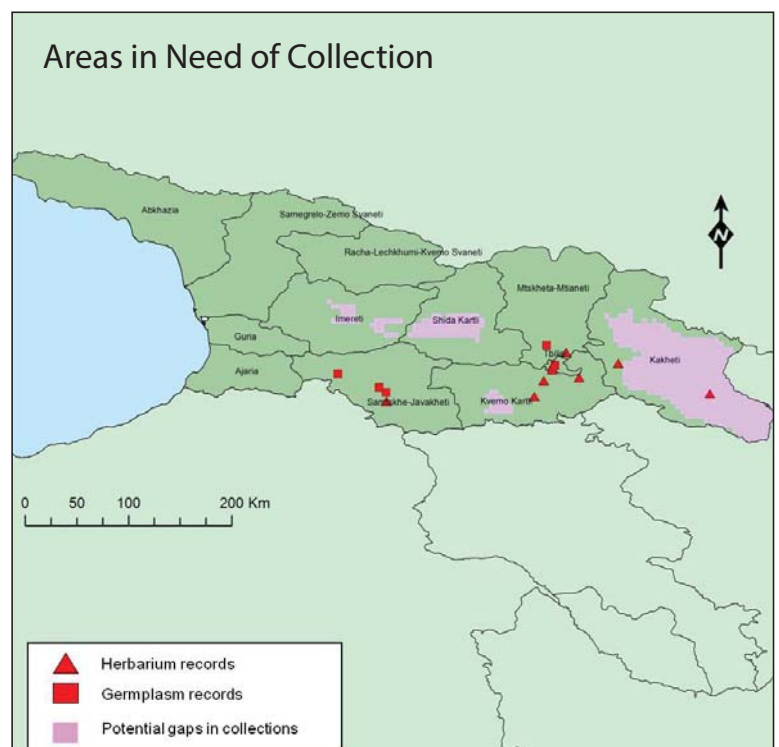


Maps

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.



Useful resources

The following resources are available online.

Kew technical information sheets

- Assessing a potential seed collection:
<http://brahmsonline.kew.org/Content/Projects/msbp/resources/Training/02-Assessing-population.pdf>
- Post-harvest handling of seed collections:
<http://brahmsonline.kew.org/Content/Projects/msbp/resources/Training/04-Post-harvest-handling.pdf>

Other sheets covering the following topics are available from

<http://brahmsonline.kew.org/msbp/Training/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 for wild species

http://ensconet.maich.gr/PDF/Collecting_protocol_English.pdf

Seed conservation: turning science into practice

<https://academic.oup.com/aob/article/95/5/888/201951>

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)

<https://iucn-csg.org/red-list-categories/>

Plants of the World Online

<http://plantsoftheworldonline.org/>

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

www.cwrdiversity.org

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)

<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.

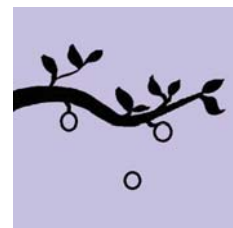


This is a very effective technique when:

- 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.

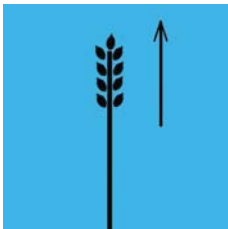
This technique may not be suitable for light, plumed seed from *Bombacaceae* and *Asclepiadaceae*, which may be carried away by air currents.



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 inflorescences (seedheads). Grasp the seedheads at the base with a gloved hand and slide the hand upwards, dislodging many or all of the seeds. This technique may introduce a proportion of immature seeds into the collection. Such seeds might need further postharvest ripening which can be time consuming and is best avoided.

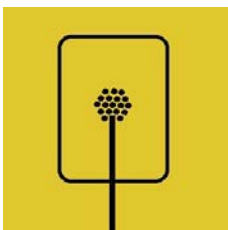


The stripping technique is most suitable for:

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

Bagging seed-heads

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



Collecting from the ground

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



In general, only collect from the ground when:

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

Collecting fleshy fruits

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



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

Containers

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

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

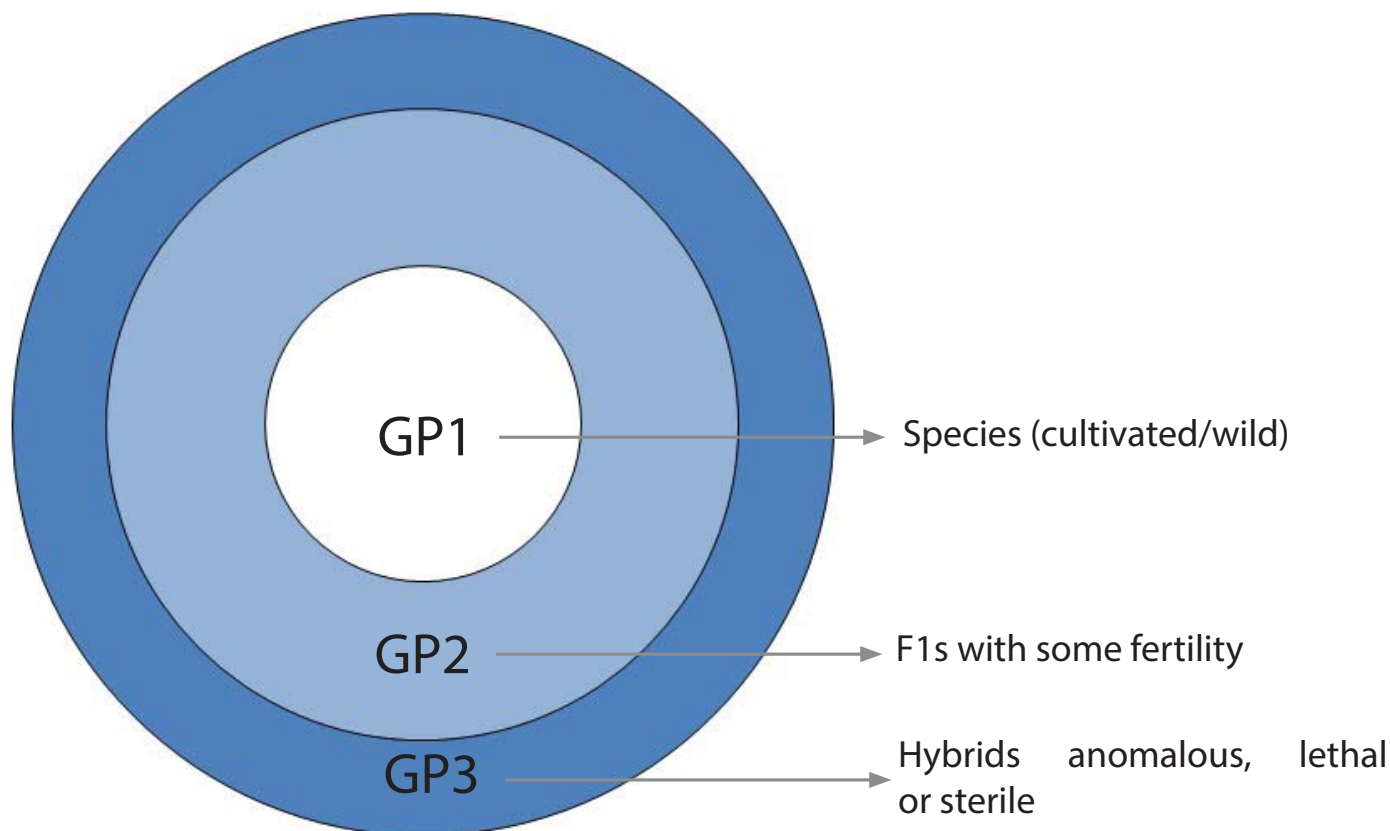
Place collections of dry, ripe seed into cloth or paper bags for transit. Store any awned seed or hooked fruit, that would damage or get stuck in cotton bags, in cardboard boxes or strong paper bags. Never collect or store seeds in plastic bags.

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

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

Gene Pool Concept

Harlan and de Wet, 1971



Taxon Group Concept

Maxted et al. 2006

Taxon Group 1 – cultivated/wild form of the crop

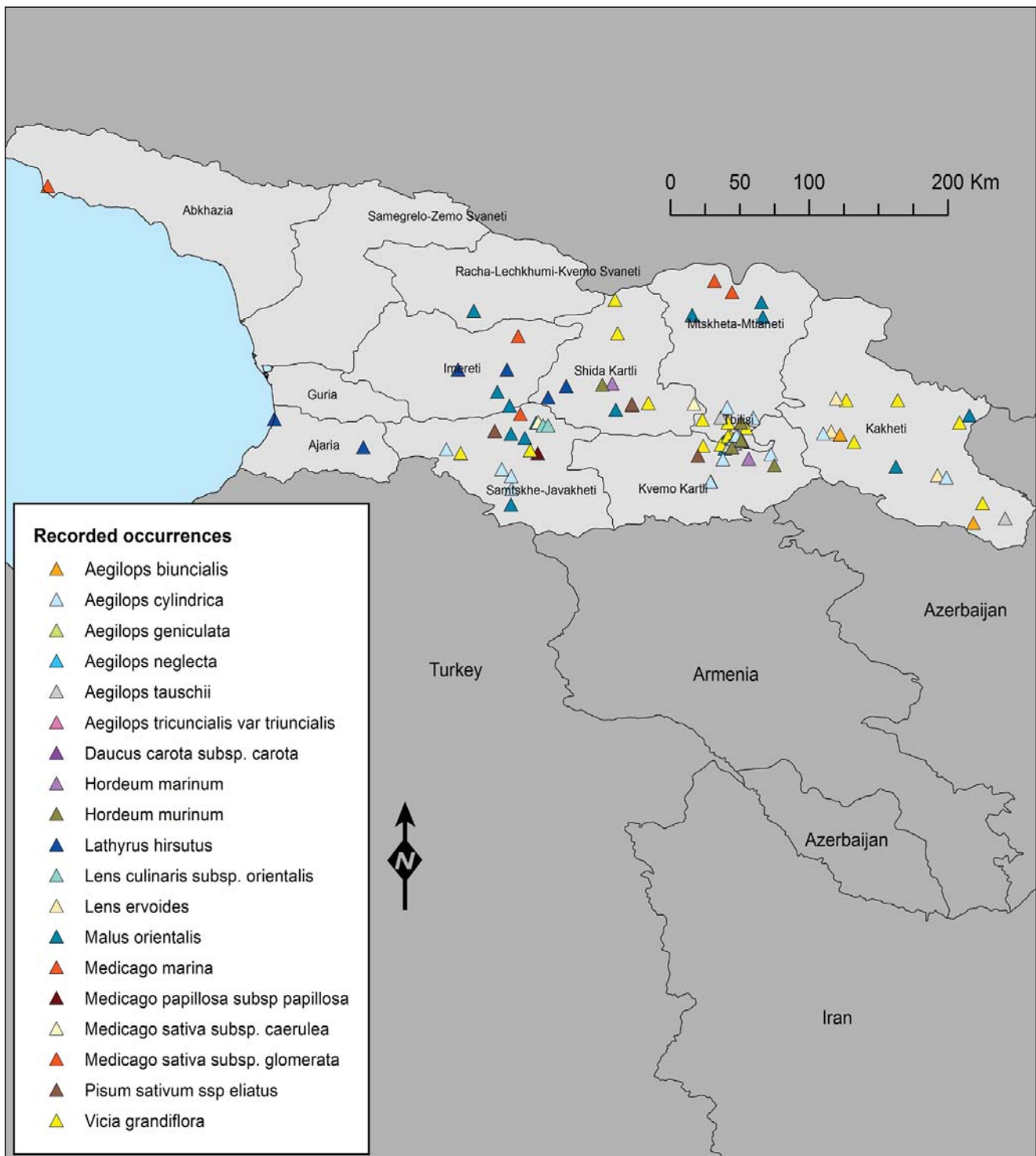
Taxon Group 2 – species in same series/section as crop

Taxon Group 3 – species in same subgenus as crop

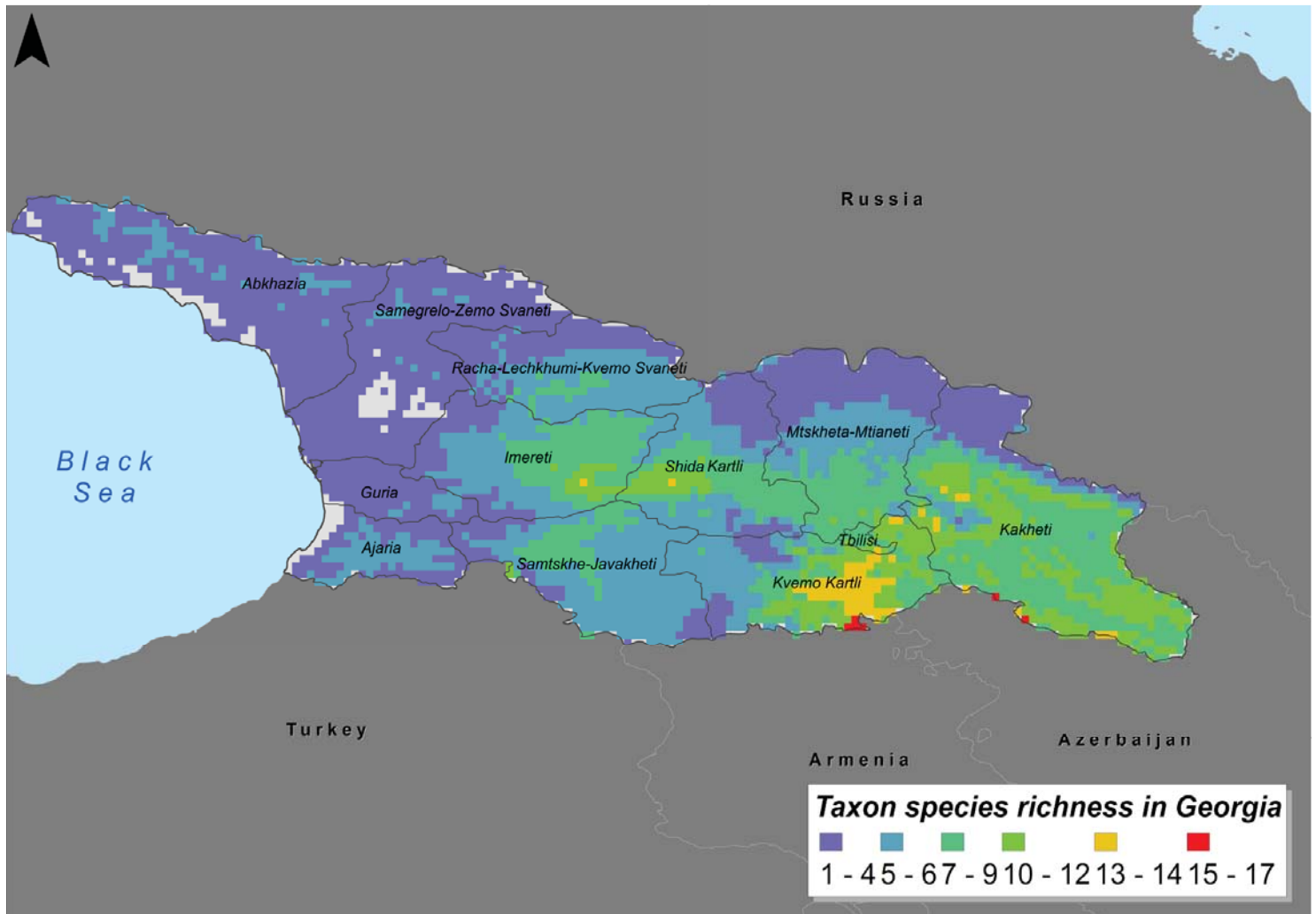
Harlan, J. and J. de Wet (1971). Towards a rational classification of cultivated plants. *Taxon* 20: 509-517.

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

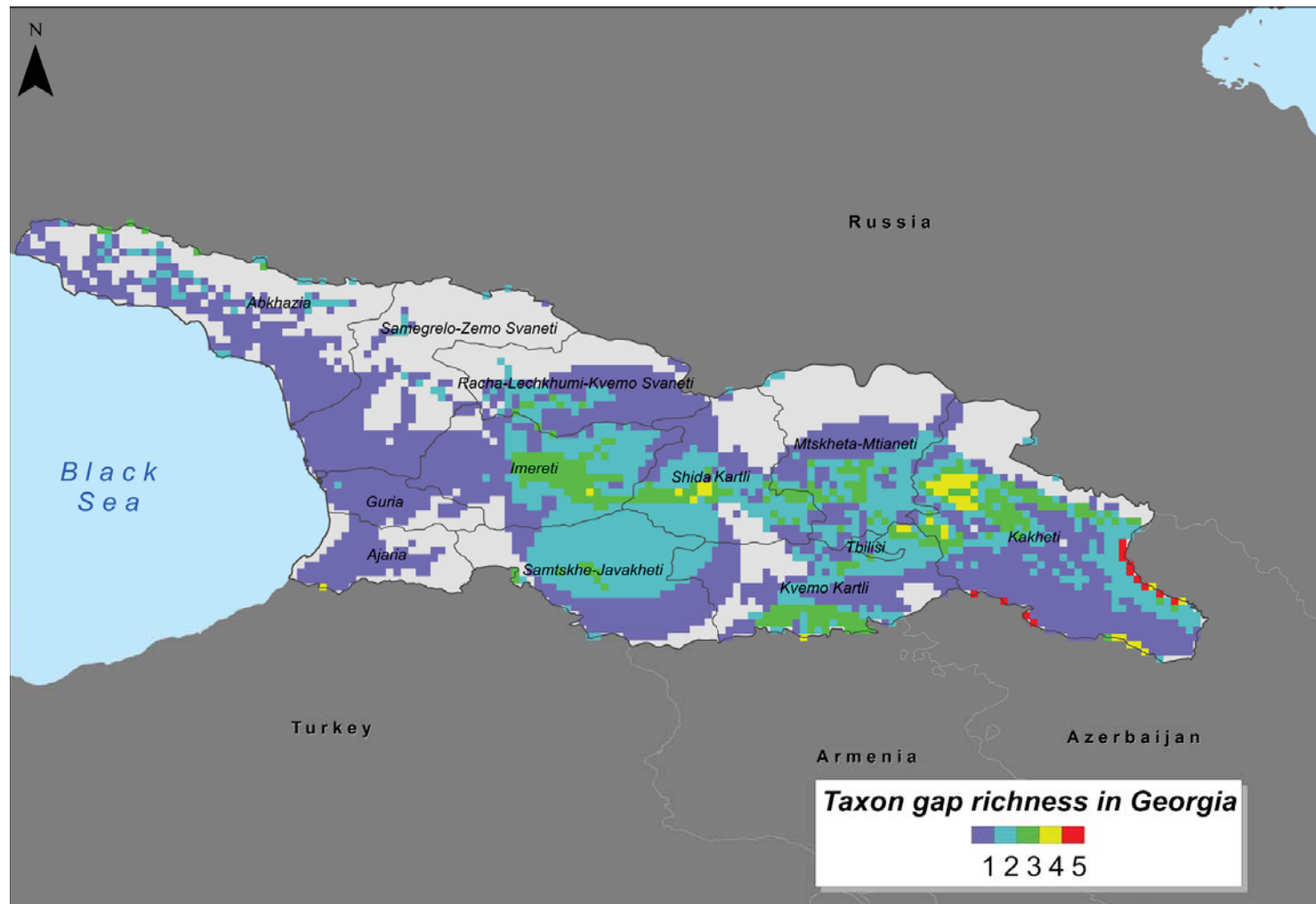
Occurrences of those taxa in this guide for which point data is available.



Species richness



Priority areas for collection



Species profiles are arranged alphabetically by family and taxon.

Family	Taxon	Genepool	Collection Priority	Sheet
Apiaceae	<i>Daucus carota</i> subsp. <i>carota</i>	Carrot	Low	1
Leguminosae	<i>Lathyrus hirsutus</i>	Grasspea	Low	2
Leguminosae	<i>Lathyrus sylvestris</i>	Grasspea	Low	3
Leguminosae	<i>Lathyrus tuberosus</i>	Grasspea	Low	4
Leguminosae	<i>Lens culinaris</i> subsp. <i>orientalis</i>	Lentil	Low	5
Leguminosae	<i>Lens ervoides</i>	Lentil	Low	6
Leguminosae	<i>Medicago littoralis</i>	Alfalfa	Low	7
Leguminosae	<i>Medicago marina</i>	Alfalfa	Low	8
Leguminosae	<i>Medicago papillosa</i> subsp. <i>papillosa</i>	Alfalfa	High	9
Leguminosae	<i>Medicago rigidula</i>	Alfalfa	Low	10
Leguminosae	<i>Medicago sativa</i> subsp. <i>caerulea</i>	Alfalfa	Low	11
Leguminosae	<i>Medicago sativa</i> subsp. <i>glomerata</i>	Alfalfa	Low	12
Leguminosae	<i>Medicago sativa</i> subsp. <i>xvaria</i>	Alfalfa	High	13
Leguminosae	<i>Pisum sativum</i> subsp. <i>elatius</i>	Pea	High	14
Leguminosae	<i>Vicia bithynica</i>	Vetch	Low	15
Leguminosae	<i>Vicia grandiflora</i>	Vetch	Low	16
Leguminosae	<i>Vicia lathyroides</i>	Vetch	Low	17
Leguminosae	<i>Vicia lutea</i>	Vetch	Low	18
Poaceae	<i>Aegilops biuncialis</i>	Wheat	Low	19
Poaceae	<i>Aegilops cylindrica</i>	Wheat	Low	20
Poaceae	<i>Aegilops geniculata</i>	Wheat	Low	21
Poaceae	<i>Aegilops neglecta</i>	Wheat	Low	22
Poaceae	<i>Aegilops tauschii</i>	Wheat	Low	23
Poaceae	<i>Aegilops triuncialis</i> var. <i>triuncialis</i>	Wheat	Low	24
Poaceae	<i>Avena eriantha</i>	Oat	Low	25
Poaceae	<i>Avena fatua</i>	Oat	Low	26
Poaceae	<i>Avena sterilis</i>	Oat	Low	27
Poaceae	<i>Hordeum marinum</i>	Barley	Low	28
Poaceae	<i>Hordeum murinum</i>	Barley	Low	29
Poaceae	<i>Secale sylvestre</i>	Rye	Low	30
Rosaceae	<i>Malus orientalis</i>	Apple	Low	31

Phenology table

Taxon	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<i>Vicia lathyroides</i>												
<i>Vicia lutea</i>												
<i>Aegilops biuncialis</i>												
<i>Aegilops cylindrica</i>												
<i>Aegilops geniculata</i>												
<i>Aegilops neglecta</i>												
<i>Aegilops tauschii</i>												
<i>Aegilops triuncialis</i> var. <i>triuncialis</i>												
<i>Avena eriantha</i>												
<i>Avena fatua</i>												
<i>Avena sterilis</i>												
<i>Hordeum marinum</i>												
<i>Hordeum murinum</i>												
<i>Secale sylvestre</i>												
<i>Malus orientalis</i>												

KEY

Species in flower

Species in fruit



Data gathered from literature and herbarium specimens

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

LEGUMINOSAE

Tertiary Gene Pool relative of *Lathyrus sativus* L.

Lathyrus hirsutus L.

Caley Pea, Winterpea,
Rough Pea, Hairy V



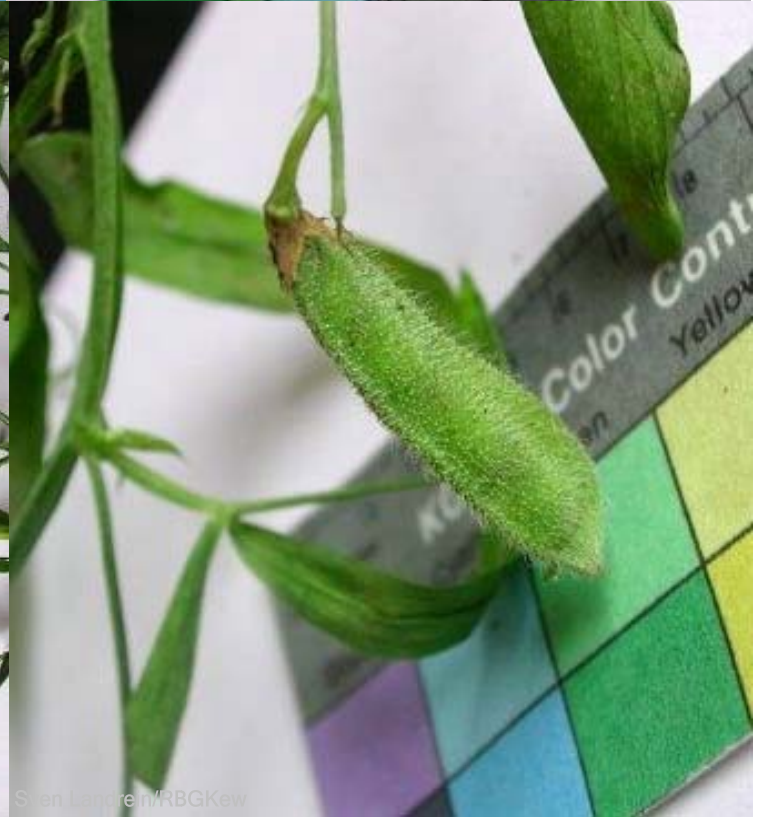
Sven Landrein/RBGKew



Sven Landrein/RBGKew



Sven Landrein/RBGKew



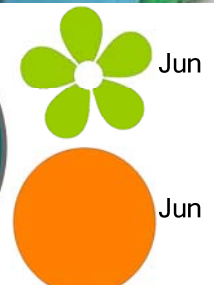
Sven Landrein/RBGKew



Steve Hurst @ USDA-NRCS
PLANTS Database



0.4-0.6
m



HABIT: Scrambling perennial herb, 0.6-2 m, stems glabrous, angled, broadly winged.

LEAVES: Glabrous, tendril branched in upper lvs, sometimes simple in lower lvs, leaflets in 1 pair, usually lanceolate to linear, rarely narrowly elliptic, narrowly acute to acuminate, 50-130 mm long, veins parallel, stipules lanceolate to linear, with 1 narrow basal lobe, <1/2 as wide as stem (c. 1-3 mm wide), (5)-10-20 mm long.

INFLORESCENCES: Larger than leaves, (2)-5-8-flowered; pedicels 4-10 mm long. Calyx glabrous, slightly or not gibbous at base; calyx teeth unequal, narrowly triangular, tube. Corolla purple-pink, 13-17 mm long.

FRUIT: Pod glabrous, brown, 8-15-seeded, 40-70 mm long.

SEEDS: Reticulate-rugose, hilum up to 1/2 of circumference.

Habitat:

On waste ground and along roadsides, on woodland edges, in scrub and grassland.

Distribution:

Throughout Europe, the Caucasus and western Russia, northern Africa.

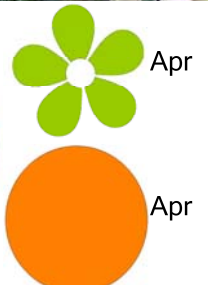
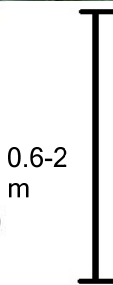
Altitude: 0 - 1000 m

<i>Lathyrus sylvestris</i>	May be confused with: <i>Lathyrus annuus</i>
Perennials; upper calyx teeth much shorter than lowest calyx tooth; corolla purplish-pink; seed surface reticulate-rugose.	Annuals; upper calyx teeth only marginally shorter than lowest calyx tooth; corolla yellow or orange; seed surface coarsely tuberculate.



All populations priority
for collection.

References: Davis, P.H. (1970) Flora of Turkey, Volume 3, p351



HABIT: Perennial scramblers, 30-80 cm tall, rootstock bearing thickened fusiform to subglobose tubers. Stems branching from the base, prostrate to erect, glabrous, wingless but often angled. Stipules semi-sagittate, 5-20 × 1-4 mm.

LEAVES: Petioles 8-14 mm long, angular. Leaflets 1-paired, ovate to obovate, glabrous, apex mucronate, venation parallel. Rachis ending in a tendril, usually branched in upper leaves.

INFLORESCENCE: Peduncles longer than leaves, often curved. Racemes loose, 2-7-flowered. Flowers 15-20 mm long; calyx campanulate, 6-7 mm, teeth equalling or shorter than tube; corolla purple-red, 1.5-2 cm long, standard subovate, shortly clawed, limb auriculate at base, wings shorter than standard.

FRUIT: Pods noddling, linear, 2-4 cm, almost cylindrical, slightly inflated, glabrous.

SEEDS: 3-10 per fruit, elliptic, finely dotted, testa dark brown, smooth.

Habitat:

Disturbed habitats, forest edges, meadows and fields.

Distribution:

Southern and Eastern Europe; Caucasus; Western and Central Asia; Russia; China.

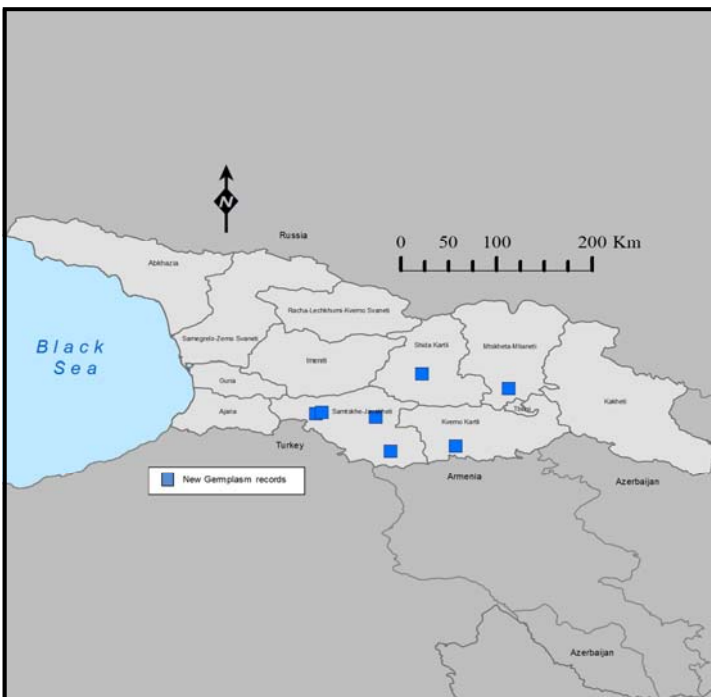
Altitude: 1000 - 1250 m

Lathyrus tuberosus

May be confused with:
Lathyrus hirsutus

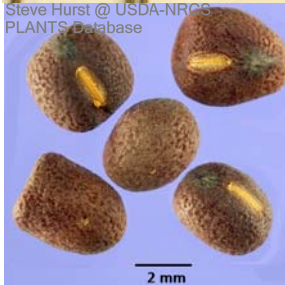
Perennial plant with tuberous rhizomes; stems not winged; corolla pink to purple, >1.5 cm long.

Annual plant; stems winged; corolla red or bluish-purple, <1.5 cm long.



All populations priority
for collection.

References: Davis, P.H. (1970) Flora of Turkey, Volume 3, p350; Komarov, V.L., ed. (1948) Flora of the USSR (English version). Volume 13, p372.



0.3-0.8 m



Jun - Aug

Jun - Aug

LEGUMINOSAE

Primary Gene Pool relative of *Lens culinaris* Medik.

Lens culinaris subsp. *orientalis* Medik.

Oriental Wild Lentil



RBG Kew

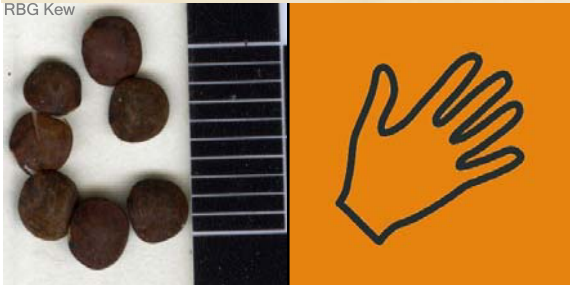


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up to
0.6m



Mar - Jun

Mar - Jun

HABIT: Suberect, straggling or climbing annual herbs, up to 0.3 m tall. Stems slender, angular, much branched.

LEAVES: 4-6 foliate; leaflets narrowly oblong or linear, 0.4-1.4 cm long, 1-4 mm wide, glabrous to thinly hairy; petiole very short to obsolete; rachis produced into a short awn or slender unbranched tendril, stipules 1-2mm.

INFLORESCENCE: 1-2 flowered (but flowers mostly solitary); calyx glabrescent or hairy; tube 1.5 mm long. Corolla pale to bright blue; standard rounded, \pm 3mm in diameter.

FRUIT: Pods oblong, very compressed, 7-9 mm long, 3.5-4 mm wide, finely puberulous to adpressed pubescent or rarely glabrescent save for ciliate margins.

SEEDS: Black and dark brown mottled, more or less circular in outline, compressed, 2-2.5mm in diameter, 1.5mm thick.

Habitat:

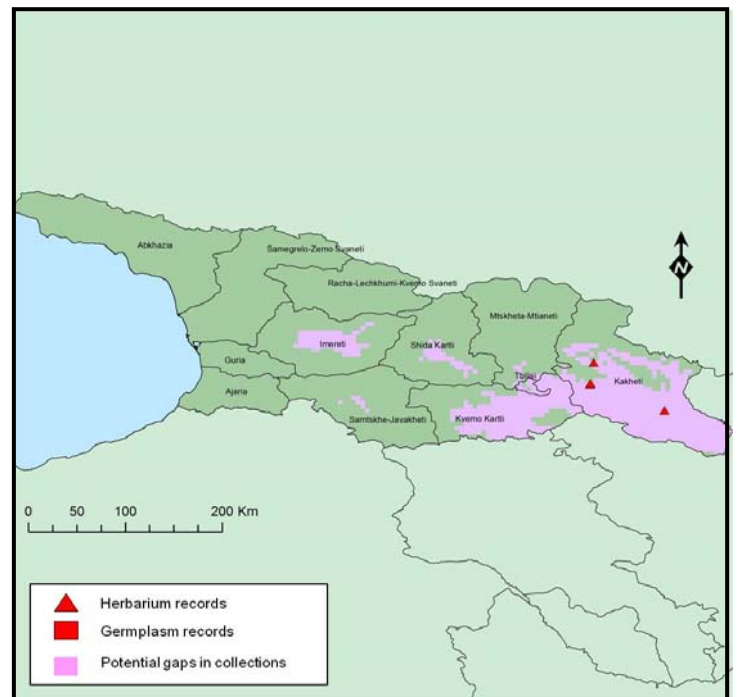
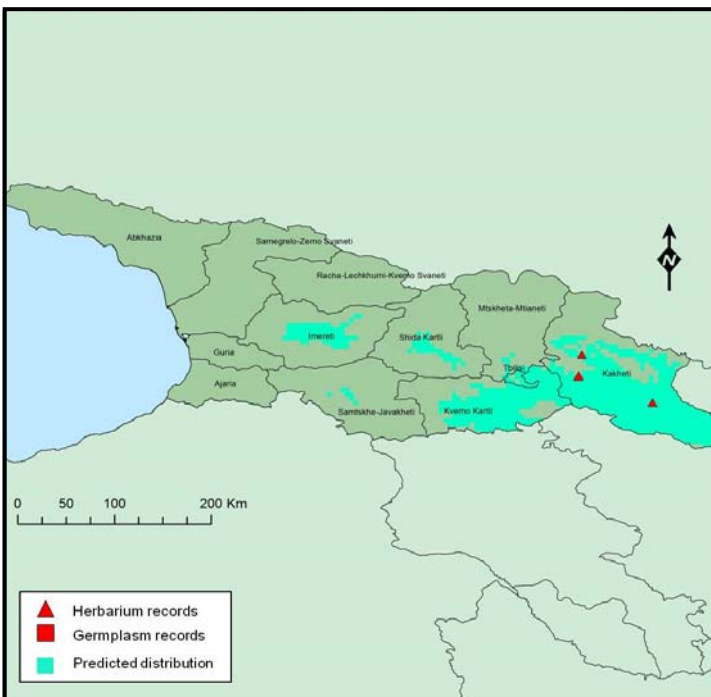
Grasslands, especially in montane areas.

Distribution:

Confined mainly to Mediterranean region, with isolated populations from Ethiopia and Uganda.

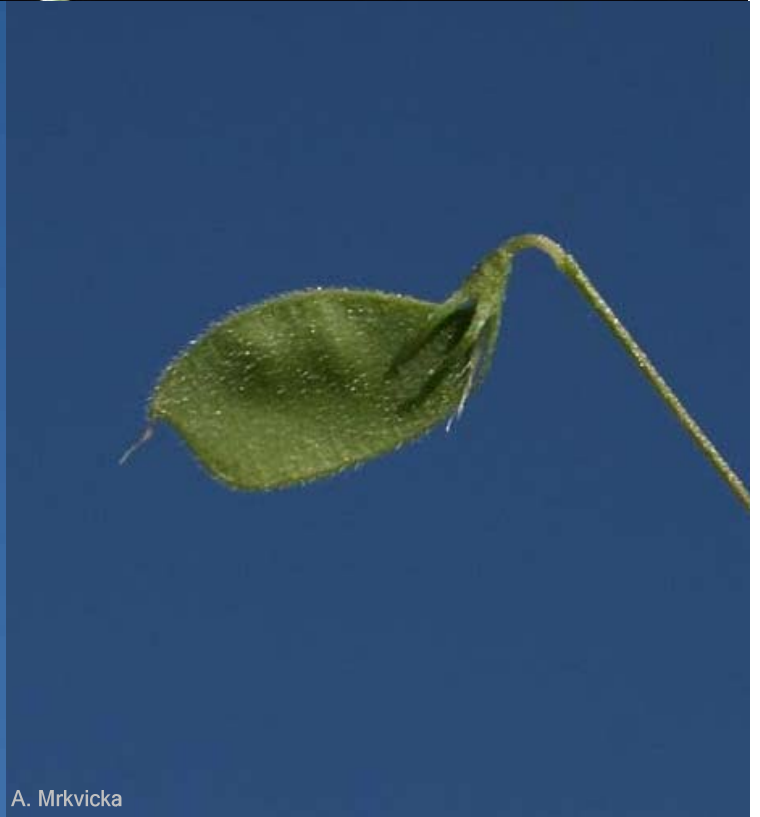
Altitude: 2300 - 2550 m

<i>Lens ervoides</i>	May be confused with: <i>Lens culinaris</i>
Leaflets glabrous to thinly hairy. Corolla +/- 3mm.	Leaflets villous on both surfaces. Corolla 4.5 - 6.5 mm.



References: Thulin, M. (1989) Fabaceae. In: Flora of Ethiopia and Eritrea. Volume 3, p249.

Ferguson, M.E., Maxted, N., van Slageren, M. & Robertson, L.D. (2000) A re-assessment of the taxonomy of *Lens* Mill. (Leguminosae, Papilionoideae, Viciae). Botanical Journal of the Linnean Society 133: 41-59.



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up to
0.3 m



Jun - Nov

Jun - Jan

HABIT: Annual, procumbent herb, ascending, branched from the base, branches 7-20(-40) cm long, vegetative parts pubescent with simple hairs. Stipules dentate to laciniate.

LEAVES: Leaflets 3-8 mm long, 2-7 mm wide, pubescent on both sides, distal margins serrate.

INFLORESCENCE: Composed of 1-3(-5) flowers, peduncle about equal to subtending petiole. Flowers 3-6 mm long; calyx with simple hairs, teeth shorter than tube; corolla yellow, about twice as long as calyx.

FRUIT: Young pod contracted and concealed within calyx. Mature pod discoid to cylindrical, glabrous, hard at maturity, 3-10 mm long, 3-7 mm wide, with 2-6(-8) adpressed coils, spiny, the spines held 90-180 degrees to pod surface, rarely overlapping. Coil surface with about 10 somewhat curving radial veins arising from ventral surface, branching slightly and entering lateral vein. Grooves along sides of dorsal suture not very pronounced.

SEEDS: 1-2 per coil, separated by transverse spongy membranes, 2.5-3.7 mm long, yellowish to brownish-yellow, reniform, surface smooth.

Habitat:

Usually found on sandy seashores, occasionally in grasslands and arid areas further inland.

Distribution:

Northern Africa, Southern and Eastern Europe, Western Asia, introduced into the Eastern USA and Australia.

Altitude: 0 - 100 m

<i>Medicago littoralis</i>	May be confused with: <i>Medicago truncatula</i>
Mature fruit glabrous; grooves either side of dorsal suture not pronounced; spines on fruit rarely overlapping.	Mature fruit with at least a few hairs; grooves either side of dorsal suture pronounced; spines on fruit usually overlapping.

Reported from Georgia, but no localities known.

All populations priority for collection.

LEGUMINOSAE

Provisional Primary Gene Pool relative of *Medicago truncatula* Gaertn.

Medicago littoralis Loisel.

Strand medic, coast medic



0.07-0.2 m



Feb - May

Mar - Jun

LEGUMINOSAE

Tertiary Gene Pool relative of *Medicago sativa* L.

Medicago marina Pall.

Coastal medic, sea alfalfa,
sea medic



Jean Tosr, via Wikimedia



RBG Kew



Jean Tosr, via Wikimedia



RBG Kew

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0.6 m

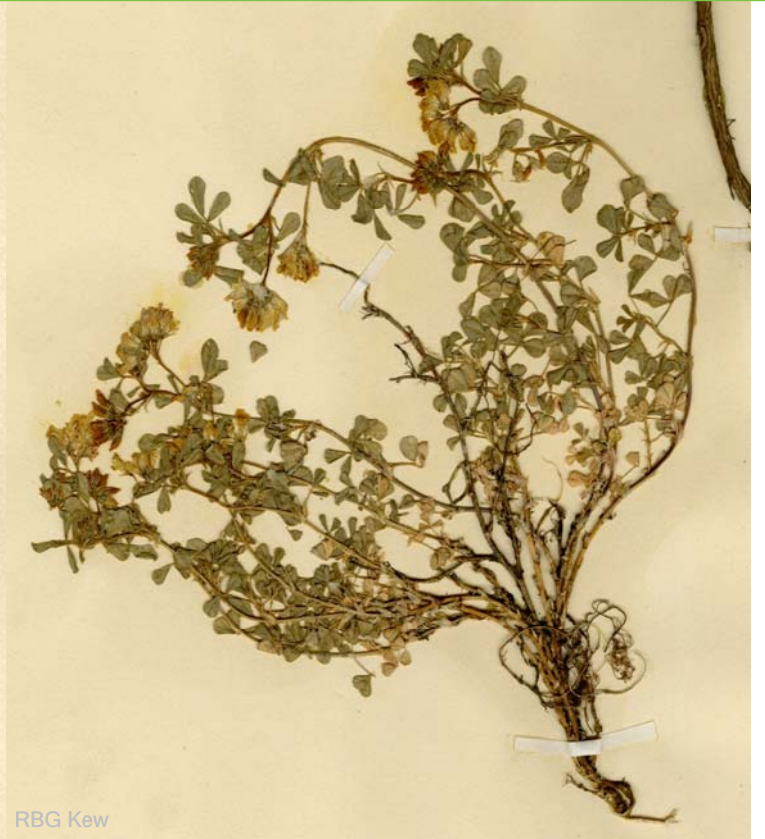
LC
PRELIM



Feb - Jun

Mar - Jun

Tertiary relative of *Medicago sativa* L.



No seed image available



0.3 m



Mar - Jul

Apr - Jul

Provisional Secondary Gene Pool relative of *Medicago truncatula* Gaertn.

Tifton medic, Tifton burclover

HABIT: Annual herb, pubescent with simple hairs, glandular hairs sometimes also present. Stems procumbent to ascending, usually branched from the base, (6-)10-40(-50) cm long. Stipules dentate to lacinate, blade divided to 1/3 to 1/4 of width, with 4-8 teeth including a long terminal tooth.

LEAVES: Leaflet blades (6-)8-12 mm long, cuneate-obovate to obovate, tips of mature leaflets usually emarginate, sometimes retuse or obtuse, margins serrate in distal half of leaflet.

INFLORESCENCES: Peduncle 1.5 to 3 times length of subtending petiole. Flowers 1-3(-6) per peduncle, pedicel about 1 mm long; calyx pubescent, shorter than corolla, lobes 60% to 80% of calyx length; corolla yellow.

FRUIT: Young fruit contracted and contained within calyx. Mature pod usually ovoid, usually pubescent, 5-10(-12) mm long, 5-10(-15) mm wide, with (4-)5-6.5(-7.5) coils, gaps present between mature coils, hard at maturity, venation on fruit surface obscure at maturity. Spines or tubercles sometimes present on edge of coils, when present 10-20 per coil, approximately oblique to pod axis.

SEEDS: 1-2 per coil, about 3-4 mm long, 1.5-2 mm wide, separated within fruit by spongy partitions, testa smooth, yellow-brown.

Habitat:

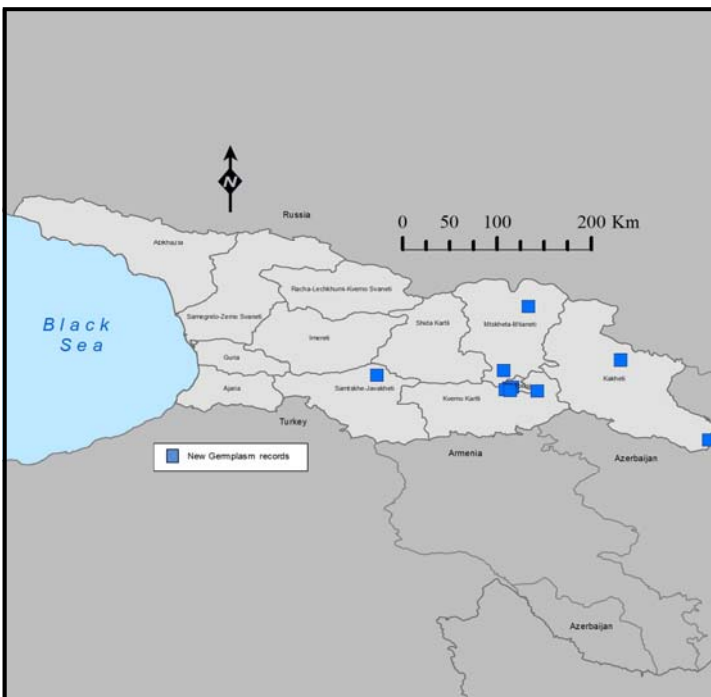
Steppes, scrubland, open woodland, disturbed ground, abandoned pastures, as a weed in crops and on roadsides.

Distribution:

Native in Northern Africa, Central and Eastern Europe; introduced in the USA.

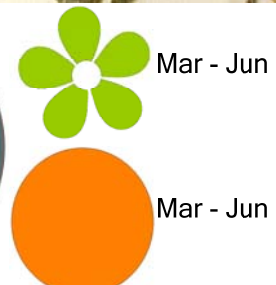
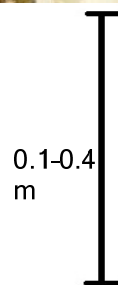
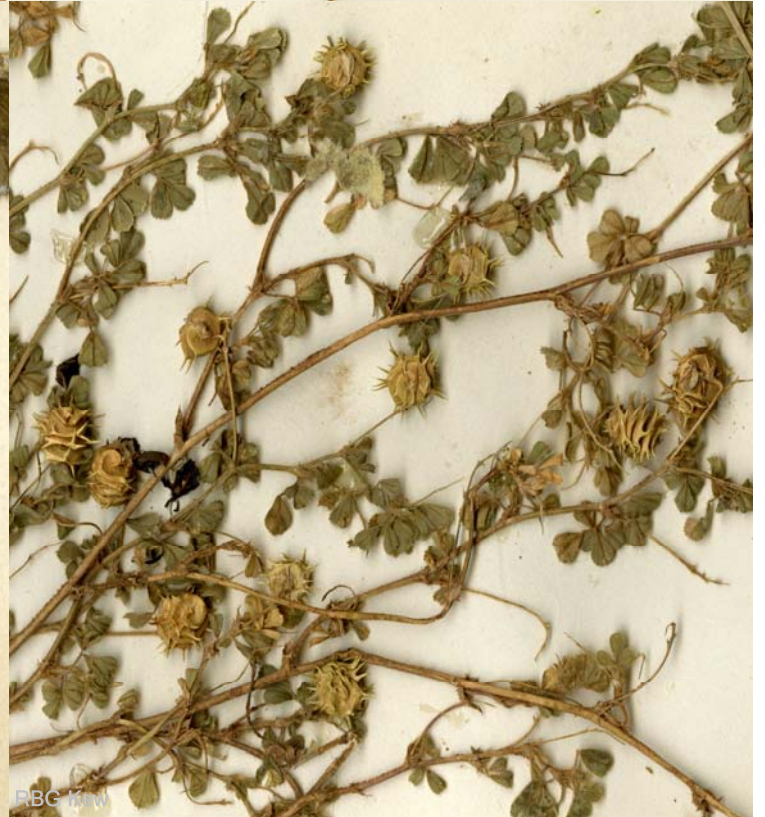
Altitude: 0 - 2150 m

<i>Medicago rigidula</i>	May be confused with: <i>Medicago rigiduloides</i>
Fruit usually with 5-8 coils; spines on fruit not prominently curved at tip, rarely reduced to tubercles or absent.	Fruit usually with 3-5 coils; spines on fruit prominently curved at tip, sometimes reduced to tubercles or absent.



All populations priority for collection.

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



HABIT: Perennial herb, stems prostrate to erect, 10-100 cm long, branching, arising from a crown, rhizome or roots. Vegetative parts usually with simple hairs, usually appressed. Stipules laceolate-acuminate, entire or basally toothed. Whole plant with a delicate appearance.

LEAVES: Leaflets 5-30 mm long, 2-15 mm wide, linear or lanceolate, apical margin serrate, more or less glabrescent above, underside more or less pubescent.

INFLORESCENCE: Composed of 3-30(-50) flowers, usually racemose, peduncle longer than subtending petiole. Flowers 5-15 mm long; calyx usually <4.5 mm long, glabrous or pubescent; corolla purple, often with a bluish tint.

FRUIT: Pod brownish, with at least 1.5 coils, coils loosely to tightly appressed, fruit intersuture width usually <1.8 mm, glandular hairs absent.

SEEDS: 2-20 per pod, ovoid to deltoid, surface smooth, 1-1.5 mm long, about 1 mm wide.

Habitat:

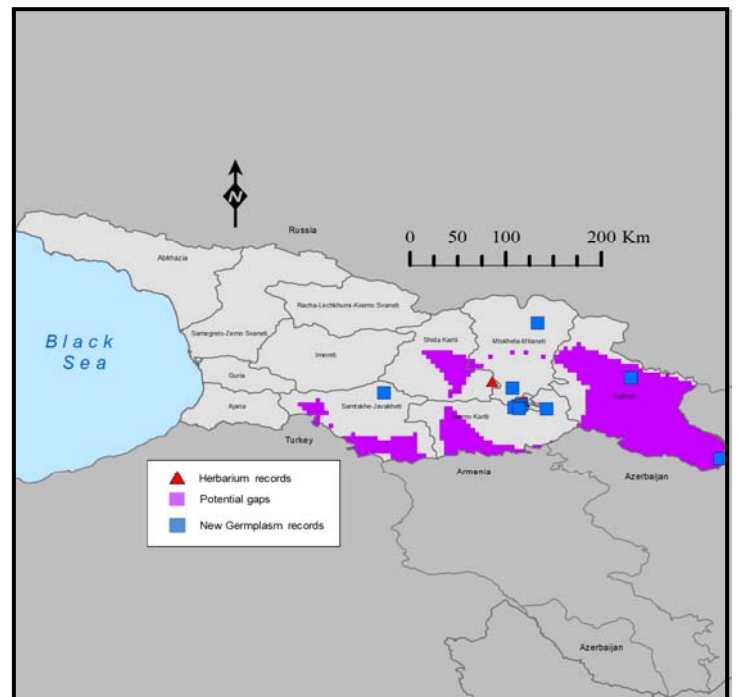
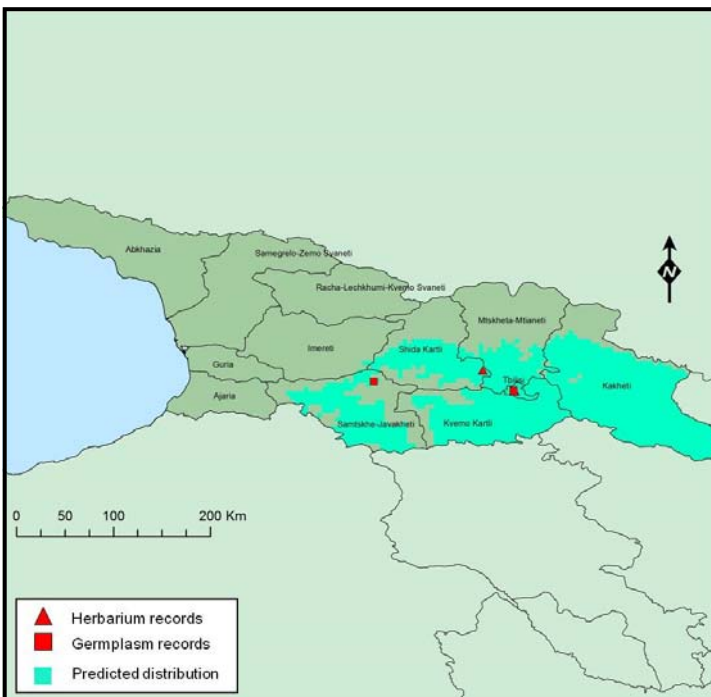
Often found in semi-deserts and saline environments, especially along the Caspian Sea coast.

Distribution:

Eastern Turkey, Iran, Eurasia as far east as Kazakhstan.

Altitude: 230 - 1480

<i>Medicago sativa</i> subsp. <i>caerulea</i>	May be confused with: <i>Medicago sativa</i> subsp. <i>sativa</i>
More delicate appearance; stronger bluish tint to the flowers and more delicate appearance; calyx (base to tip of longest lobe) usually less than 4.5 mm long; fruit intersuture width usually less than 1.8 mm.	Generally more robust appearance; purplish tint to flowers; calyx length usually more than 4.5 mm; mid-fruit intersuture width usually more than 1.8 mm.

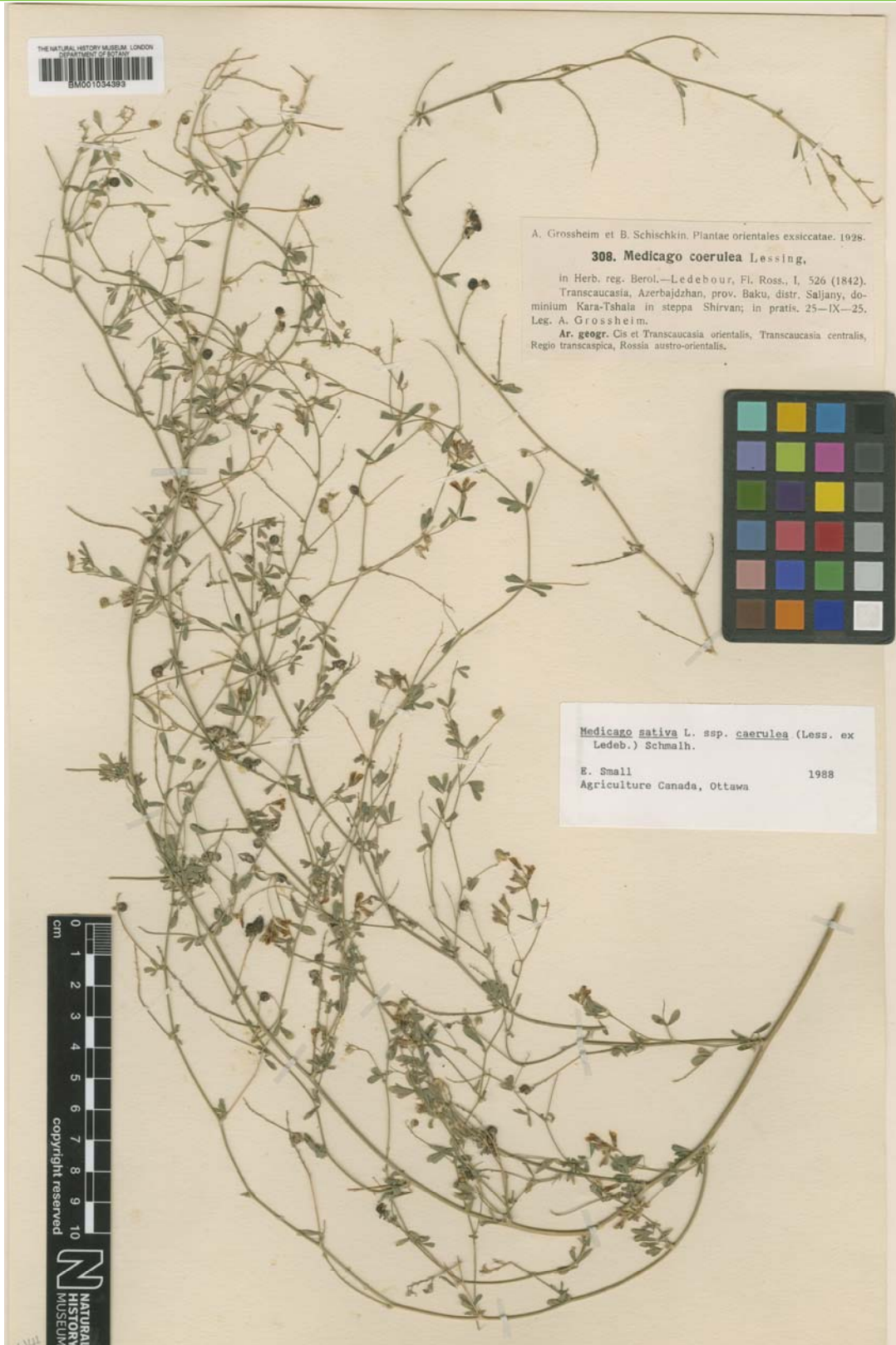


References: Small, E. (2011) Alfalfa and Relatives: Evolution and classification of *Medicago*. NRC Research Press, Ottawa.

Medicago sativa subsp. *caerulea* (Ledeb.) Schmalh.

Secondary Gene Pool relative of *Medicago sativa* L.

Blue alfalfa

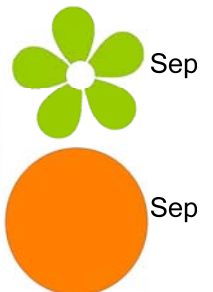


Natural History Museum London

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0.1-1
m



HABIT: Perennial herbs, stems prostrate to erect, 10-100 cm long, branching, arising from a crown, rhizome or roots. Vegetative parts with a mix of simple and glandular hairs, usually appressed. Stipules laceolate-acuminate, entire or basally toothed.

LEAVES: Leaflets 5-30 mm long, 2-15 mm wide, obovate, linear or lanceolate, apical margin serrate, more or less glabrescent above, underside more or less pubescent.

INFLORESCENCE: Composed of 3-30(-50) flowers, usually racemose, peduncle longer than subtending petiole. Flowers 5-15 mm long; calyx usually >4.5 mm long, glabrous or pubescent; corolla yellow.

FRUIT: Pod brownish, with at least 1.5 coils, coils loosely to tightly appressed, glandular hairs present, mid-fruit intersuture width usually >1.8 mm.

SEEDS: 2-20 per pod, ovoid to deltoid, surface smooth, 1-1.5 mm long, about 1 mm wide.

Habitat:

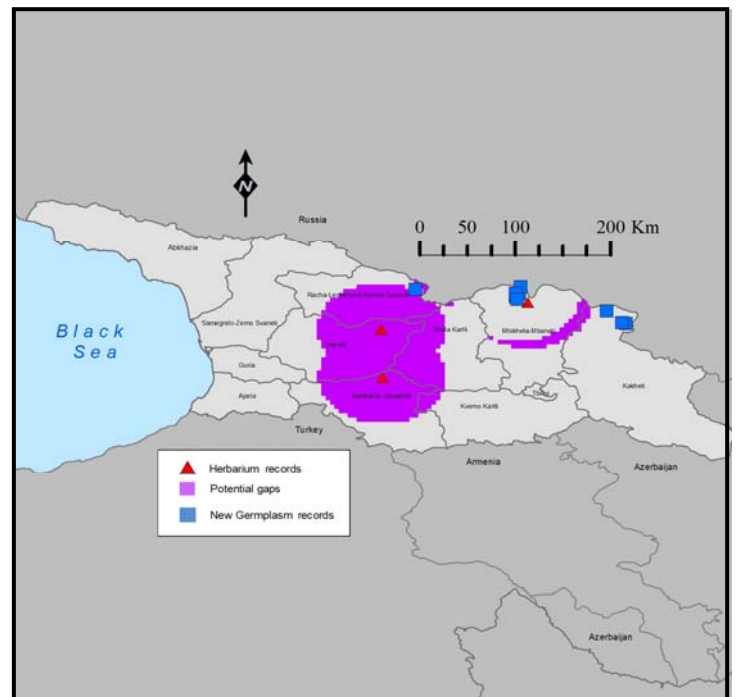
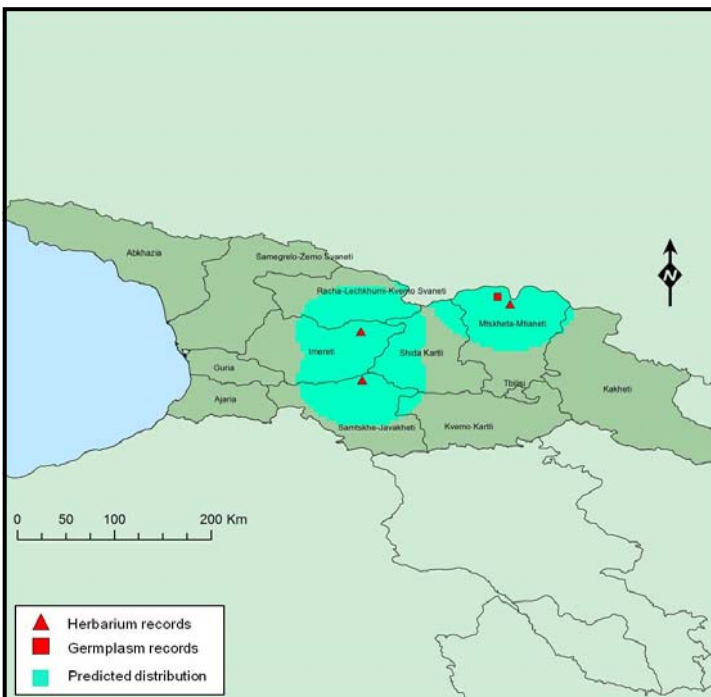
Mesic, montane areas.

Distribution:

Southern and Eastern Europe, the Caucasus region, Northern Africa.

Altitude: 1740 - 2080

<i>Medicago sativa</i> subsp. <i>glomerata</i>	May be confused with: <i>Medicago sativa</i> subsp. <i>sativa</i> and subsp. <i>caerulea</i>
Flowers yellow; fruit with gland-tipped trichomes	Flowers variegated yellow-violet, violet or bluish; fruit without gland-tipped trichomes



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



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0.1-1 m



Jun - Sep

Jun - Sep

Medicago sativa L. subsp. *varia* (Martyn) Arcang.

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

Hybrid alfaalfa, sand alfalfa

HABIT: Perennial (some annual domesticated forms), stems prostrate to erect, 10-100(150) cm long, branching, arising from a crown, rhizome, or roots. Vegetative parts of shoots more or less pubescent with simple appressed hairs, rarely also glandular hairs

LEAVES: Leaflets 5-30 mm long, 2-15 mm wide, obovate to linear or lanceolate, apical margin serrate, more or less pubescent below, more or less glabrescent above. Stipules lanceolate-acuminate, entire or basally toothed.

INFLORESCENCE: 3-30(50) flowers, usually in a raceme, peduncle longer than subtending petiole.

FLOWER: 5-15 mm long, corolla violet, yellow, yellow-orange, variegated yellow-violet, or pink, green or white. Calyx about half of length of flower, teeth about equal to length of tube, glabrous, or pubescent with simple hairs and/or glandular hairs.

FRUIT: Spineless, brownish, glabrescent or pubescent with simple hairs, straight, falcate, or with up to six coils, the coils loosely to tightly appressed, the pod face with veins running obliquely from ventral suture.

SEEDS: 2-20 per pod, ovoid to deltoid, surface smooth, yellow, brownish, greenish-yellow, or violet brown, 1-2.5 mm long, 1-1.5 mm wide, radicle slightly longer than half seed length.

Habitat:

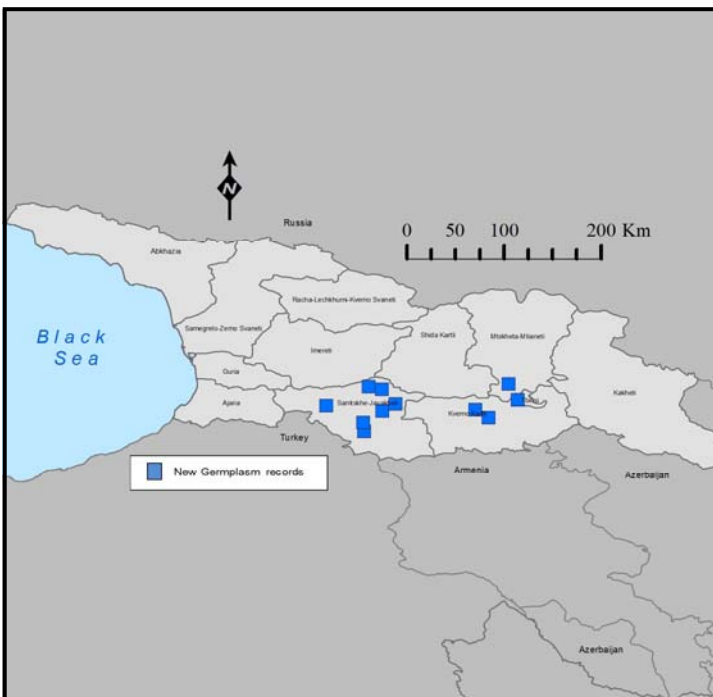
A diverse range of habitats, often occurs as a weed.

Distribution:

Russian Federation, United Kingdom, Iran, Spain, Italy, Armenia, Azerbaijan, Cyprus, Georgia, Syria, Turkey, Austria, Belgium, Switzerland.

Altitude: 620 - 2030

<i>Medicago sativa</i> subsp. <i>xvaria</i>	May be confused with: <i>Medicago sativa</i> subsp. <i>falcata</i>
Flowers variegated yellow-violet; fruit with 0.8 to 1.4 coils.	Flowers yellow; fruit falcate or straight (usually <0.5 coils)



All populations priority for collection.

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

Medicago sativa L. subsp. *varia* (Martyn) Arcang.

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

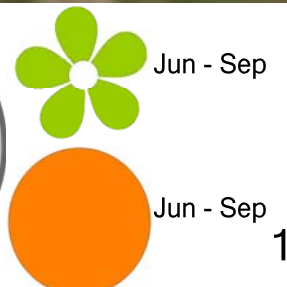
Hybrid alfaalfa, sand alfalfa



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0.1-1 m



HABIT: Annuals bearing branched tendrils, herbaceous or climbing, stems 10-200 cm long. Whole plant glabrous and often glaucous, stems terete. Stipules larger than leaflets, 1.5-8 cm long, margin irregularly dentate in lower 1/2, base rounded and semi-amplexicaul.

LEAVES: Leaflets 1-4-paired, oblong to elliptic, margins entire or denticulate.

INFLORESCENCE: Peduncle 1/4 to 4 times as long as stipules. Inflorescence 1-3-flowered, usually longer larger than leaflets, short awn sometimes present. Flowers 16-30 mm long; calyx 8-15 mm, teeth subequal, longer than tube, ovate-lanceolate, more or less acuminate; standard lilac, wings darker reddish-purple.

FRUIT: Pod oblong-linear or linear, 40-70 mm long, 7-12 mm wide, stiff, usually dehiscent, venation prominently reticulate.

SEEDS: 3-10 per fruit, at least 5 mm in diameter, globose, densely papillose.

Habitat:

Rocky or grassy slopes, abandoned land, field margins.

Distribution:

Turkey, Caucasus and Crimea, Cyprus, North Africa, Iran.

Altitude: 0 - 1700 m

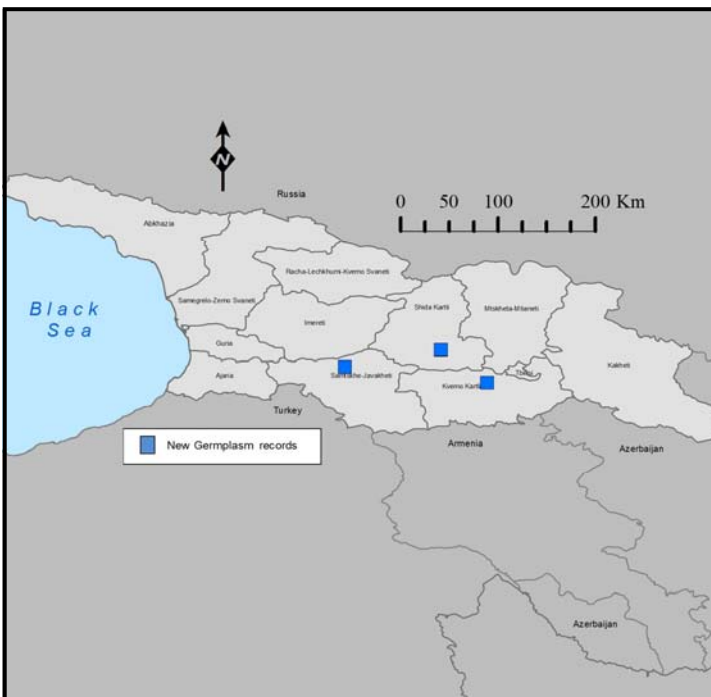
Pisum sativum subsp. elatius

Peduncles 1/4 to 4 times as long as stipules; flowers bicoloured; fruit 7-12 mm wide; seeds densely papillose.

May be confused with:

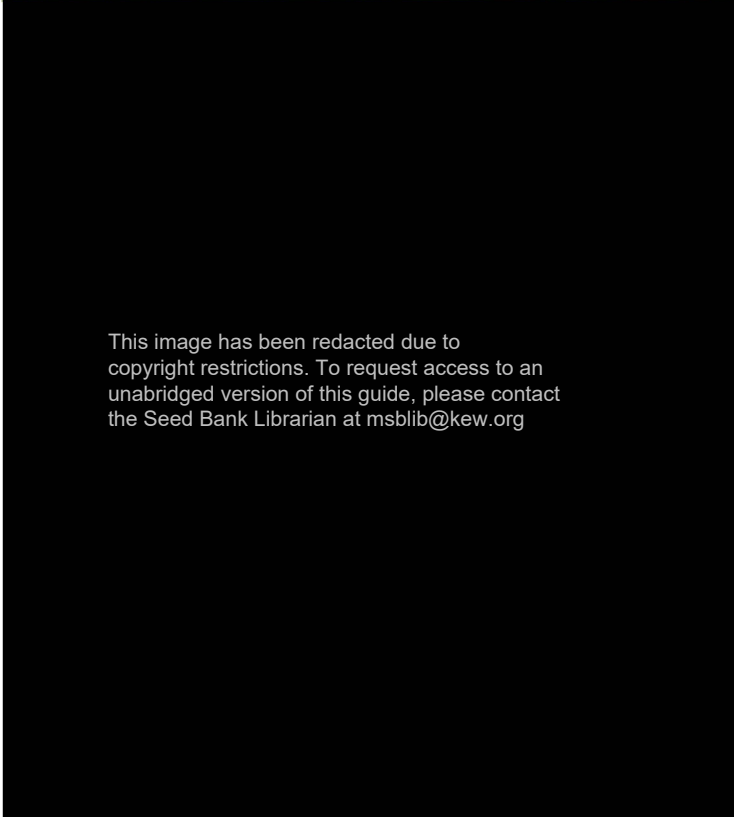
Pisum sativum subsp. sativum

Peduncle 1/2 to 2 times as long as stipules; flowers white or bicoloured; fruit 12-17 mm wide; seeds densely papillose.

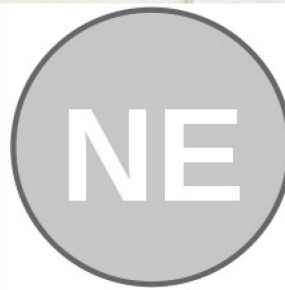


All populations priority
for collection.

References: Davis, P.H. (1970) Flora of Turkey and the East Aegean Islands, Volume 3, pp 370-371; Komarov, V.L., ed. (1948) Flora of the USSR (English version). Volume 13, pp 398-399 (as *P. elatius*).



0.5-2 m



Apr - Jun

Apr - Jun

HABIT: Annual climbers, 20-70 cm tall, branching at the base, stems slender, acutely angular. Stipules asymmetrical, sagittate, 4-26 mm by 2-16 mm, margins with 3-8 subulate teeth in apical half.

LEAVES: Leaves 12-67 mm long, tendril present at apex. Leaflets 1-3-paired, 10-70 x 2-31 mm, symmetric, those of lower leaves shorter and wider than upper leaves, margins entire.

INFLORESCENCES: Peduncles shorter than leaves, 1-69 mm, with 1-2 flowers, pedicel 1-5 mm. Flowers 11-22 mm long; calyx mouth straight, teeth subequal; all petals approximately equal length, standard blue or purple, stenonychioid (lamina contacting into a narrow claw and no distinct constriction between lamina and claw), upper standard surface glabrous, wing marking absent, wing limb slightly folded at base.

FRUIT: Pod 23-47 mm by 6-11 mm, rhomboid, laterally flattened, sutures parallel, valves pubescent, hairs swollen at the base, septa present.

SEEDS: 2-7 per fruit, round, not laterally flattened, hilum <1/4 of seed circumference, lens positioned near hilum, testa smooth.

Habitat:

Agricultural and disturbed land, rarely on woodland edges.

Distribution:

Western and Eastern Europe, Turkey, Iran and Caucasus.

Altitude: 0 - 750 m

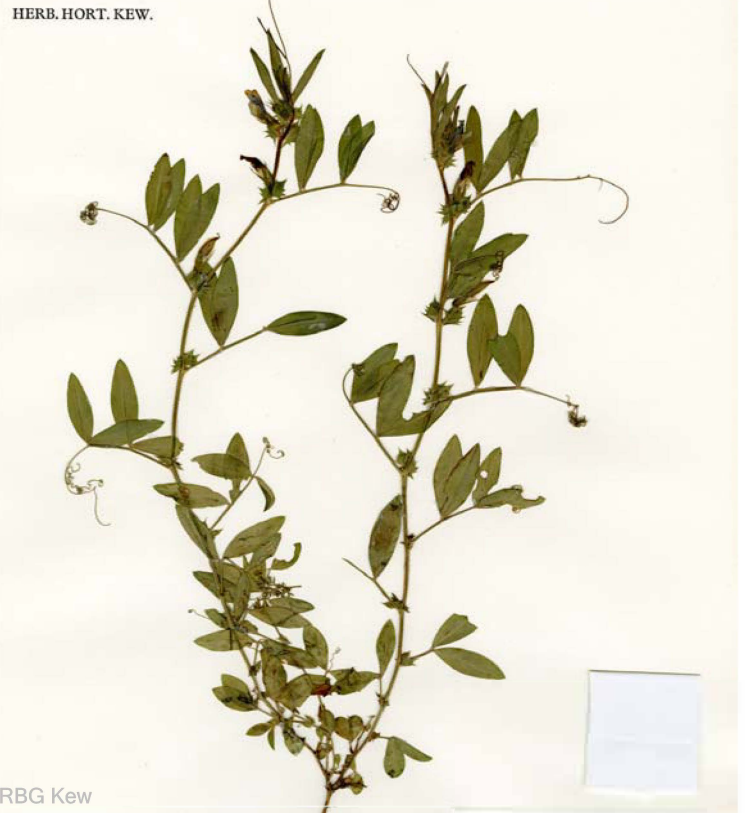
<i>Vicia bithynica</i>	May be confused with: <i>Vicia narbonensis</i>
Stipules ovate; leaflets narrowly ovate to linear; calyx teeth subequal; peduncle usually longer than calyx.	Stipules orbicular; leaflets broadly ovate or obovate; calyx teeth unequal, peduncle rarely longer than calyx.

Reported from Georgia, but no localities known.

All populations priority for collection.

Tertiary Gene Pool relative of *Vicia faba* L.

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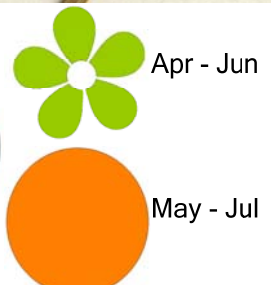
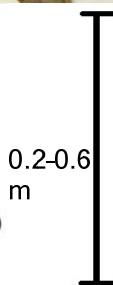


0.2-0.7
m



Mar - May

Mar - Dec



Wild relative of *Vicia sativa* L.

Spring vetch

HABIT: Scrambling annual, stems slender. Stipules entire or semi-hastate, 2-6.5 mm by 1-4 mm, margins entire or with 1 or 2 teeth.

LEAVES: Leaves 3-48 m long, apex with a tendril, 2-12 leaflets per leaf. Leaflets 2-23 mm long by 1-9 mm wide, symmetric, margins entire.

INFLORESCNCE: Flowers usually solitary, peduncle 1-2 mm, pedicel 1-2 mm; calyx mouth straight, teeth subequal, base not gibbous; all petals approximately equal, purple to pinkish, shape stenonychioid, claw bowing absent, wing marking absent, wing limb without basal folding.

FRUIT: Pod 13-35 mm long by 3-5 mm wide, linear, more or less laterally flattened, sutures parallel or curved, valves glabrous, septa absent.

SEEDS: 4-8(-12) per pod, rounded in cross section, hilum < 1/4 of seed circumference, testa surface rough.

Habitat:

A weed of lawns and grazed pastures, open woodland and disturbed land.

Distribution:

From the UK and Scandinavian, eastwards to Turkey, the Caucasus and Iran, southwards to Jordan and Israel.

Altitude: 10 - 1500 m

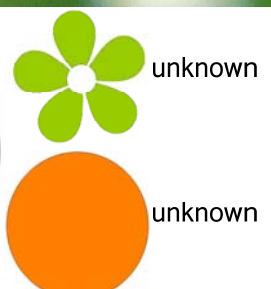
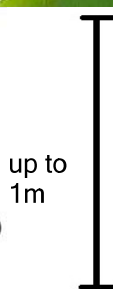
<i>Vicia lathyroides</i>	May be confused with: <i>Vicia cuspidata</i>
Flowers 9-15 mm; fruit more or less straight, only slightly beaked at distal end; seed surface tuberculate.	Flowers 5-12 mm; fruit curved, strongly beaked at distal end; seed surface ruminant-reticulate.

Reported from Georgia, but no localities known.

All populations priority for collection.

References: Macted, N. (1995) An Ecogeographical Study of *Vicia* subgenus *Vicia*. Systematic and Ecogeographic Studies on Crop Genepools 8. International Plant Genetic Resources Institute, p57.

Wild relative of *Vicia sativa* L.



HABIT: Annual scrambling herbs, 20-80 cm tall, stems branching at base, vegetative parts usually sparsely hairy. Stipules 2.5-4 mm long, triangular-ovate to semi-hastate.

LEAVES: Leaflets 6-8(-10)-paired, 10-25 x 20-50 mm, oblong, lanceolate or linear, apex rounded or truncate.

INFLORESCENCE: Axillary, flowers 1-3, subsessile. Flowers 18-21 mm long; calyx tubular-campanulate, obliquely truncate, tube 4-6.5 mm, teeth linear; corolla 20-30 mm, yellow, often purple-tinged, glabrous, wings shorter than standard.

FRUIT: Pods elliptic to oblong-rhomboid, 25-35 x 7-14 mm, with stiff hairs arising from conspicuous tubercles with stalk-like bases 1-2 mm across. Seeds 3-6 per fruit, subglobose, testa black or brown, hilum about 1/2 circumference.

Habitat:

Disturbed and agricultural land, open woodland.

Distribution:

Western and Southern Europe, Northern Africa and the Middle East.

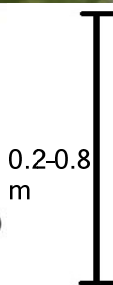
Altitude: 5 - 2200 m

<i>Vicia lutea</i>	May be confused with: <i>Vicia hybrida</i>
Corolla standard upper surface glabrous; fruit pubescent only on valves.	Corolla standard upper surface pubescent; fruit pubescent all over.

Reported from Georgia, but no localities known.

All populations priority for collection.

Taxon Group 2 relative of *Vicia pannonica* Crantz



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

HABIT: Annual, caespitose. Culms ascending, 10-40 cm long.

LEAVES: Leaf-sheaths pilose, oral hairs ciliate. Leaf-sheath auricles falcate. Ligule an eciliate membrane. Leaf-blades 2-5 cm long; 2-3 mm wide, surface glabrous, or pilose.

INFLORESCENCES: Racemes single, lanceolate, bilateral, 1.5-2 cm long, bearing 2(-3) fertile spikelets. Deciduous as a whole. Rhachis tough. Spikelet packing broadside to rhachis, with upper internodes elongated.

Basal sterile spikelets 1-2, rudimentary. Fertile spikelets comprising 4-5 fertile florets, with diminished florets at the apex. Spikelets narrowly obovoid-ellipsoid, laterally compressed, 8-11 mm long, falling entire, deciduous with accessory branch structures. Glumes similar, shorter than spikelet. Lower glume oblong, or obovate; 7-10 mm long; 1 length of upper glume; coriaceous; without keels, 7-9 -veined. Lower glume lateral veins unequally thickened, ribbed, surface pubescent, or pilose, apex truncate, 2-3 -awned. Awns increasing in length towards inflorescence apex.

FLORETS: fertile lemma oblong; 8-11 mm long, coriaceous, without keel, 5 -veined. Lemma apex dentate, 1-2 -fid, 1-2 -awned.

FLOWER: Lodicules 2. Ovary pubescent on apex.

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

Habitat:

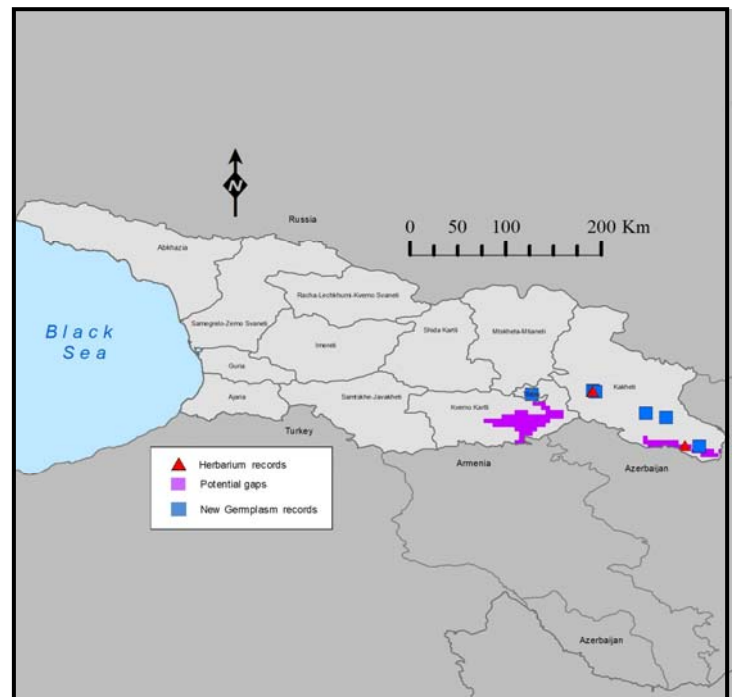
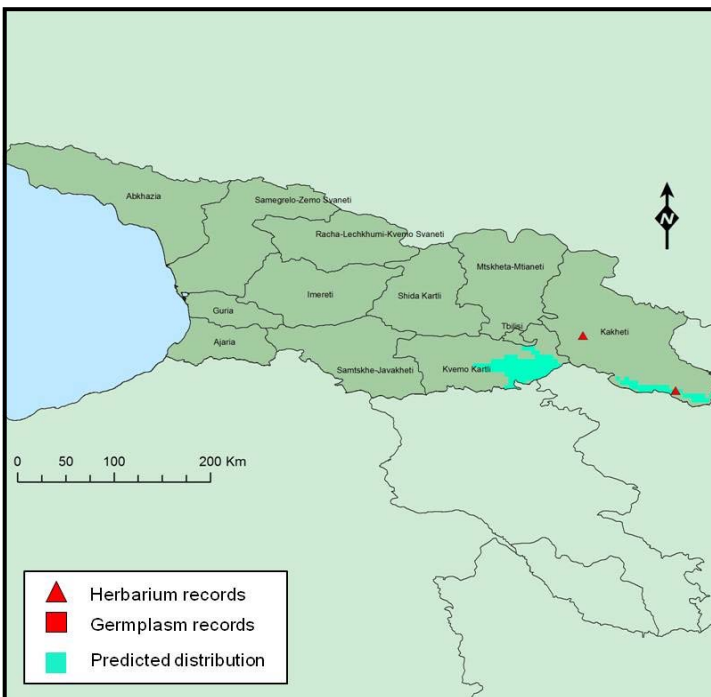
Usually found in dry and disturbed habitats e.g. roadsides, edges of cultivated land and forest, grasslands, steppe maquis, rocky mountain slopes.

Distribution:

Europe: southwestern, southeastern, and eastern.
Africa: north and Macaronesia. Asia-temperate: Soviet Middle Asia, Caucasus, and western Asia.

Altitude: 150 - 1030 m

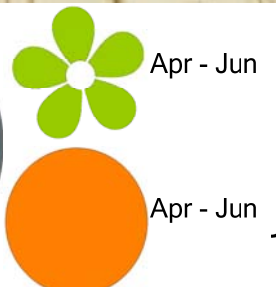
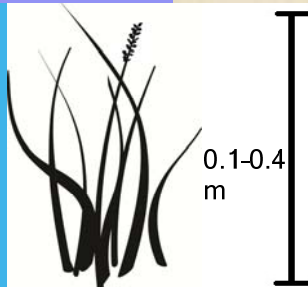
<i>Aegilops biuncialis</i>	May be confused with: <i>Aegilops geniculata</i>
Spikelets 2(-3), all fertile, narrowly obovoid-ellipsoid, not constricted above; glume apex with 2-3 awns, longer towards apex of inflorescence.	Spikelets (2-)3-4, upper one sterile, lowest 1-3 subventricose, widest at or below the middle, constricted above; glume apex with (3-)4-5 awns, becoming shorter towards apex of inflorescence.

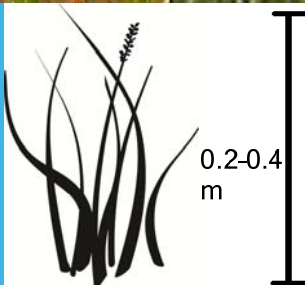
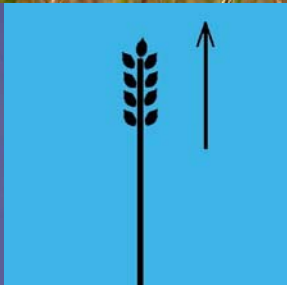


References: Slageren, M.W. van (1994) Wild Wheats: A Monograph of *Aegilops* L. and *Amblyopyrum* (Jaub. & Spach) Eig. Wageningen Agricultural University Papers; GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>.



No seed image available





HABIT: Annual; caespitose. Culms geniculately ascending; 10-30 cm long.

LEAVES: Leaf-sheath oral hairs ciliate, auricles falcate. Ligule an eciliate membrane. Leaf-blades 4-8 cm long; 1.5-3 mm wide, surface pubescent. Inflorescence composed of racemes; deciduous as a whole.

INFLORESCENCES: Racemes single, obovate, bilateral, 1-2 cm long, 4-9 mm wide, bearing 2(-3) fertile spikelets on each. Rhachis tough. Spikelet packing broadside to rhachis. Spikelets solitary. Fertile spikelets sessile. Basal sterile spikelets rudimentary, 1-2 in number. Apical sterile spikelets barren; 2-3 in number; 2-3 mm long. Fertile spikelets comprising 3 fertile florets, with diminished florets at the apex. Spikelets ovate, laterally compressed, 7-11 mm long, falling entire, deciduous with accessory branch structures. Glumes similar, shorter than spikelet. Lower glume oblong, 6-10 mm long, 1 length of upper glume, coriaceous, without keels, 7-9 -veined. Lower glume lateral veins unequally thickened, ribbed. Lower glume surface scabrous, rough on veins, pubescent. Lower glume apex truncate, 3-4(-5) -awned.

FLORETS: Fertile lemma oblong; 7-11 mm long; coriaceous; without keel; 5 -veined. Lemma apex dentate; 3 -fid; 3 -awned.

FLOWER: Lodicules 2. Ovary pubescent on apex.

FRUIT: Caryopsis with adherent pericarp; hairy at apex. Disseminule comprising an inflorescence.

Habitat:

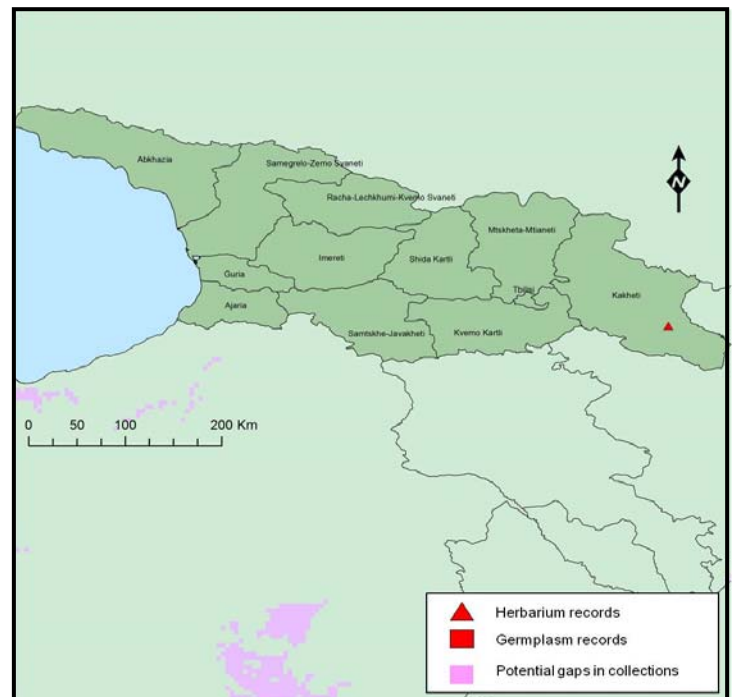
Dry, disturbed habitats e.g. wastelands, formerly cultivated sites, roadsides, dry rocky slopes, field edges, woodland, forest and scrub.

Distribution:

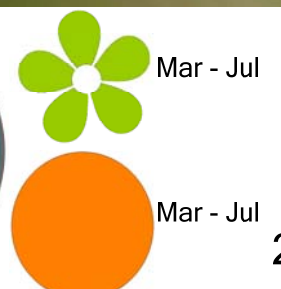
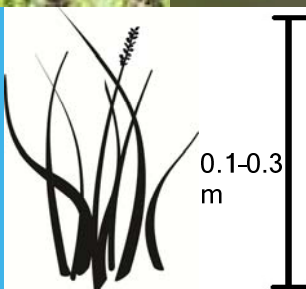
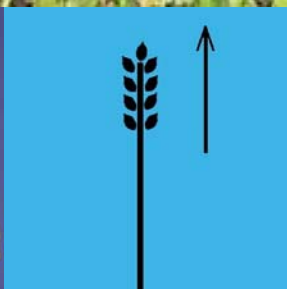
Europe: southwestern, southeastern, and eastern. Africa: north and Macaronesia. Asia-temperate: Caucasus and western Asia.

Altitude: 100 - 1200 m

<i>Aegilops geniculata</i>	May be confused with: <i>Aegilops biuncialis</i>
Spikelets (2-)3-4, upper one sterile, lowest 1-3 subventricose, widest at or below the middle, constricted above; glume apex with (3-)4-5 awns, becoming shorter towards apex of inflorescence.	Spikelets 2(-3), all fertile, narrowly obovoid-ellipsoid, not constricted above; glume apex with 2-3 awns, longer towards apex of inflorescence.



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



HABIT: Annual, caespitose. Culms geniculately ascending; 25-35 cm long.

LEAVES: Leaf-sheath oral hairs ciliate, auricles falcate. Ligule an eciliate membrane. Leaf-blades 2-6 cm long; 2.5-3 mm wide, surface pilose, margins ciliate. Inflorescence composed of racemes, deciduous as a whole. **INFLORESCENCE:** Racemes single, obovate, bilateral, 3-6 cm long, bearing 2(-3) fertile spikelets on each. Rhachis tough. Spikelet packing broadside to rhachis. Spikelets solitary. Fertile spikelets sessile. Basal sterile spikelets rudimentary, 3 in number. Apical sterile spikelets barren, 1-2 in number, 1-2 mm long. Fertile spikelets comprising 2 fertile florets, with diminished florets at the apex. Spikelets elliptic, laterally compressed, 10-11 mm long; falling entire, deciduous with accessory branch structures. Glumes similar, shorter than spikelet. Lower glume elliptic, gibbous, 9-10 mm long, 1, surface pubescent, apex 2-3 -awned. Upper glume elliptic, gibbous, 9-10 mm long, surface pubescent, 2-3 -awned.

FLORETS: Fertile lemma oblong, 10-11 mm long, coriaceous, without keel; 5 -veined. Lemma apex dentate, 2-4 -fid, awned, 2-4 -awned. Principal lemma awn 10-25 mm long overall. Palea 2 -veined. Palea keels scaberulous. Apical sterile florets resembling fertile though underdeveloped.

FLOWER: Lodicules 2. Ovary pubescent on apex.

FRUIT: Caryopsis with adherent pericarp; hairy at apex. Disseminule comprising a inflorescence.

Habitat:

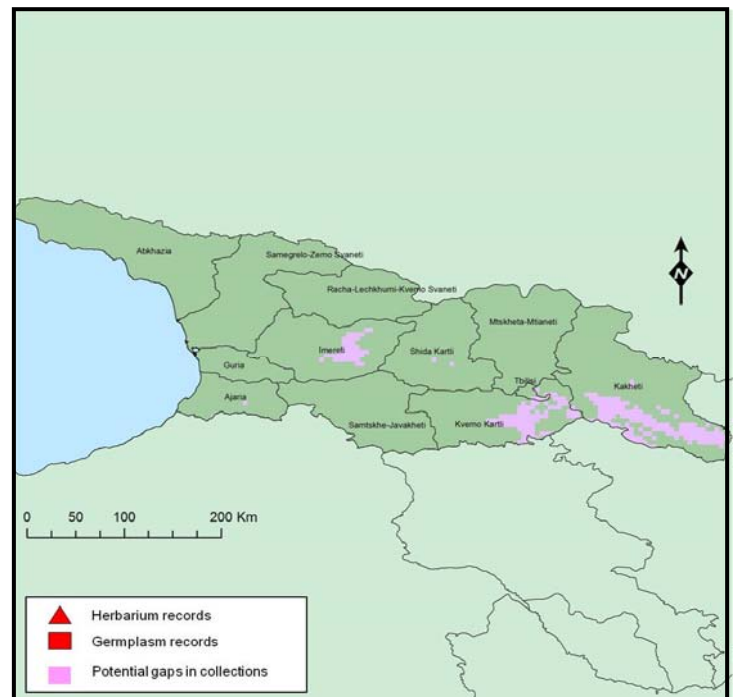
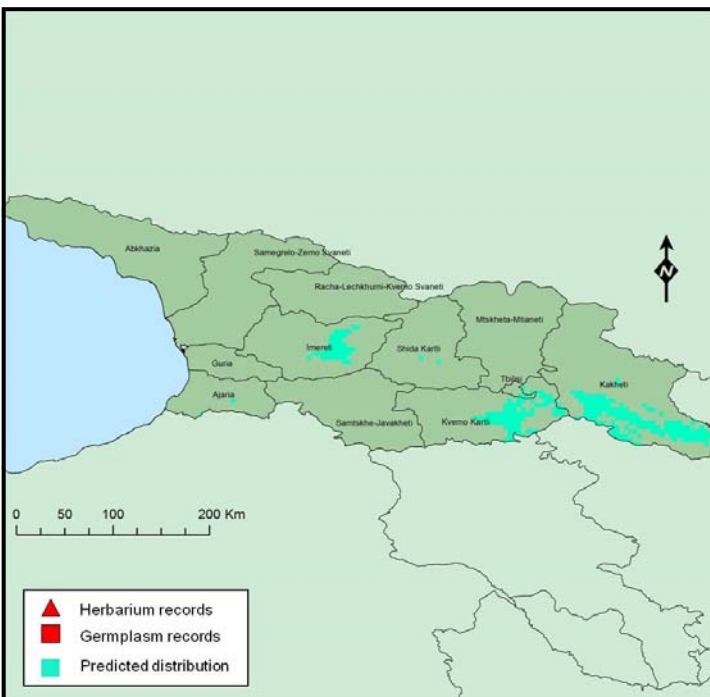
Dry, disturbed habitats e.g. wastelands, formerly cultivated sites, roadsides, dry rocky slopes, field edges, woodland, forest and scrub, often on limestone.

Distribution:

Europe: southwestern, southeastern, and eastern. Africa: north. Asia-temperate: Soviet Middle Asia, Caucasus, and western Asia.

Altitude: 0 - 1700 m

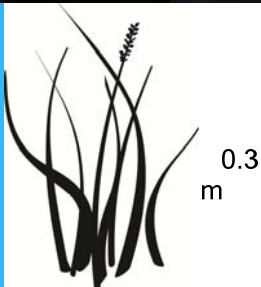
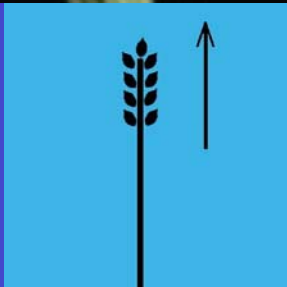
<i>Aegilops neglecta</i>	May be confused with: <i>Aegilops columnaris</i>
Glumes of lower, fertile spikelets obovate-elliptical, apex with 3 equal awns; spike obovoid-ellipsoid and inflated in lower part, upper part narrowly cylindrical; spikelets 3-6; upper 1-3 sterile.	Glumes of lower 2-3 spikelets elliptic-oblong, apex with 2 awns, 1 much larger than the other; spike obovoid in lower part, more linear in upper part; spikelets 3-4, all fertile.



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



No seed image available



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

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

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

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

FRUIT: Caryopsis with adherent pericarp; hairy at apex.

Habitat:

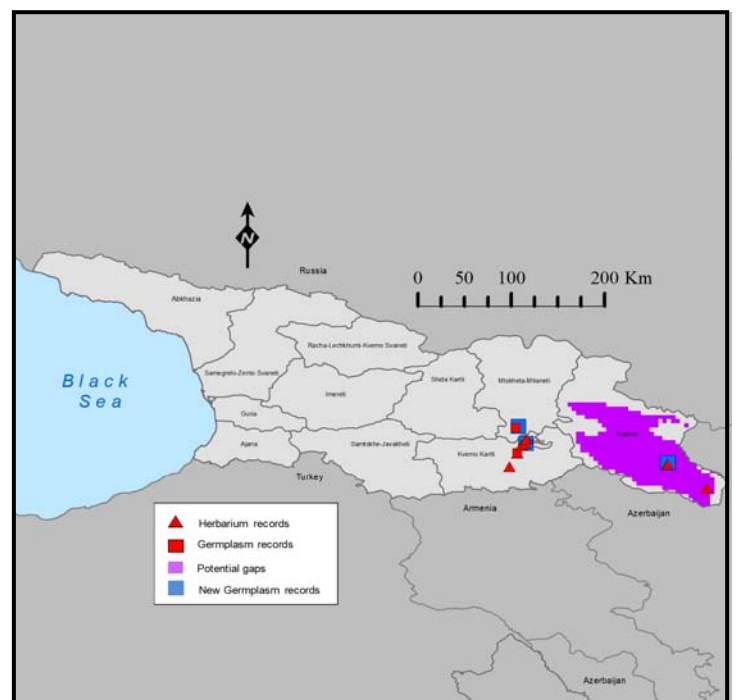
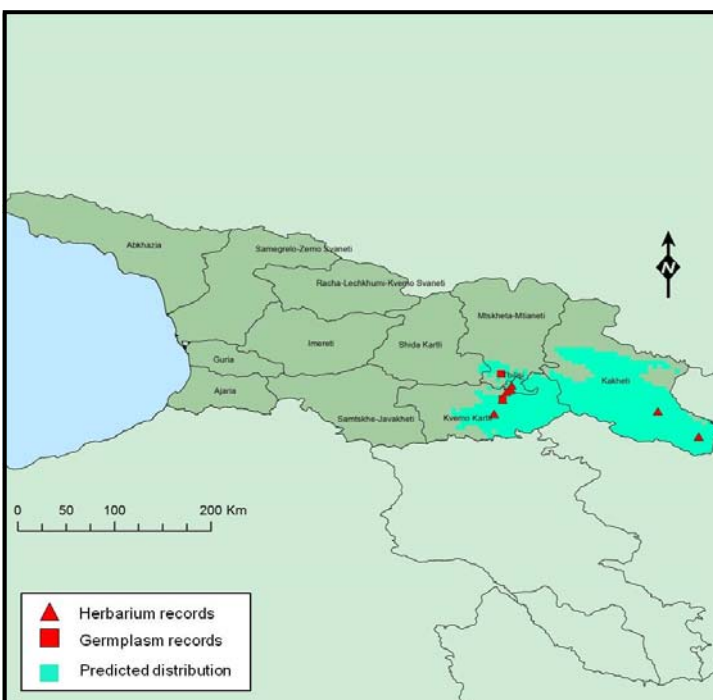
A wide range of habitats including: grasslands, fallow ground, steppes, wastelands, roadsides, within cultivation, forests, stony slopes.

Distribution:

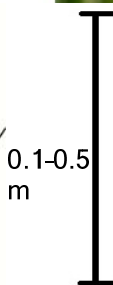
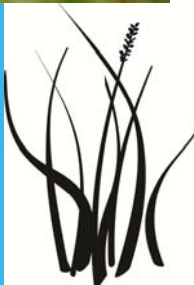
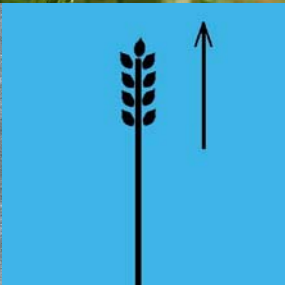
Eastern Europe, Central and Western Asia, from the Caucasus to India and China.

Altitude: 1300 - 2700 m

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



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



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

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

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

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

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

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

Habitat:

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

Distribution:

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

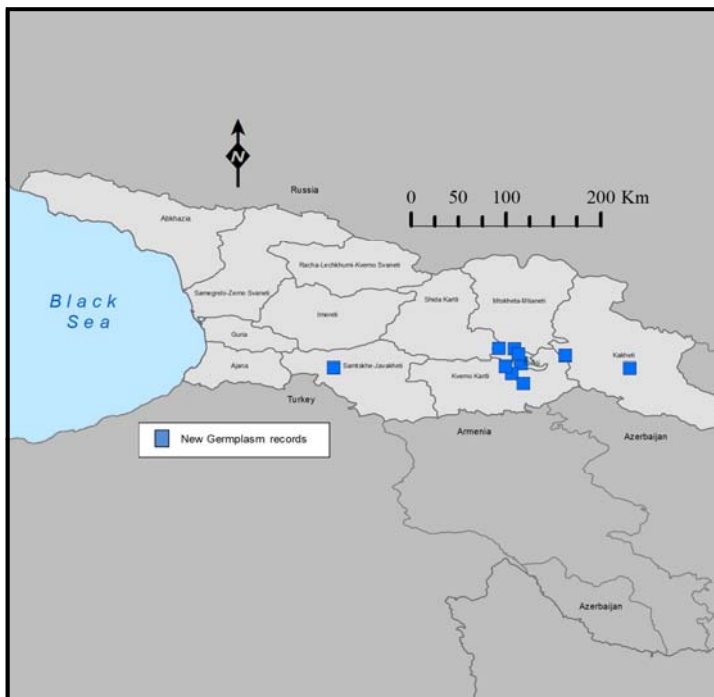
Altitude: 500 - 1200 m

Aegilops triuncialis var. *triuncialis*

May be confused with:
Aegilops neglecta

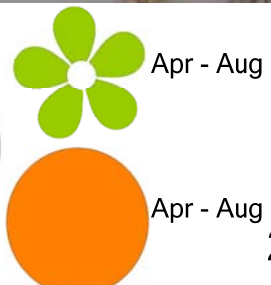
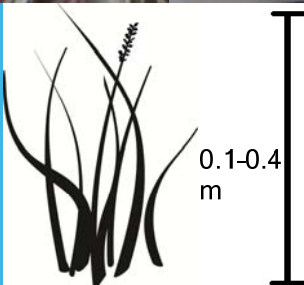
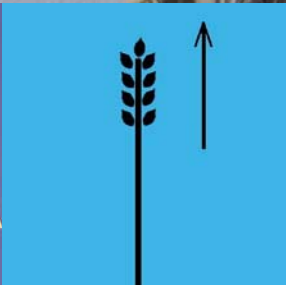
Inflorescence subcylindrical, 2.5–6 cm long; glumes of apical spikelets with 3 awns.

Inflorescence ovoid to oblong, 1.5–4.5(–6) cm long; glumes of apical spikelets with 2–3 awns.



All populations priority
for collection.

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



Tertiary relative of *Avena sativa* L.

HABIT: Annual, culms solitary, or caespitose. Culms erect or ascending, 13-60 cm long. Culm-internodes glaucous. Lateral branches lacking.

LEAVES: Leaf-sheaths glabrous on surface, or pilose, often appearing glaucous. Ligule an eciliate membrane, 1.8-3 mm long. Leaf-blades 3-10 cm long, 2-4 mm wide, surface glabrous or pilose.

INFLORESCENCE: Panicle open, elliptic, nodding, 6-15 cm long; 4-6 cm wide. Spikelets pendulous, solitary. Fertile spikelets pedicelled. Pedicels filiform. Fertile spikelets comprising 2-3 fertile florets; with a barren rhachilla extension. Spikelets lanceolate, laterally compressed, 18-25 mm long, breaking up at maturity. Floret callus evident, bearded, obtuse, disarticulating obliquely.

GLUMES: Persistent. Lower glume lanceolate, 11-15 mm long. Upper glume elliptic, 20-25 mm long. Florets: Fertile lemma lanceolate, 20 mm long, coriaceous, much thinner above, without keel, 7 -veined. Lemma surface glabrous, or pilose, hairy above. Lemma apex dentate, 2 -fid, awned, 3 -awned. Principal lemma awn dorsal, arising a third to a half of way up back of lemma, geniculate, 30 mm long overall, with twisted column.

FLOWER: Anthers 3. Ovary pubescent all over.

FRUIT: Caryopsis with adherent pericarp, sulcate on hilar side, hairy all over. Hilum linear.

Habitat:

In areas protected from grazing, slopes, calcareous hills, sandy areas, steppes and maquis.

Distribution:

Europe: eastern. Africa: north and Macaronesia. Asia-temperate: Soviet Middle Asia, Caucasus, and western Asia.

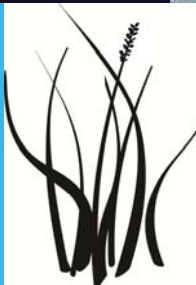
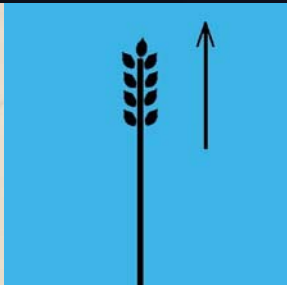
Altitude: 200 - 1100 m

<i>Avena eriantha</i>	May be confused with: <i>Avena ventricosa</i>
Glumes unequal, upper glume larger than lower.	Glumes more or less equal in size.

Reported from Georgia, but no localities known.

All populations priority for collection.

Tertiary relative of *Avena sativa* L.



0.1-0.6 m

LC
PRELIM



Mar - Jun

Mar - Jun

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:

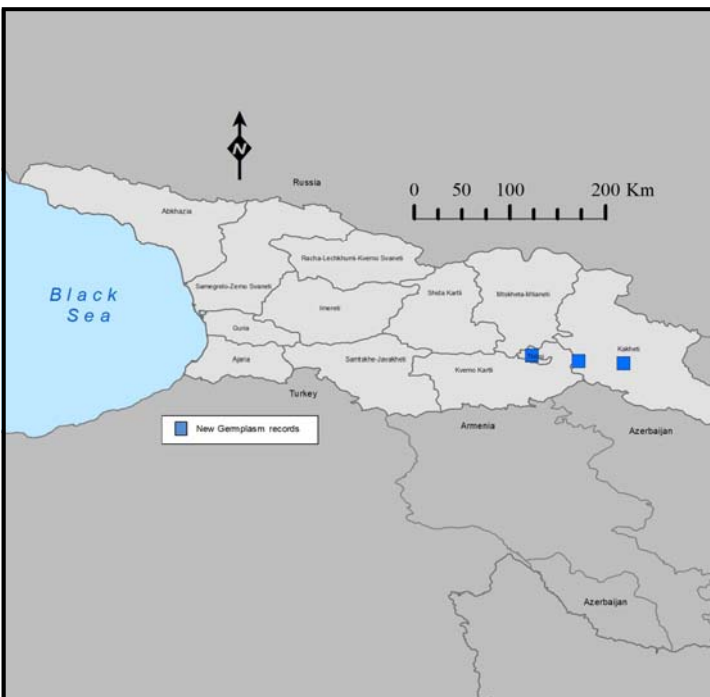
Roadside weed or weed of arable land.

Distribution:

Distributed globally.

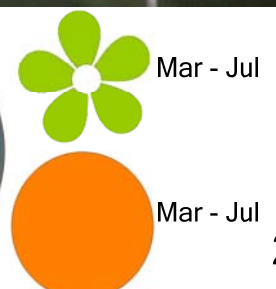
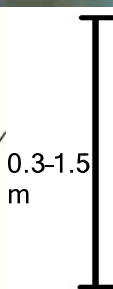
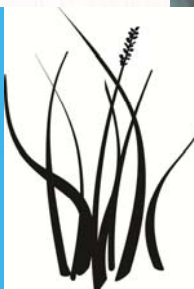
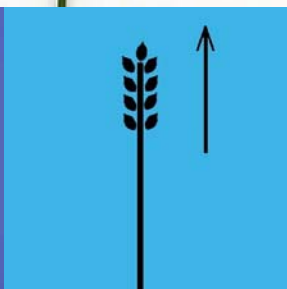
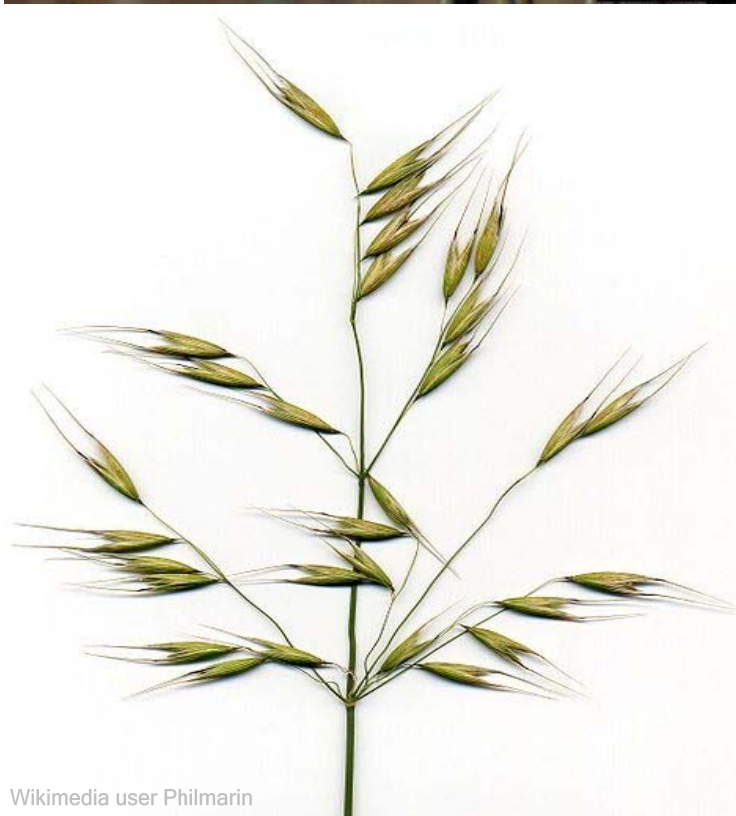
Altitude: 0 - 2400 m

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



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



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

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

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

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

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

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

Habitat:

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

Distribution:

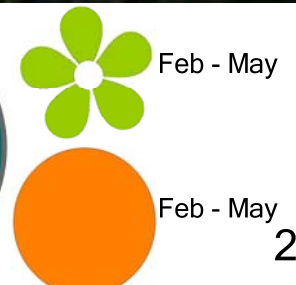
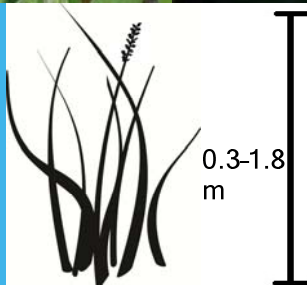
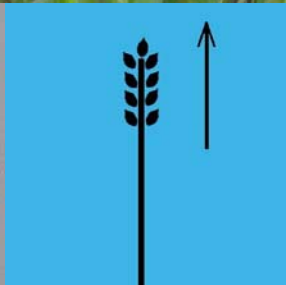
Distributed globally.

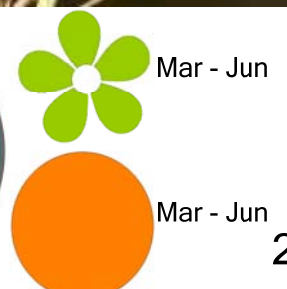
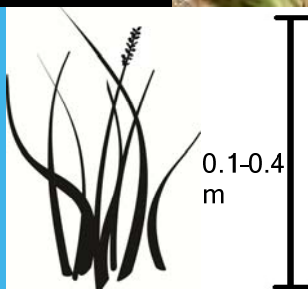
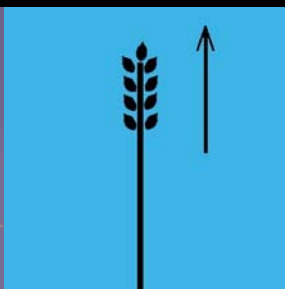
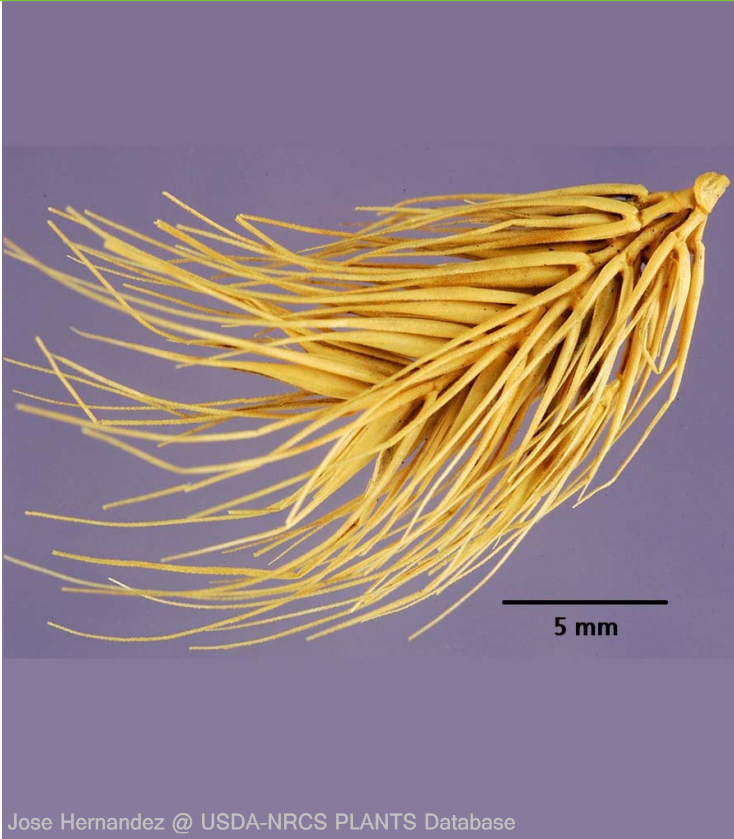
Altitude: 2100 - 2400 m

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

Reported from Georgia, but no localities known.

All populations priority for collection.





HABIT: Annual, culms 5-50 cm high, tufted or solitary, erect or geniculate ascending.
LEAVES: Leaf-blades up to 20 cm long, 2-8 mm wide, glabrous or sparsely pubescent.
INFLORESCENCE: Spike oblong, strongly compressed, 2-7(-12) cm long, green or tinged with purple, rachis sparsely ciliate on the margins, fragile. Central spikelet sessile or with a pedicel up to 1.8 mm long.
GLUMES: Lanceolate, long-awned, up to 26 mm long including the awn, fringed with hairs below, lemma lanceolate, 7-12 mm long, scabrid towards the tip, awn 18-50 mm long, anthers 0.2-1.4 mm long. Lateral spikelets well-developed, male or barren, pedicellate, glumes slightly dissimilar, the inner lanceolate, ciliate below, the outer setaceous, both long-awned, 16-30 mm long including the awn, lemma 7-11 mm long, with an awn 10-40 mm long, rachilla extension slender or stout.
FRUIT: Caryopsis with adherent pericarp, ellipsoid, sulcate on hilar side, hairy at apex. Hilum linear, equalling length of caryopsis.

Habitat:

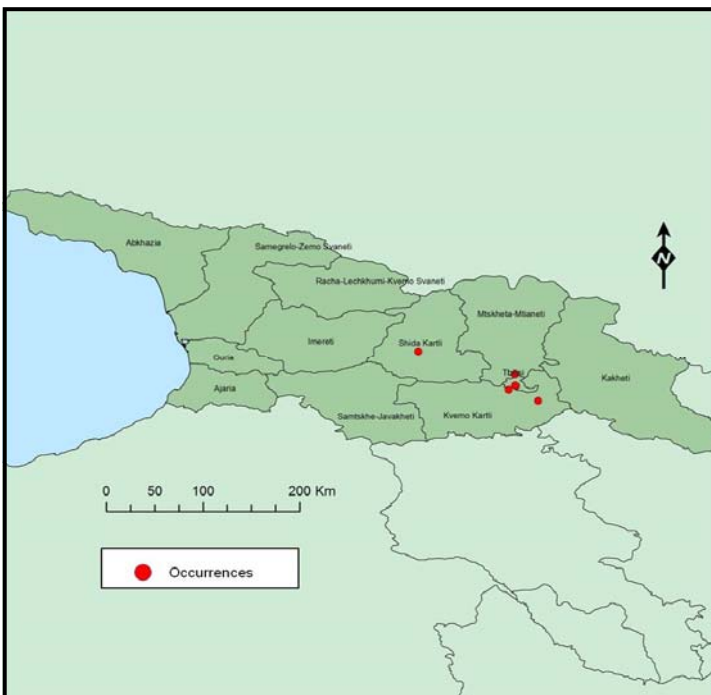
Found as a weed in disturbed habitats and cultivated land, but probably originally native to coastal areas, sandy riversides and grazed areas in wetlands.

Distribution:

Distributed globally.

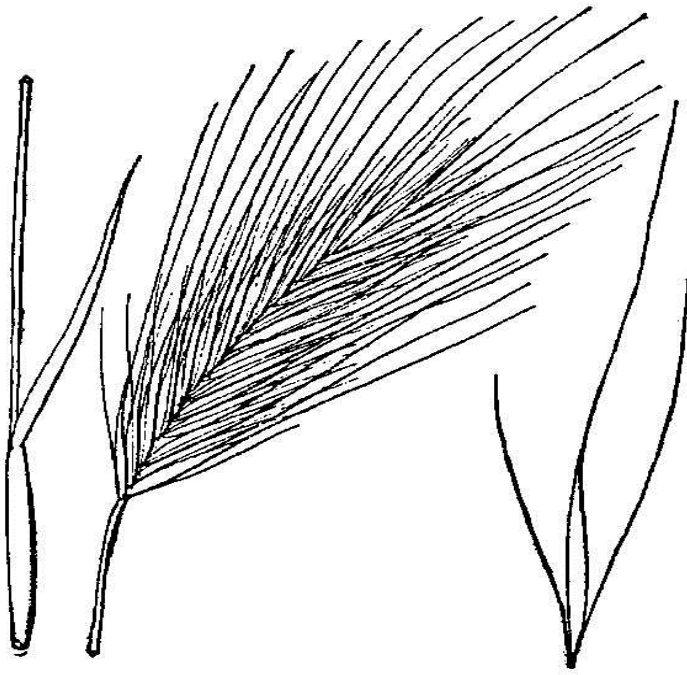
Altitude: 0 - 1700 m

<i>Hordeum murinum</i>	May be confused with: <i>Hordeum vulgare</i>
Central spikelet pedicellate to subsessile, less than 2 mm wide; awn 2-4 cm long.	Central spikelet sessile, at least 3 mm wide; awn if present 5-15 cm long.



All populations priority for collection.

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



USDA-NRCS PLANTS Database / Britton, N.L., & Brown, A. (1913)



Wikimedia user Mwasatoski

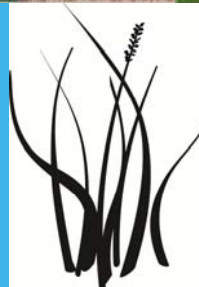


Wikimedia user Rasbak



Wikimedia user Rasbak

No seed image available



0.05-0.5 m



Mar - Jun

Mar - Jun

Taxon Group 3 relative of *Secale cereale* L.

HABIT: Annual; culms solitary, or caespitose. Culms erect, or geniculately ascending; 15-30 cm long.
LEAVES: Leaf-sheaths puberulous. Leaf-sheath oral hairs lacking. Leaf-sheath auricles falcate. Ligule an eciliate membrane. Leaf-blades flat, or involute; 5-10 cm long; 1.5-3 mm wide. Leaf-blade surface glabrous, or puberulous.
INFLORESCENCES: Peduncle pubescent above. Racemes 1, single, bilateral, 2-3.5 cm long, 8-10 mm wide. Rhachis fragile at the nodes, margins ciliate. Spikelet packing broadside to rhachis. Rhachis internodes oblong, 3-3.5 mm long; falling with spikelet above. Spikelets solitary. Fertile spikelets sessile. Fertile spikelets comprising 2 fertile florets, with diminished florets at the apex. Spikelets cuneate, laterally compressed; 12-14 mm long; falling entire; deciduous with accessory branch structures. Glumes similar, shorter than spikelet; thinner than fertile lemma. Lower glume linear; 11-12 mm long; Upper glume linear; 11-12 mm long; Upper glume apex acuminate; 1 -awned. Upper glume awn 25-50 mm long.
FLORETS: Fertile lemma elliptic; 10-12 mm long, coriaceous, keeled, 5 -veined. Lemma midvein pectinately ciliate. Lemma surface scaberulous. Lemma apex acuminate 1 -awned.
FLOWER: Lodicules 2, ciliate. Anthers 3. Ovary with a fleshy appendage below style insertion; pubescent on apex.
FRUIT: Caryopsis with adherent pericarp. Hilum linear.

Habitat:

Sandy substrates, including dunes and sandy steppes.

Distribution:

Europe: central, southeastern, and eastern. Asia-temperate: Siberia, Soviet Middle Asia, Caucasus, western Asia, and China.

Altitude: 0 - 2300 m

<i>Secale sylvestre</i>	May be confused with: <i>Other Secale species</i>
Glume awns 15-35 mm long.	Glume awns when present up to 6mm long.

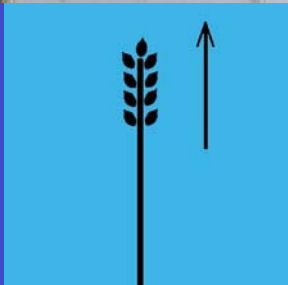
Reported from Georgia, but no localities known.

All populations priority for collection.

Taxon Group 3 relative of *Secale cereale* L.



No seed image available



Primary Gene Pool relative of *Malus domestica* Borkh.

HABIT: Tree 3-10 m tall, usually unarmed, rarely spiny when young. Twigs and young shoots dark brown, slightly pubescent.

LEAVES: Elliptic-obovate to almost orbicular, 3-8(-10) cm long by 1.5-3.5 cm wide, usually cuneate at the base, apex obtuse, rarely acuminate or mucronate, margin coarsely serrate-dentate in apical half, young leaves pubescent above, densely pale tomentose below, adult leaves glabrescent above except along veins, sometimes tomentose below, veins prominent.

INFLORESCENCE: Flowers in umbelliform fascicles of 4-6, 3-4 cm across, hypanthium and pedicels often tomentose; calyx narrowly triangular, apex acute; corolla white to pink, lobes obovate, narrowing into a conspicuous claw; styles about as long as stamens.

FRUIT: Pomes globose, 2-3 cm across, green to greenish yellow or reddish.

Habitat:

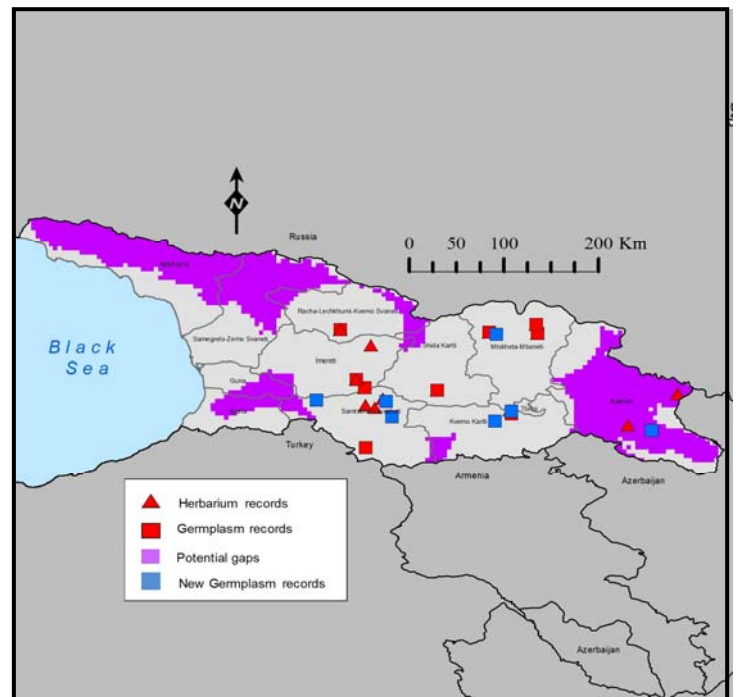
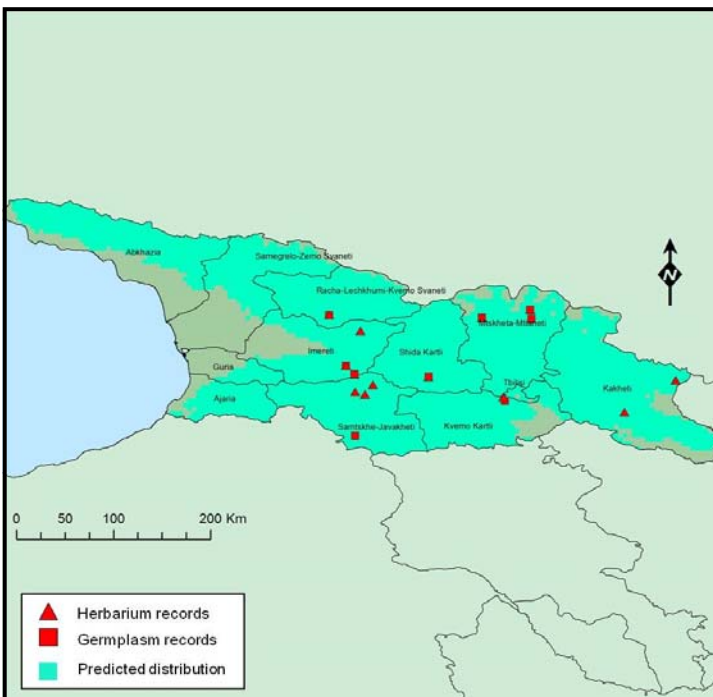
Deciduous woodland, scrub and thickets, rocky slopes, field edges and along streams, often locally common.

Distribution:

Caucasus and Crimea, Iran, Turkey and southern Russia.

Altitude: 150 - 2300 m

<i>Malus orientalis</i>	May be confused with: <i>Malus praecox</i>
Leaves cuneate at the base, apex not mucronate, margin toothed only in upper half, underside densely tomentose.	Leaves rounded at the base, mucronate at apex, margin toothed throughout, underside only slightly hairy.

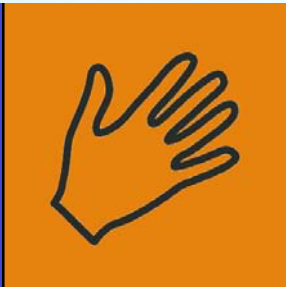


References: Yuzepchuk, S.V. (Ed.) Flora of the USSR (English version), Volume IX p275.

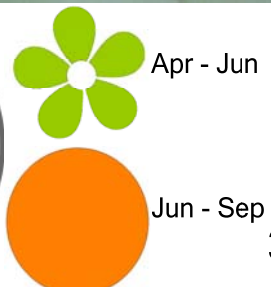
Primary Gene Pool relative of *Malus domestica* Borkh.



No seed image available



up to 10m



Appendix - Synonyms

Taxon	Sheet	Synonyms
<i>Daucus carota</i> subsp. <i>carota</i>	1	None known
<i>Lathyrus hirsutus</i>	2	None known
<i>Lathyrus sylvestris</i>	3	<i>Lathyrus platyphyllus</i> Retz.; <i>Lathyrus silvester</i> sensu auct.
<i>Lathyrus tuberosus</i>	4	None known
<i>Lens culinaris</i> subsp. <i>orientalis</i>	5	<i>Ervum orientale</i> Boiss.; <i>Lens orientalis</i> (Boiss.) Hand. Mazz.
<i>Lens ervoides</i>	6	<i>Cicer ervoides</i> Brign.; <i>Ervum ervoides</i> (Brign.) Hayek; <i>Ervum hohenakeri</i> Fisch. & C.A. Mey.; <i>Ervum lenticula</i> Schreb. ex Sturm; <i>Lens lenticula</i> ; <i>Lens nigricans</i> (M. Bieb.) Godr. subsp. <i>ervoides</i> (Brign.)Ladiz.; <i>Vicia ervoides</i> (Brign.) Fiori; <i>Vicia lenticula</i> (Schreb.) Janka
<i>Medicago littoralis</i>	7	<i>Medica littoralis</i> (Loisel.) Bubani; <i>Medicago truncatula</i> Gaertn. subsp. <i>littoralis</i> (Rohde ex Loisel.); <i>Medicago arenaria</i> Ten.; <i>Medicago braunii</i> Godron; <i>Medicago cylindracea</i> DC.; <i>Medicago gracilis</i> Biv.; <i>Medicago littoralis</i> Rohde ex Loisel. subsp. <i>braunii</i> (Godron) Bonnier & Layens; <i>Medicago littoralis</i> Rohde ex Loisel. subsp. <i>brevisepala</i> (DC.) Urb. var. <i>depressa</i> Urb.; <i>Medicago littoralis</i> Rohde ex Loisel. var. <i>breviseta</i> DC.; <i>Medicago littoralis</i> Rohde ex Loisel. subsp. <i>breviseta</i> (DC.) Urb.; <i>Medicago littoralis</i> Rohde ex Loisel. subsp. <i>cylindracea</i> (DC.) Nyman; <i>Medicago littoralis</i> Rohde ex Loisel. var. <i>dextrorsa</i> Dur.; <i>Medicago littoralis</i> Rohde ex Loisel. var. <i>inermis</i> Moris; <i>Medicago littoralis</i> Rohde ex Loisel. subsp. <i>inermis</i> (Moris) Urb.; <i>Medicago littoralis</i> Rohde ex Loisel. subsp. <i>inermis</i> (Moris) Urb. var. <i>pentacycla</i> Urb.; <i>Medicago littoralis</i> Rohde ex Loisel. var. <i>inermis</i> Rouy; <i>Medicago littoralis</i> Rohde ex Loisel. subsp. <i>longiseta</i> (DC.) Urb.; <i>Medicago littoralis</i> Rohde ex Loisel. var. <i>longeaculeata</i> Moris; <i>Medicago littoralis</i> Rohde ex Loisel. var. <i>rouyana</i> Fiori; <i>Medicago littoralis</i> Rohde ex Loisel. var. <i>subinermis</i> (Bertol.) Boiss.; <i>Medicago pusilla</i> Viv.; <i>Medicago rugulosa</i> Batt.; <i>Medicago subinermis</i> Bertol.; <i>Medicago tetracycla</i> Presl; <i>Medicago tricycla</i> Senn. non DC.; <i>Medicago trigyra</i> Senn.
<i>Medicago marina</i>	8	<i>Medica marina</i> (L.) Lam.; <i>Medicago marina</i> L. f. <i>genuina</i> Asch. & Graebn.; <i>Medicago marina</i> L. f. <i>genuina</i> Grossh.; <i>Medicago marina</i> L. var. <i>inermis</i> Rouy; <i>Medicago marina</i> L. f. <i>longispina</i> (Sen.) Maire; <i>Medicago maritima</i> Pall. ex Georgi; <i>Medicago maritima</i> Bubani; <i>Medica tomentosa</i> Moench; <i>Medicago marina</i> L. var. <i>tuberculata</i> Rouy; <i>Medicago marina</i> L. f. <i>tuberculata</i> (Rouy) Asch. & Graebn.
<i>Medicago papillosa</i> subsp. <i>papillosa</i>	9	<i>Medicago dzhawakhetica</i> Bordz.

Appendix - Synonyms

b

Medicago rigidula	10	Medicago agrestis Ten.; Medicago bondevii Kozukharov; Medicago bonofcensis Kit.; Medicago cinerascens Jordan; Medicago depressa Jordan; Medicago gaditana Perez Lara ex Wilk.; Medicago gerardii Waldst. & Kit. ex Willd.; Medicago gerardi Waldst. & Kit. ex Willd. subsp. agrestis (Ten.) Bonnier & Layens; Medicago germana Jordan; Medicago mitis Willd. ex Urb.; Medicago morisiana Jord.; Medicago muricata (L.) All.; Medicago polymorpha L. var. muricata L.; Medicago polymorpha L. var. rigidula L.; Medicago rigidula (L.) All. subsp. agrestis (Ten.) Ponert; Medicago rigidula (L.) All. var. cinerascens (Jord.) Rouy; Medicago rigidula (L.) All. var. compacta Kozuharov; Medicago rigidula (L.) All. var. eriocarpa Rouy; Medicago rigidula (L.) All. var. germana (Jordan) Rouy; Medicago rigidula (L.) All. var. minor Ser.; Medicago rigidula (L.) All. var. morisiana (Jord.) Rouy; Medicago rigidula (L.) All. var. brevispina Rouy; Medicago rigidula (L.) All. var. submitis Boiss.; Medicago rigidula (L.) All. var. agrestis (Ten.) Burnat; Medicago rigidula (L.) All. f. discoidaea Kozuharov; Medicago rigidula (L.) All. f. elegans Kozuharov; Medicago timeroyi Jordan; Medicago tomentosa Chevallier; Medicago villosa DC.
Medicago sativa subsp. caerulea	11	Medicago caerulea Less. ex Ledeb.; Medicago coerulea Less. ex Nyman; Medicago sativa L. subsp. microcarpa Urb. var. caerulea (Less. ex Ledeb.) Urb.; Medicago sativa L. subsp. caerulea (Less. ex Ledeb.) Schmalh.
Medicago sativa subsp. glomerata	12	Medicago glutinosa M. Bieb.; Medicago gunibica Vassilcz.
Medicago sativa subsp. xvaria	13	Medicago falcata L. var. ambigua Trautv.; Medicago glutinosa M. Bieb. subsp. praefalcata Sinskaya; Medicago komarovii Vassilcz.; Medicago media Pers.; Medicago sativa L. subsp. ambigua (Trautv.) Tutin; Medicago sativa L. subsp. hemicycla (Grossh.) C. R. Gunn; Medicago sativa L. subsp. praefalcata (Sinskaya) C. R. Gunn; Medicago sativa L. var. varia (Martyn) Urb.; Medicago schischkinii Sumnev.; Medicago trautvetteri Sumnev.; Medicago tianschanica Vassilcz.; Medicago vardanis Vassilcz.; Medicago varia Martyn.
Pisum sativum subsp. elatius	14	Pisum biflorum Raf.; Pisum elatius M. Bieb.; Pisum humile Boiss. & Noe; Pisum sativum var. elatior Trautv.; Pisum sativum subsp. humile (Holmboe) Greuter & al.; Pisum sativum subsp. pumilo (Meikle) Ponert
Vicia bithynica	15	Lathyrus bithynicus L.
Vicia grandiflora	16	Vicia grandiflora Scop. var. kitaibeliana W. D. J. Koch
Vicia lathyroides	17	Ervum lathyroides (L.) Stank.; Ervum soloniense L.; Vicia lathyroides subsp. olbiensis (Reut.) Smejkal; Vicia olbiensis Timb.-Lagr.
Vicia lutea	18	Vicia laevigata Sm.; Vicia lutea L. var. laevigata (Sm.) Boiss.
Aegilops biuncialis	19	Aegilops lorentii Hochst.; Aegilops macrochaeta Shuttlew. & E. Huet ex Duval-Jouve; Triticum macrochaetum (Shuttlew. & E. Huet ex Duval-Jouve) K. Richt.
Aegilops cylindrica	20	Aegilops cylindrica Host subsp. pauciaristata Eig; Cyindropyrum cylindricum (Host) A. Love; Cyindropyrum cylindricum (Host) A. Love subsp. pauciaristatum (Eig) A. Love; Triticum cylindricum (Host) Ces.

Appendix - Synonyms

Aegilops geniculata	21	Aegilops geniculata Roth subsp. geniculata; Aegilops geniculata Roth subsp. gibberosa (Zhuk.) K. Hammer; Aegilops ovata auct.; Aegilops ovata L. subsp. gibberosa Zhuk.; Triticum ovatum auct.
Aegilops neglecta	22	Aegilops neglecta Req. ex Bertol. subsp. neglecta; Aegilops neglecta Req. ex Bertol. subsp. recta (Zhuk.) K. Hammer; Aegilops ovata L.; Aegilops recta (Zhuk.) Chennav.; Aegilops triaristata Willd.; Aegilops triaristata Willd. subsp. recta Zhuk.; Triticum neglectum (Req. ex Bertol.) Greuter; Triticum rectum (Zhuk.) Bowden; Triticum triaristatum (Willd.) Gren. & Godr.
Aegilops tauschii	23	Aegilops squarrosa L. misapplied by Cav.; Aegilops squarrosa L. var. anathera Eig; Aegilops squarrosa L. var. meyeri Griseb.; Aegilops squarrosa L. subsp. salinum Zhuk.; Aegilops squarrosa L. subsp. strangulata Eig; Aegilops tauschii Coss. var. anathera (Eig) K. Hammer; Aegilops tauschii Coss. var. meyeri (Griseb.) Tzvelev; Aegilops tauschii Coss. subsp. strangulata (Eig) Tzvelev; Aegilops tauschii Coss. subsp. tauschii; Patropyrum tauschii (Coss.) A.Love; Patropyrum tauschii (Coss.) A. Love subsp. salinum (Zhuk.) A.Love; Patropyrum tauschii (Coss.) A. Love subsp. strangulata (Eig) A.Love; Triticum tauschii (Coss.) Schmalh.
Aegilops triuncialis var. triuncialis	24	Aegilopodes triuncialis (L.) A.Love; Aegilops elongata Lam.; Aegilops squarrosa L.; Aegilops triuncialis L. var. assyriaca Eig; Aegilops triuncialis L. subsp. triuncialis; Triticum triunciale (L.) Raspail
Avena eriantha	25	Avena eriantha var. acuminata Coss.; Trisetum pilosum Roem. & Schult.
Avena fatua	26	Anelytrum avenaceum Hack.; Avena ambigua Schoenb.; Avena cultiformis (Malzev) Malzev; 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.) Hauskn.; 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.

Appendix - Synonyms

Avena sterilis	27	Avena fatua var. sterilis (L.) Fiori & Paol.; Avena macrocarpa Moench; Avena nutans St.-Lag.; Avena sativa var. sterilis (L.) Fiori; Avena sterilis subsp. macrocarpa Briq.
Hordeum marinum	28	Hordeum berterioanum É.Desv.; Hordeum caudatum V.Jirásek; Hordeum marinum subsp. marinum; Hordeum marinum var. pubescens (Guss.) Nevski; Hordeum maritimum Stokes [Illegitimate]; Hordeum maritimum var. annuum (Lange) Maire & Weiller; Hordeum maritimum var. pubescens (Guss.) Woods; Hordeum pratense var. annuum Lange; Hordeum pubescens Guss.; Hordeum rigidum Roth; Hordeum winkleri Hack.; Zeocriton rigidum (Roth) P.Beauv.
Hordeum murinum	29	Critesion murinum (L.) Á.Löve; Critesion murinum subsp. murinum; Hordeum boreale Gand.; Hordeum coleophorum Phil.; Hordeum delphicum Gand.; Hordeum depilatum Gand.; Hordeum dilatatum Gand.; Hordeum elongatum Gand.; Hordeum flexicaule Gand.; Hordeum hohenackeri Gand.; Hordeum microcladum Gand.; Hordeum murinum var. glaucescens Zapal.; Hordeum murinum var. leptostachys Trab.; Hordeum murinum var. majus Godr.; Hordeum murinum f. montanum Hack.; Hordeum murinum subsp. montanum (Hack.) H.Scholz & Raus; Hordeum murinum subsp. murinum ; Hordeum murinum subsp. setarium H.Scholz & Raus; Hordeum murinum var. simulans Bowden; Hordeum neglectum Gand.; Hordeum pseudomurinum Tapp. ex W.D.J.Koch; Hordeum rubens Willk.; Hordeum vaginatum K.Koch; Zeocriton murinum (L.) P.Beauv.
Secale sylvestre	30	Secale campestre Kit.; Secale fragile M.Bieb.; Secale glaucum d'Urv.; Triticum campestre (Schult.) Roem. & Schult.; Triticum fragile (M.Bieb.) Link [Illegitimate]; Triticum sylvestre (Host) Asch. & Graebn.
Malus orientalis	31	Malus sylvestris (L.) Mill. subsp. orientalis (Uglitzk.) Browicz