

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

# Armenia



# Seed Collecting Guide

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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](http://cwrdiversity.org).

#### **Cover photos**

TOP LEFT: *Pisum sativum elatius*, CREDIT: PikiWiki via Wikimedia;

TOP RIGHT: *Hordeum murinum*, CREDIT: Miwasatoshi/Wikimedia;

BOTTOM LEFT: *Lathyrus sylvestris*, CREDIT: Anneli Salo/Wikimedia;

BOTTOM RIGHT: *Avena barbata* CREDIT: Ettore Balocchi/Wikimedia

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

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



MILLENNIUM  
SEED BANK  
PARTNERSHIP



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

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

UNIVERSITY OF  
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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.



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:

**Richard Allen**

Collecting Guide Compiler  
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Crop Wild Relatives Project Co-ordinator  
Millennium Seed Bank Partnership  
Seed Conservation Department  
Royal Botanic Gardens, Kew

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

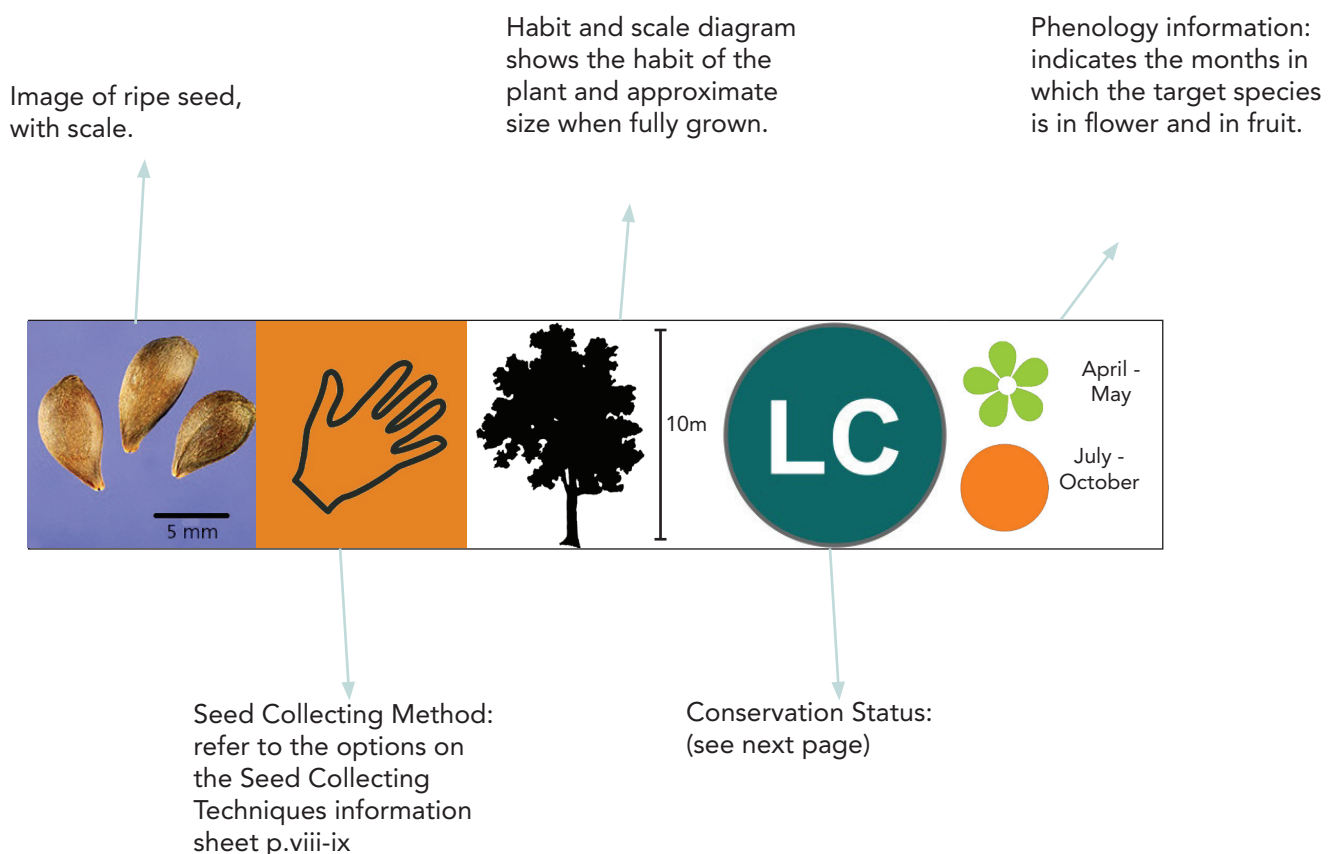
The species included in this guide are a selection of the wild relatives of the 29 key crops which this project covers (African Rice, Alfalfa, Apple, Aubergine, Bambara groundnut, Banana, Barley, Bread Wheat, Butter Bean, Carrot, Chickpea, Common Bean, Cowpea, Faba bean, Finger millet, Grasspea, Lentil,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

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

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

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

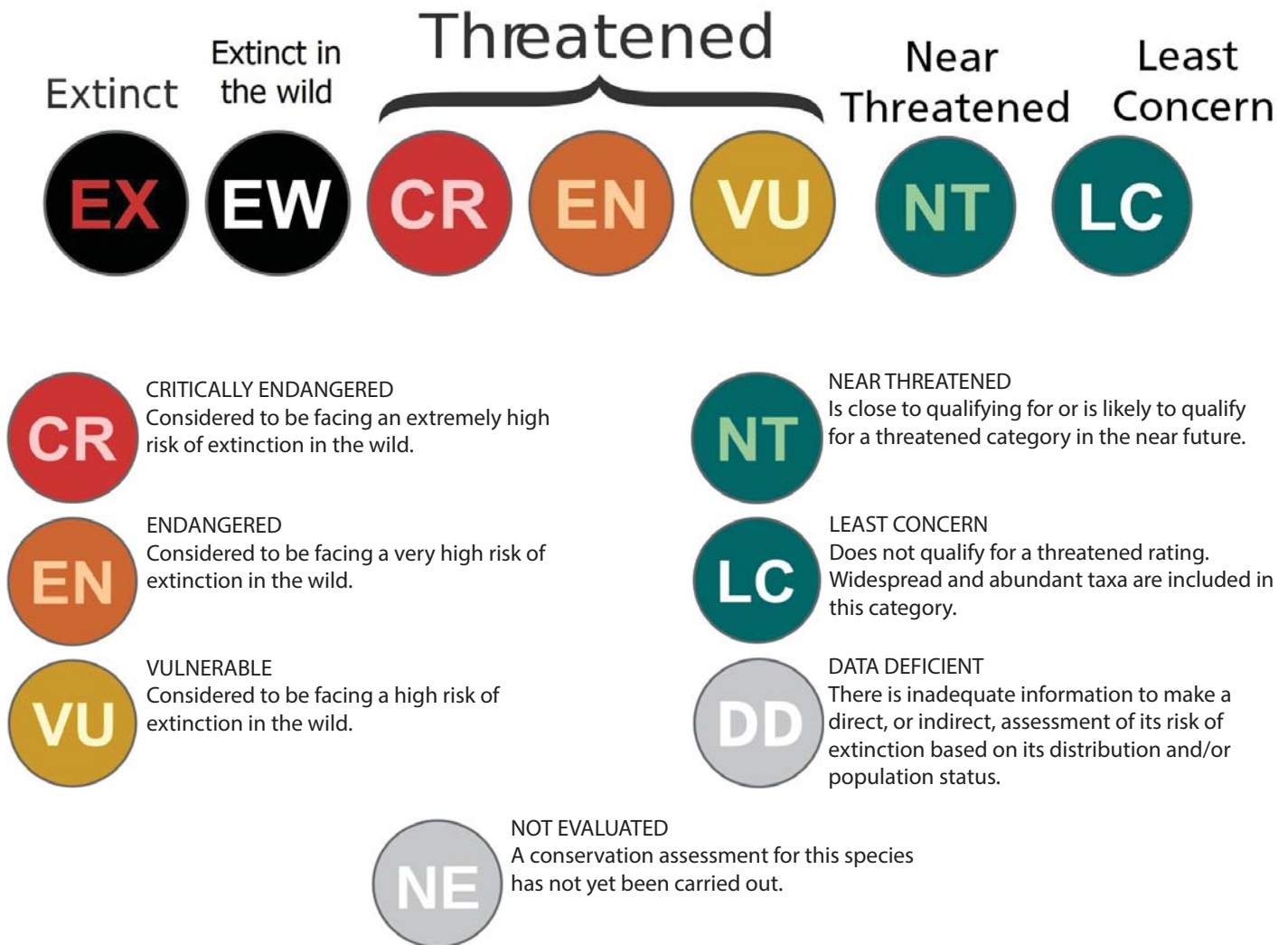
On each species profile, there is a collection of images to help identify the target species, accompanied by a series of symbols :



# Conservation Assessments

## Conservation Status:

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



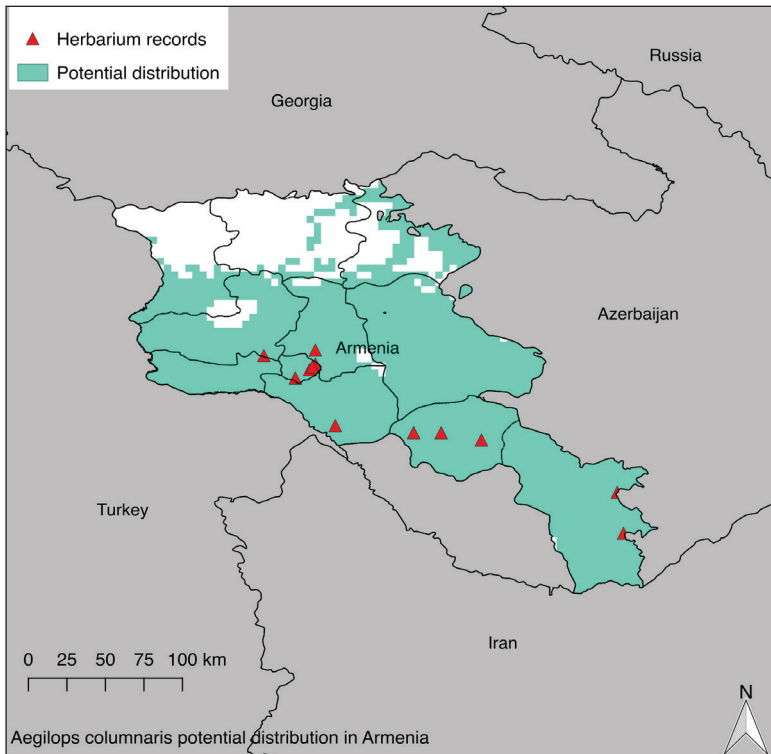
Where a full conservation assessment has not been completed, a preliminary conservation rating may be indicated. Preliminary assessments are produced using specimen locality data and GIS, which calculates two parameters accepted by IUCN as suitable measures of range: namely extent of occurrence (EOO)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

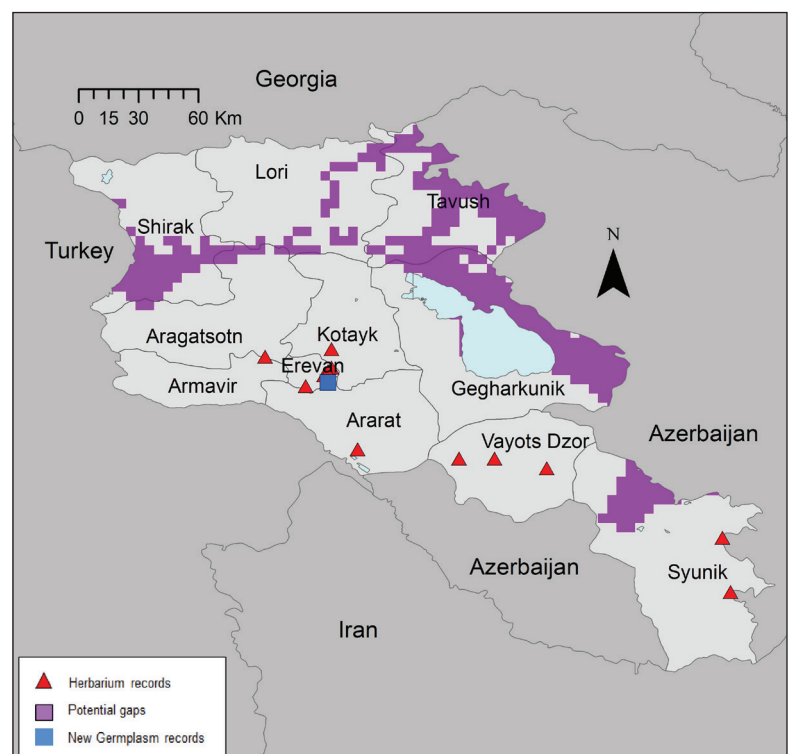


# Maps

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



# Identification Keys

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Interactive identification keys can be accessed using the links below.

**Kew Grassbase interactive identification key**

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

Clayton, W.D., Vorontsova, M.S., Harman, K.T. and Williamson, H. (2006 onwards). GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>. [accessed 15 March 2012; 14:30 GMT]

# 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.

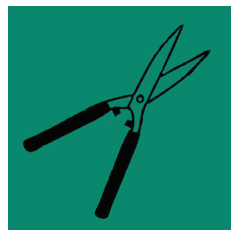


## Pruning clusters of fruit

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.



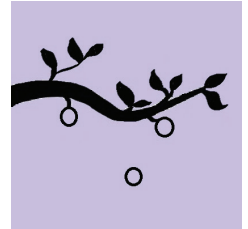
## Shaking branches

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

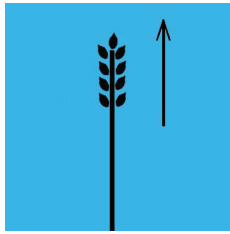
## Stripping entire seed-heads

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.

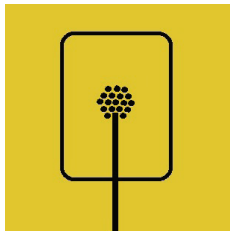


## Collecting fleshy fruits

- 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.

## 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.



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

## 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.

## Containers

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

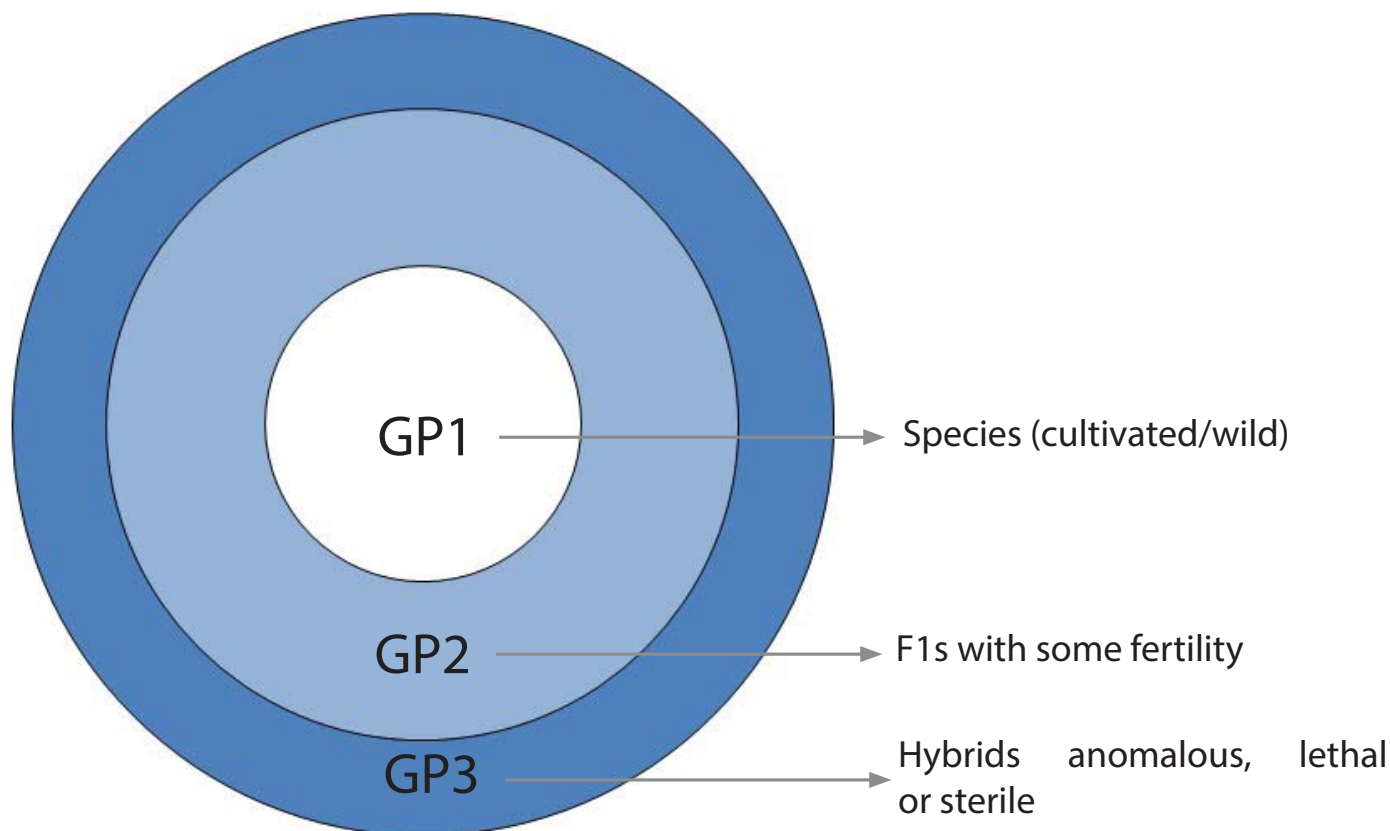
Using buckets has the advantage of allowing you to monitor the quality of the collection whilst associated insects disperse freely.

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

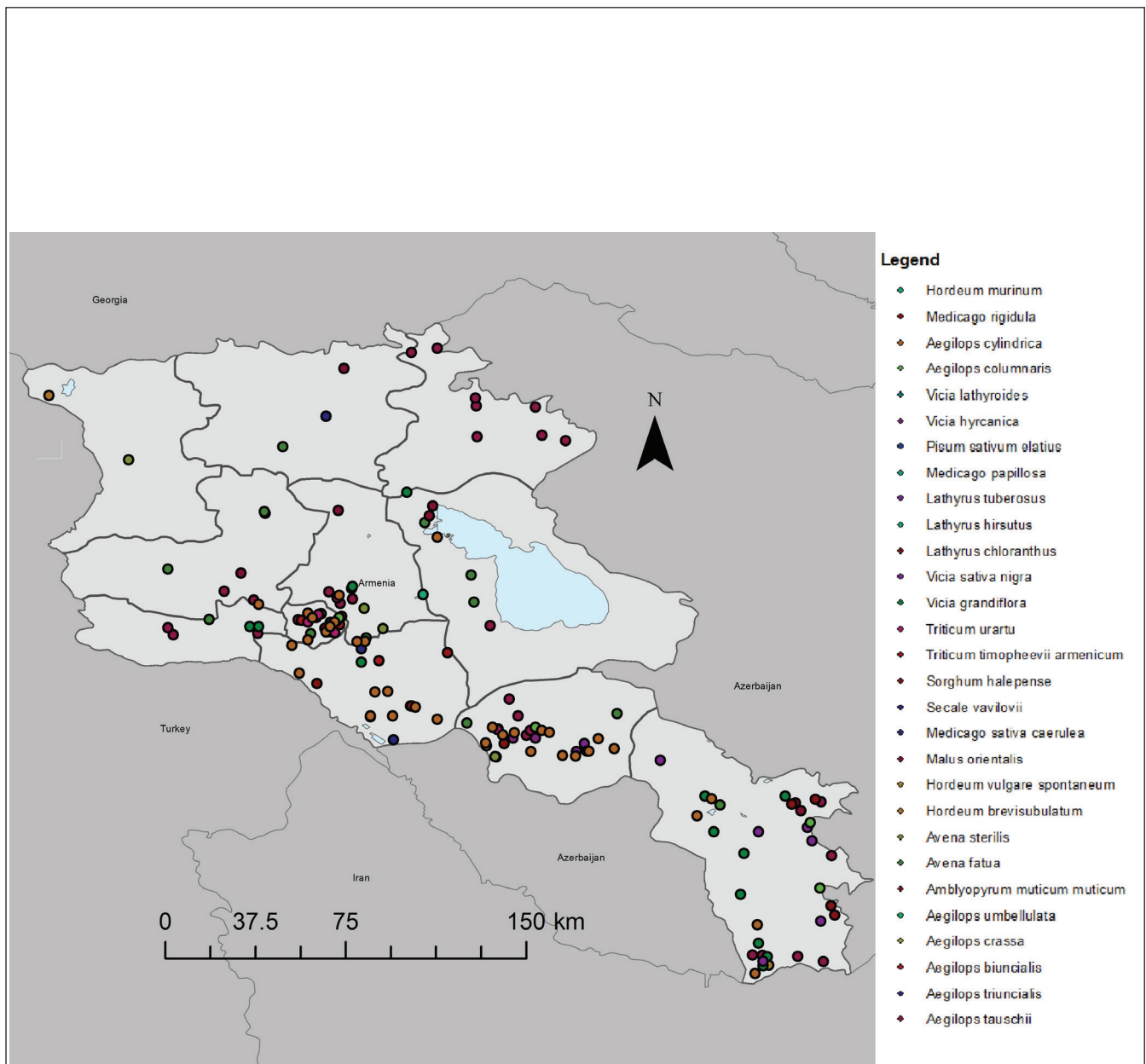
Taxon Group 2 – species in same series/section as crop

Taxon Group 3 – species in same subgenus as crop

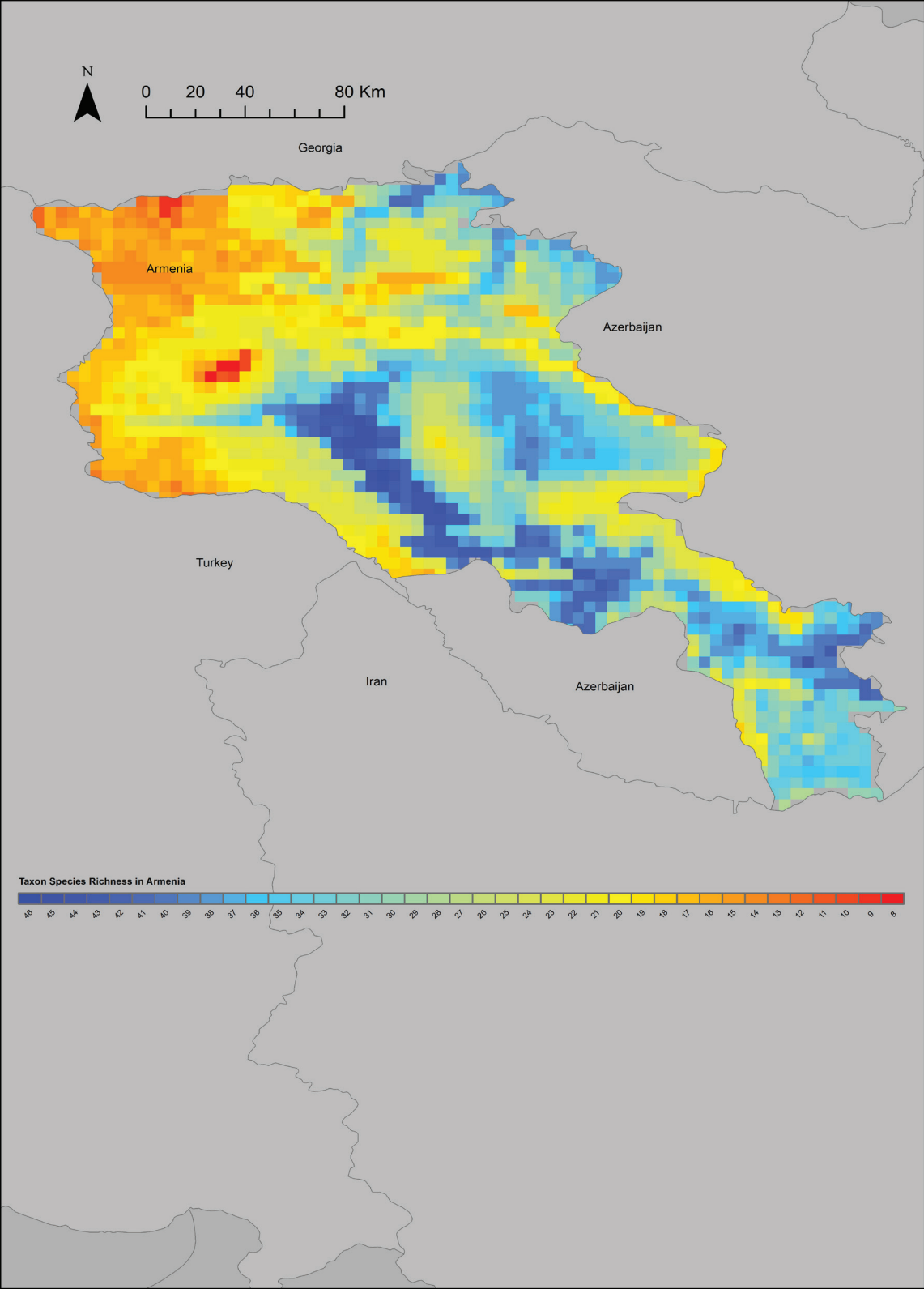
Harlan, J. and J. de Wet (1971). Towards a rational classification of cultivated plants. *Taxon* 20: 509-517.

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.

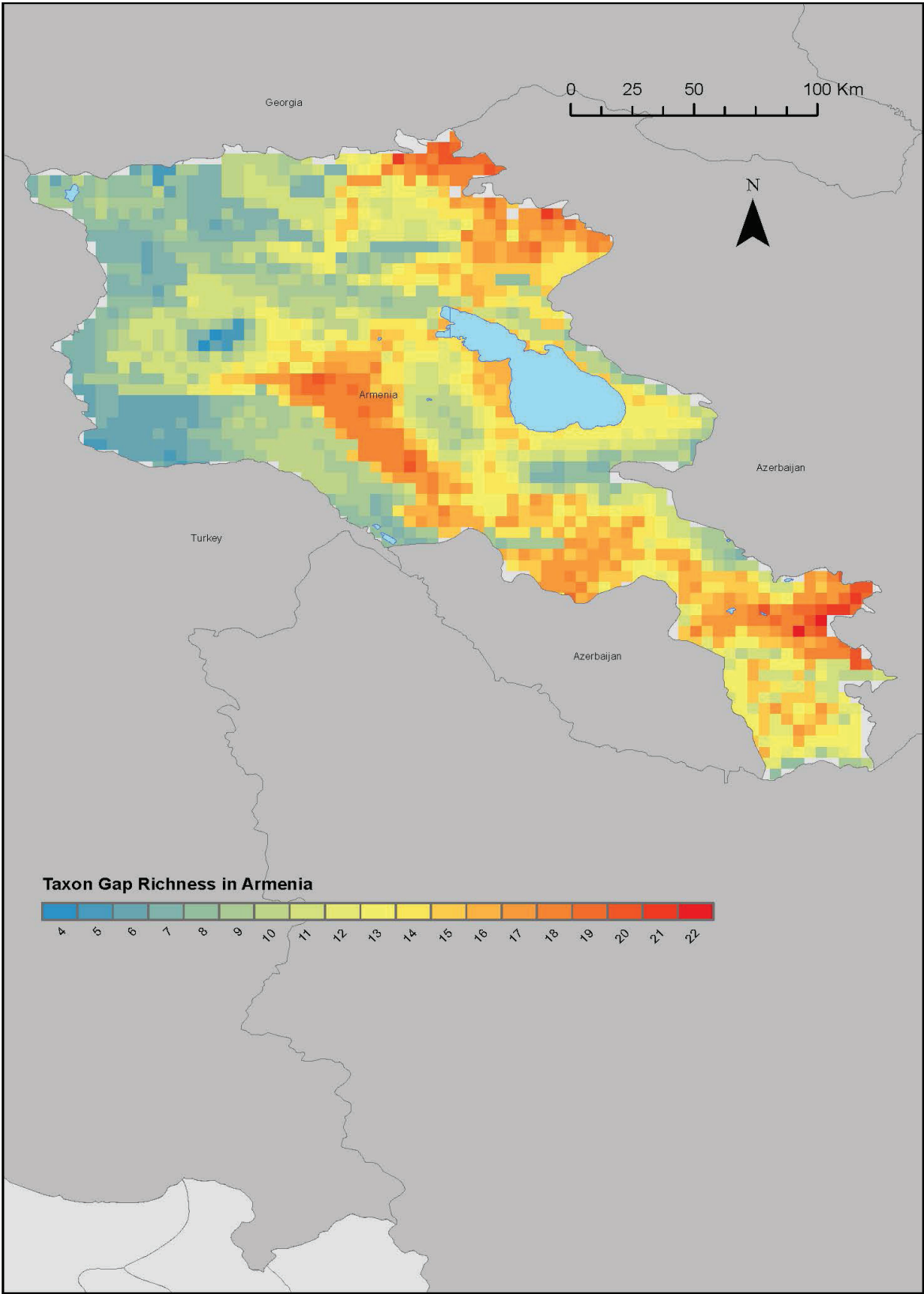
Occurrences of all taxa in this guide, as a point distribution



## Species richness



## Gap richness



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

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

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

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

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

**Habitat:**

Mountain slopes, ruderal areas.

**Distribution:**

Worldwide in temperate regions.

**Altitude:** 0 - 3000 m

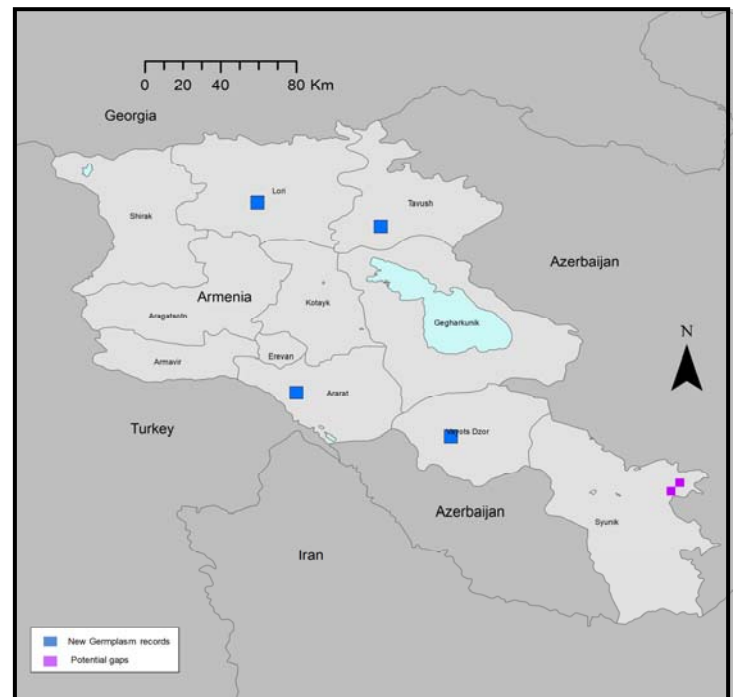
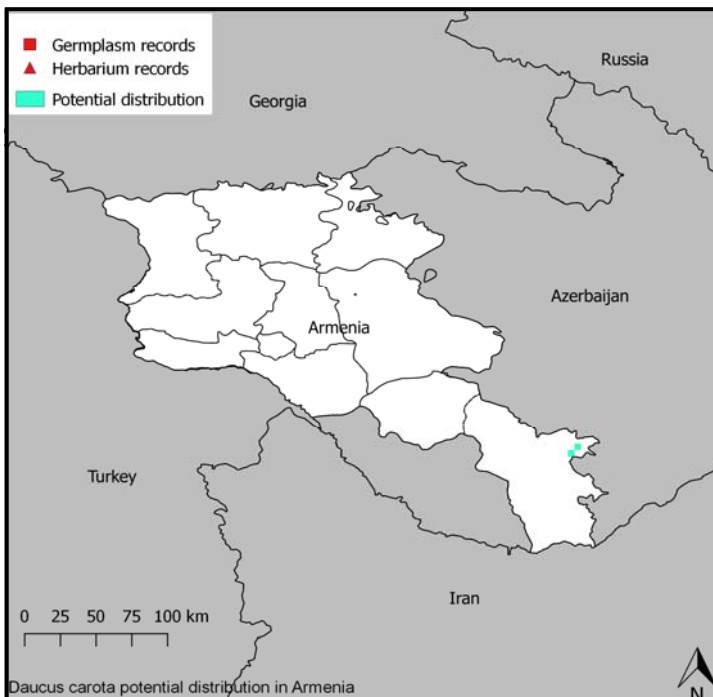
*Daucus carota subsp. carota*

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

## May be confused with:

*Daucus carota subsp. sativa*

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



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



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

Taxon Group 2 relative of *Lathyrus cicera* L.

**HABIT:** Scrambling annual, 30-120cm, vegetative parts covered in dense, soft, spreading hairs, branching below, stems and branches winged, angular, striate. Stipules lanceolate or semisagittate, 7-10mm, narrow,  
**LEAVES:** Paripinnate with a single pair of leaflets, the lower shortly (1.5-4cm) petiolate, all winged; rachis terminating in a branched, very prehensile tendrils; leaflets elliptic to ovate or oblong; mucronate, 20-55x12-25mm., with 3-5 principal veins.  
**FLOWERS:** Solitary or rarely 2, pale greenish-yellow, the standard sometimes streaked with crimson; peduncle 4-6 cm., pilose and glandular, usually equalling or exceeding the subtending leaf, terminating in a frequently very long arista; pedicel c. 5mm., densely pilose and glandular; bracts setaceous, membranous, caducous. Calyx 7-10mm., densely hairy and somewhat glandular, teeth subequal, lanceolate-acuminate, longer than the tube. Corolla 3 times as long as the calyx; standard broadly obovate, 14-17 x 10-11mm, rounded above with a short rather indistinct claw, wings 11-13 mm., oblong, blunt. Style pilose along much of the inner surface.  
**FRUIT:** Pod spreading-hairy with tuberculate-based hairs, pod linear, compressed, yellowish, straight, 40-50 x 6-9 mm., rather abruptly narrowed at each end.  
**SEEDS:** Roundish, somewhat compressed, c. 4 mm, brown, shallowly verruculose.

**Habitat:**

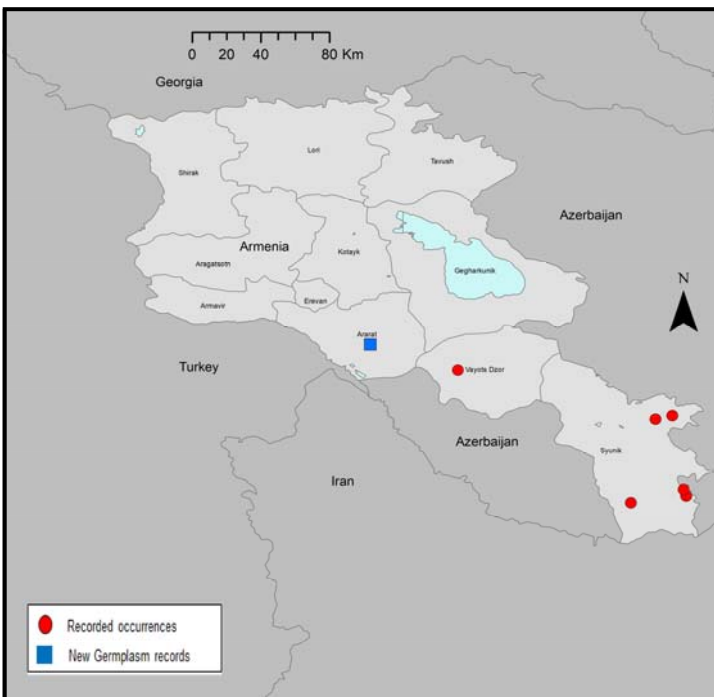
Shady places, in forests or hedgerows.

**Distribution:**

India, central Asia to Turkey.

**Altitude:** 1000 - 1700 m

<i>Lathyrus chloranthus</i>	May be confused with:



All population priority for collection



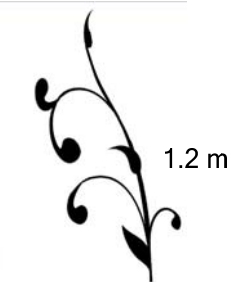

References:

Taxon Group 2 relative of *Lathyrus cicera* L.




RBGE herbarium specimen

No seed image available



Feb - Sep



Feb - Sep

2

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

**HABIT:** Scrambling annual, sparsely pubescent, 40-60 cm tall. Stems branching from the base, ascending or erect, winged. Stipules 10-18 mm long, linear, semi-sagittate, shorter than petioles.

**LEAVES:** Petioles shorter than leaflets. Leaflets usually 1-paired, 30-60 mm long, 3-11 mm wide, linear-elliptic, apex abruptly tapering, mucronate. Rachis ending in 3-sect or pinnately branched tendrils.

**INFLORESCENCE:** Raceme 1-3-flowered, peduncle much longer than leaf.

**FLOWER:** 10-13 mm long, blue-violet or occasionally reddish; calyx 4.5-5.5 mm long, teeth subequal, as long as or slightly longer than the tube, standard much longer than keel, wings approximately equalling keel, limb broadly auricled at base.

**FRUIT:** Pods 20-50 mm long by 5-8 mm wide, oblong-linear, tuberculate, densely beset with white hairs on tubercles when young, glabrescent when ripe, 5-10-seeded.

**Habitat:**

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

**Distribution:**

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

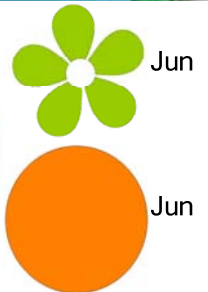
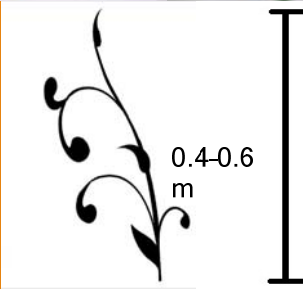
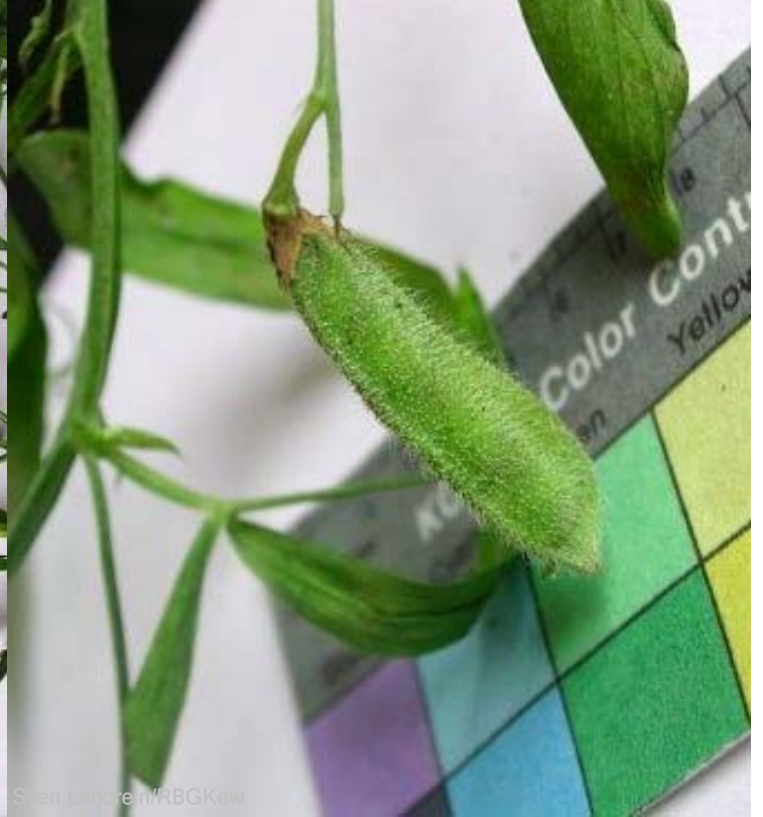
**Altitude:** 0 - 1000 m

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

Reported from  
Armenia but no  
localities known.

All population priority for  
collection

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



**HABIT:** 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:**

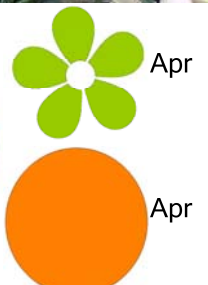
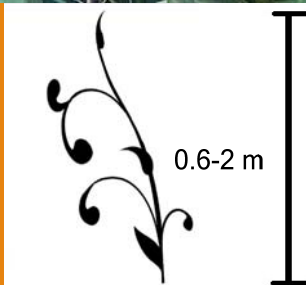
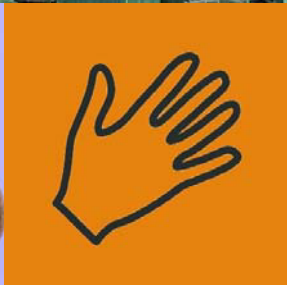
Throughout Europe, the Caucasus and western Russia, northern Africa.

**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.

Reported from  
Armenia but no  
localities known.

All population priority for  
collection



**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:**

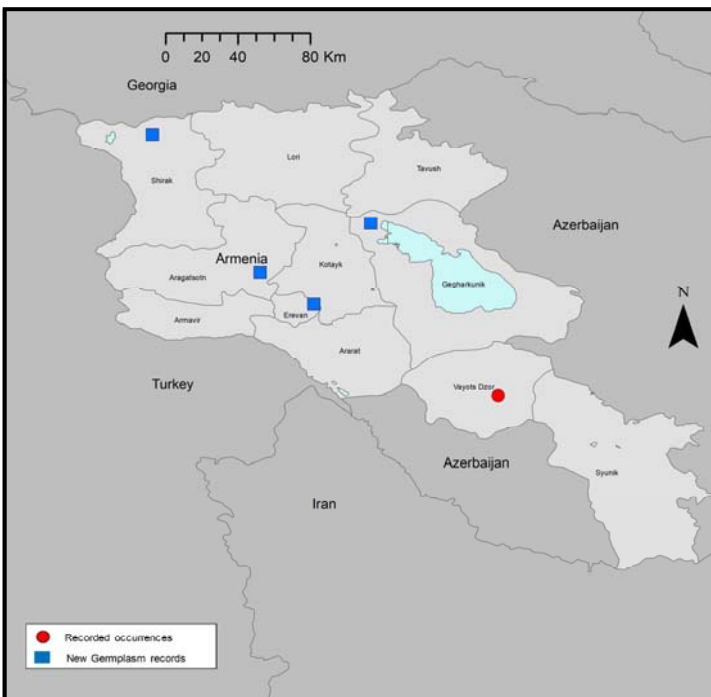
Disturbed habitats, forest edges, meadows and fields.

**Distribution:**

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

**Altitude:** 1000 - 1250 m

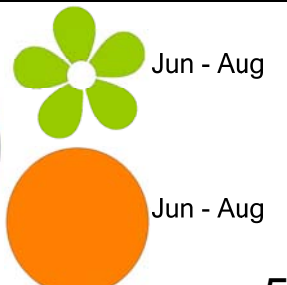
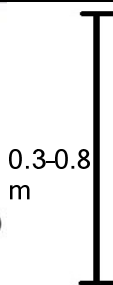
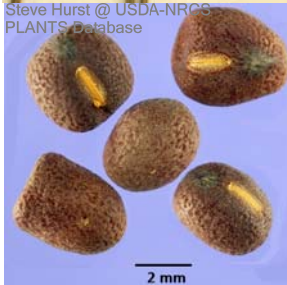
<i>Lathyrus tuberosus</i>	May be confused with: <i>Lathyrus hirsutus</i>
Perennial plant with tuberous rhizomes; stems not winged; corolla pink to purple, >1.5 cm long.	Annual plant; stems winged; corolla red or bluish-purple, <1.5 cm long.



All population 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.





Tertiary relative of *Medicago sativa* L.

**HABIT:** Perennial herb arising from a stout, woody, rhizome, the root system penetrating deep into the ground. Stems numerous from rhizome 5-30(40) cm long, procumbent to ascending, appressed-hairy.  
**LEAVES:** Leaflets 3-12 mm long, 2-12 mm wide, obovate, oboval, or cuneate-obovate, glabrous or essentially so above, appressed-hairy beneath, denticulately serrate on distal portion. Stipules triangular-lanceolate, appressed-pubescent, outer margin dentate or incised (mostly at base).  
**INFLORESCENCES:** Almost capitate with 5-15 flowers. Peduncle as long as or longer than subtending petiole. Corolla 5-8 mm long, yellow, calyx appressed-hairy, turbinate-campanulate, with unequal triangular lanceolate teeth more or less as long as the tube.  
**FRUIT:** Pod glabrous with a few hairs (rarely densely pubescent) or with pellucid articulate hairs, with 2-4(5) loosely adpressed coils, 3.5-6.3 mm wide, the coil face with 8-12 curving radial veins that anastomose.  
**SEEDS:** 2.3-3 mm long, 1.3-1.5 mm wide, 1-2 seeds per coil, separated by thick spongy septa, yellow to brownish yellow, radicle about half length of seed.

**Habitat:**

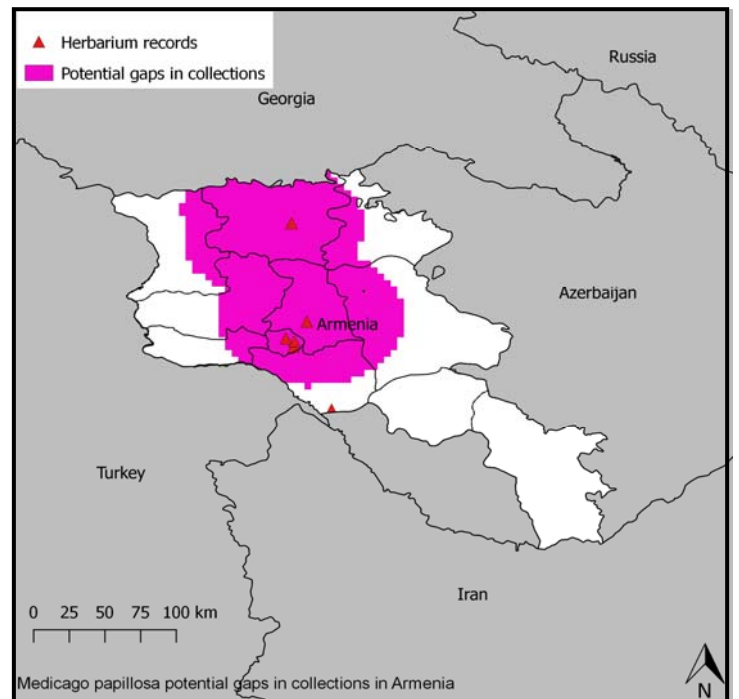
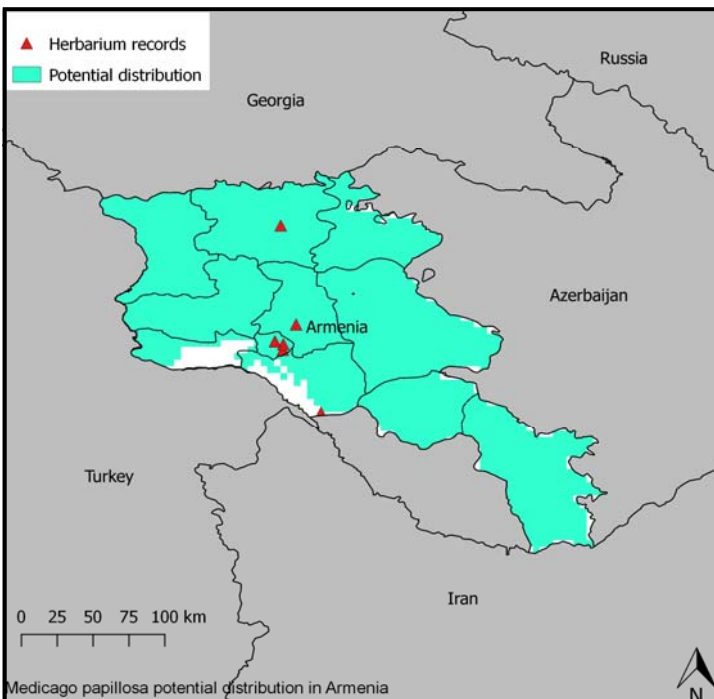
On dry, rocky slopes, cliffs, talus slopes and mountain pastures, occasionally in grasslands.

**Distribution:**

Armenia, Georgia, Turkey.

**Altitude:** 1000 - 3000 m

<i>Medicago papillosa</i> subsp. <i>papillosa</i>	May be confused with: <i>Medicago papillosa</i> subsp. <i>macrocarpa</i>
Fruit diameter less than 6.3 mm.	Fruit diameter 6.3 mm or larger.



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

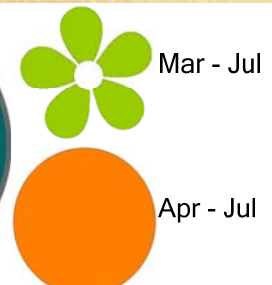
Tertiary relative of *Medicago sativa* L.



No seed image available



0.3 m



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.

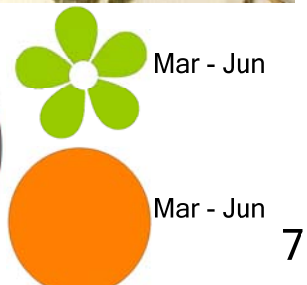
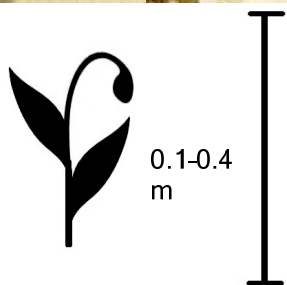
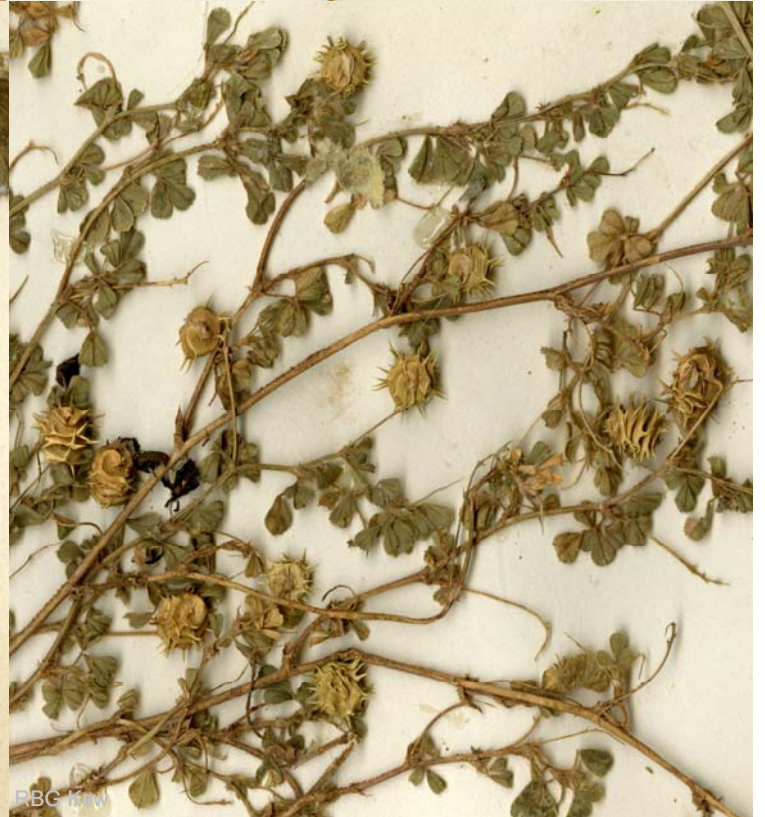
**Altitude:** 0 - 2150 m

<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.

Reported from  
Armenia but no  
localities known.

All population 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:**

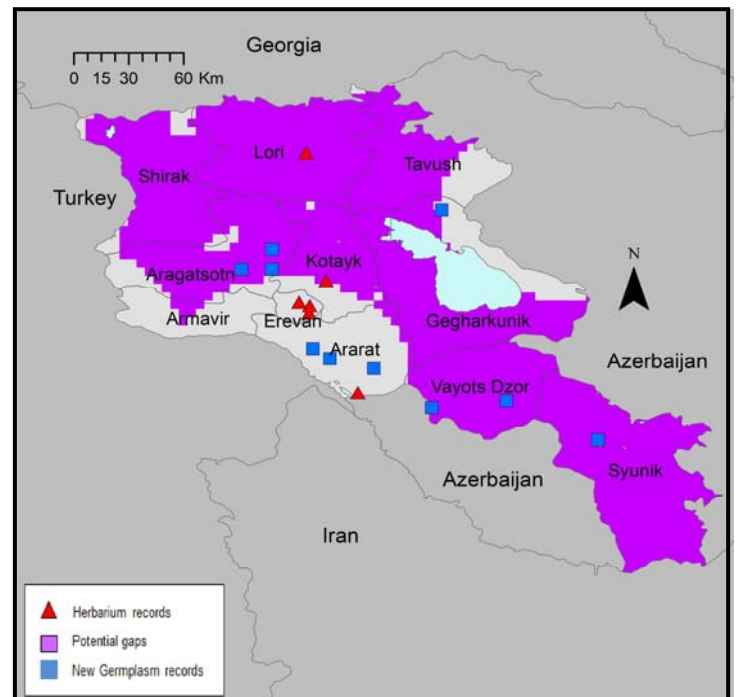
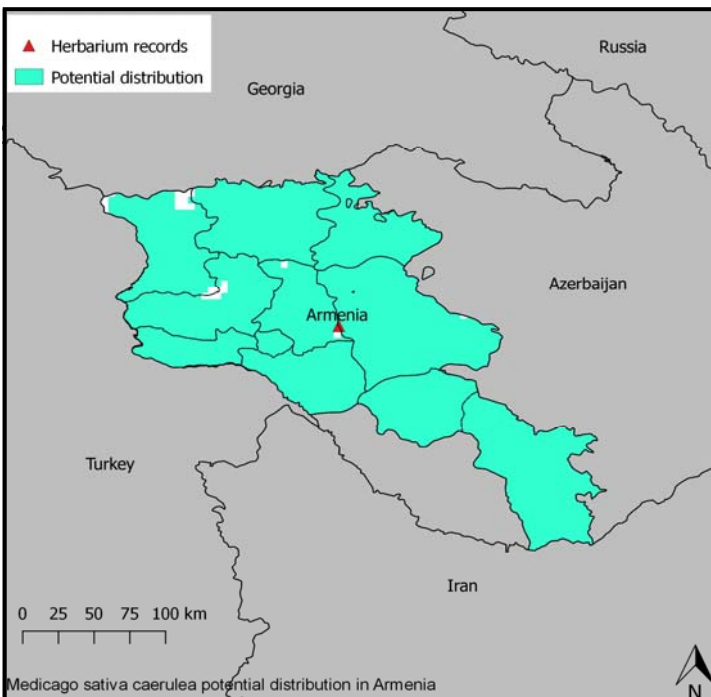
Often found in semi-deserts and saline environments, especially along the Caspian Sea coast.

**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.

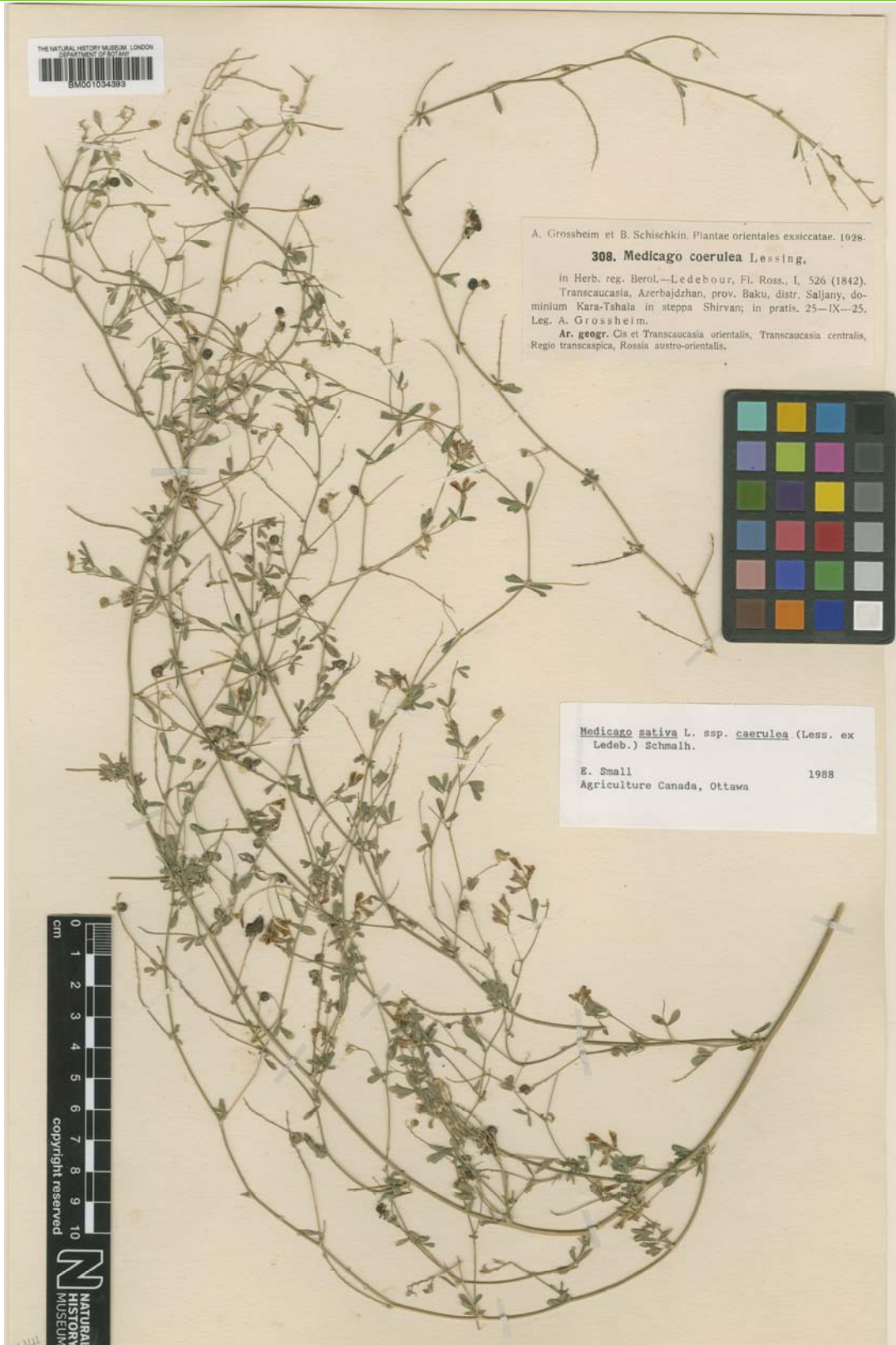


**References:** Small, E. (2011) Alfalfa and Relatives: Evolution and classification of *Medicago*. NRC Research Press, Ottawa.

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

Secondary Gene Pool relative of *Medicago sativa* L.

Blue alfalfa

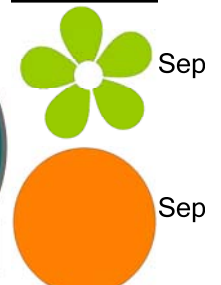


Natural History Museum London

No seed  
image  
available



0.1-1 m



LEGUMINOSAE

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

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

Sickle Medick, Yellow alfalfa

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

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

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

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

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

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

Habitat:

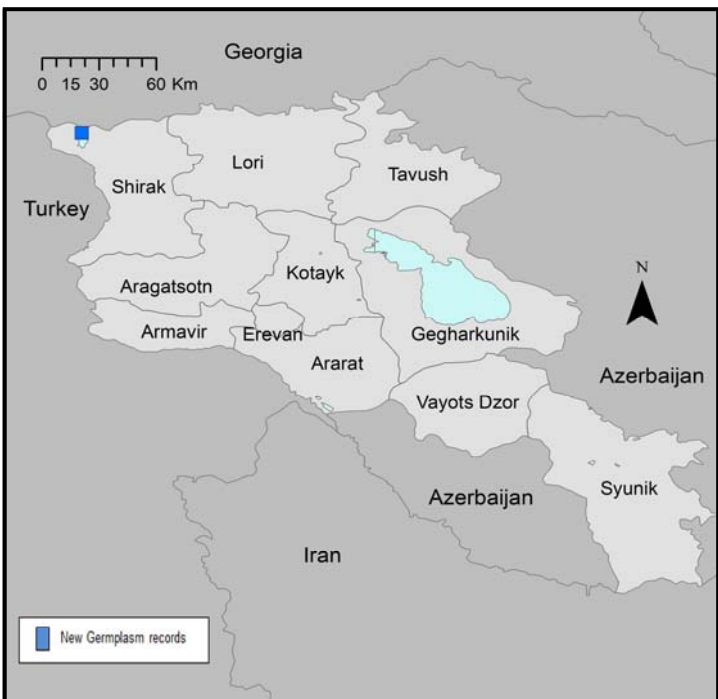
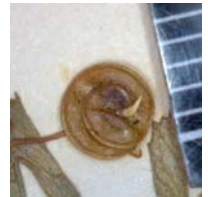
Grassy places, slopes, ravines, dry sandy fields.

Distribution:

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

Altitude: 0 - 2500 m

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



All population 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:** 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 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:**

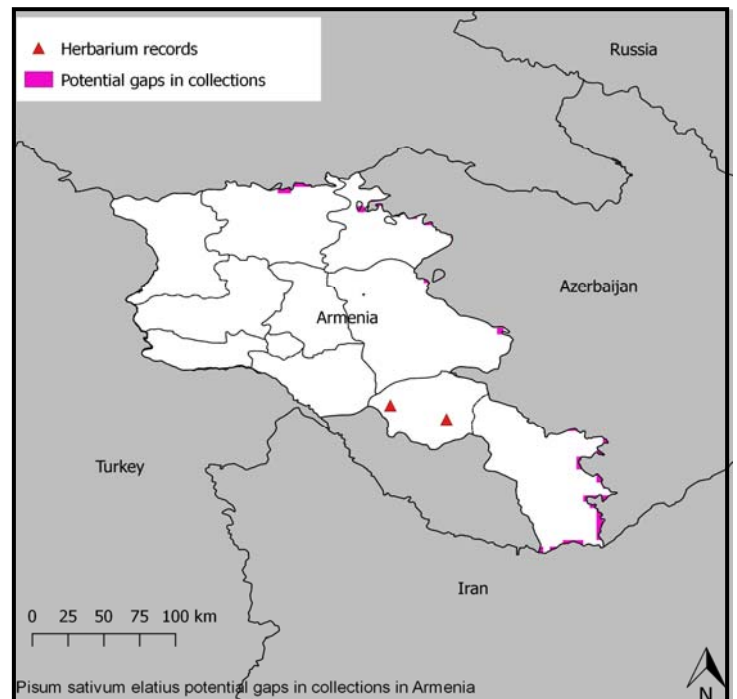
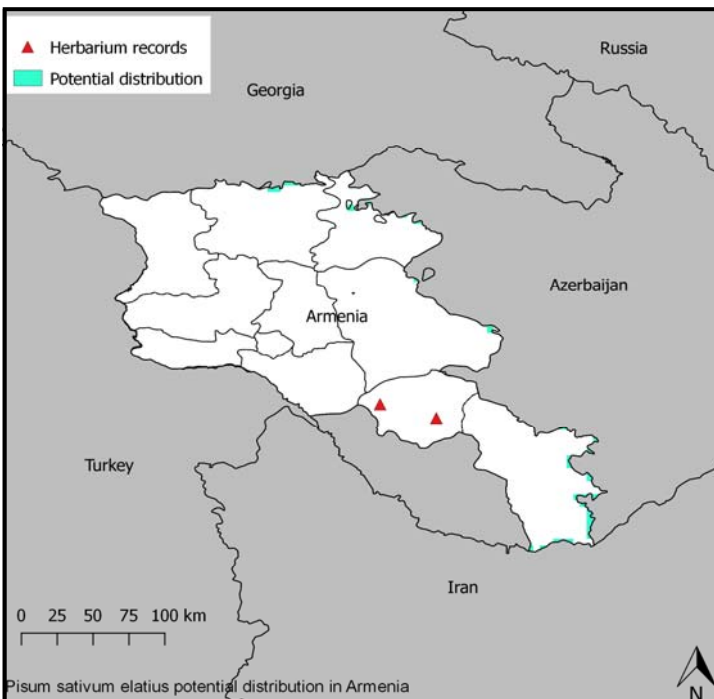
Rocky or grassy slopes, abandoned land, field margins.

**Distribution:**

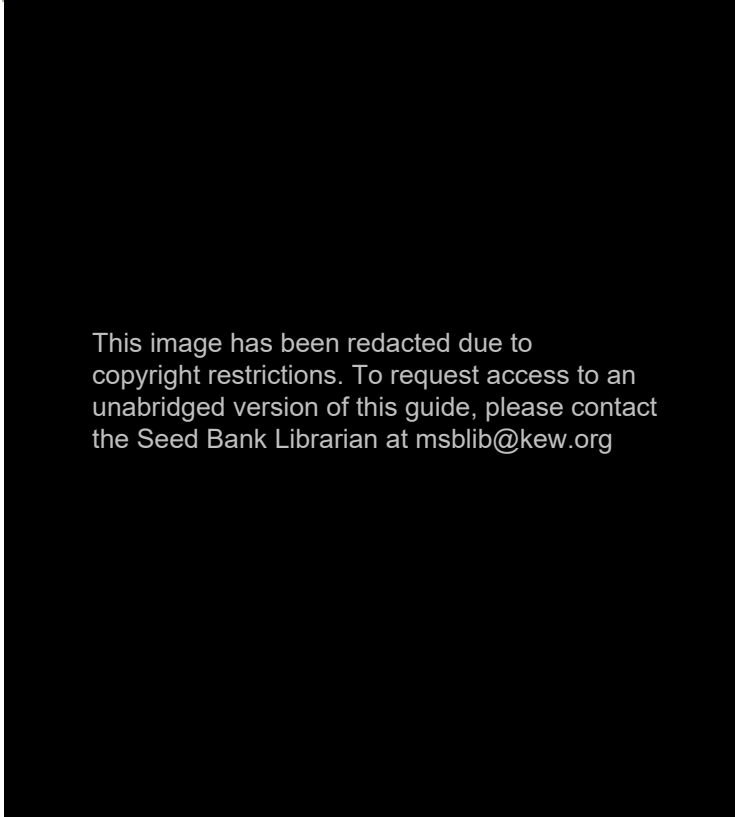
Turkey, Caucasus and Crimea, Cyprus, North Africa, Iran.

**Altitude:** 0 - 1700 m

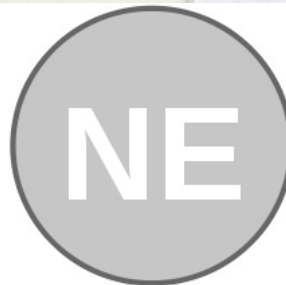
<i>Pisum sativum subsp. elatius</i>	May be confused with: <i>Pisum sativum subsp. sativum</i>
Peduncles 1/4 to 4 times as long as stipules; flowers bicoloured; fruit 7-12 mm wide; seeds densely papillose.	Peduncle 1/2 to 2 times as long as stipules; flowers white or bicoloured; fruit 12-17 mm wide; seeds densely papillose.



**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 or biennial climbers, 25-60 cm tall, stems slender, ascending. Stipules 2.5-12 mm by 1-11 mm, lower semi-hastate and few-toothed, upper ovate to lanceolate, entire.

**LEAVES:** Leaflets 3-7-paired, 7-38 x 1-15 mm, oblong, obovate or suborbicular, apex obtuse or truncate, mucronate, margins entire or serrate.

**INFLORESCENCES:** Axillary, 1-3-flowered but most often paired. Peduncle 1-13 mm, pedicel 1-4 mm. Flowers 10-33 mm; calyx teeth subequal; petals all approximately equal in length, standard cream or yellow, sometimes with a lilac tinge, shape stenonychioid (lamina contacting into a narrow claw and no distinct constriction between lamina and claw), claw bowing absent, upper standard surface glabrous, wing marking absent, wing limb with or without basal folding.

**FRUIT:** Pod 6-70 mm long by 4-12 mm wide, linear or rectangular, rounded or flattened, sutures straight, valves glabrous or pubescent.

**SEEDS:** 1-14 per fruit, more or less circular, laterally flattened, 2-7 mm in diameter, hilum > 1/2 of seed circumference.

**Habitat:**

Disturbed land, woodlands and woodland margins.

**Distribution:**

Southern and Eastern Europe, Turkey and the Caucasus.

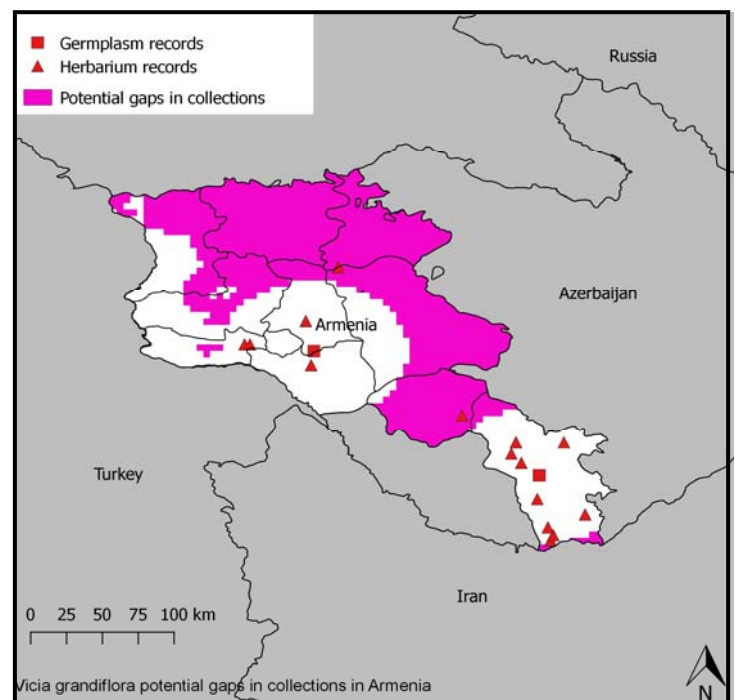
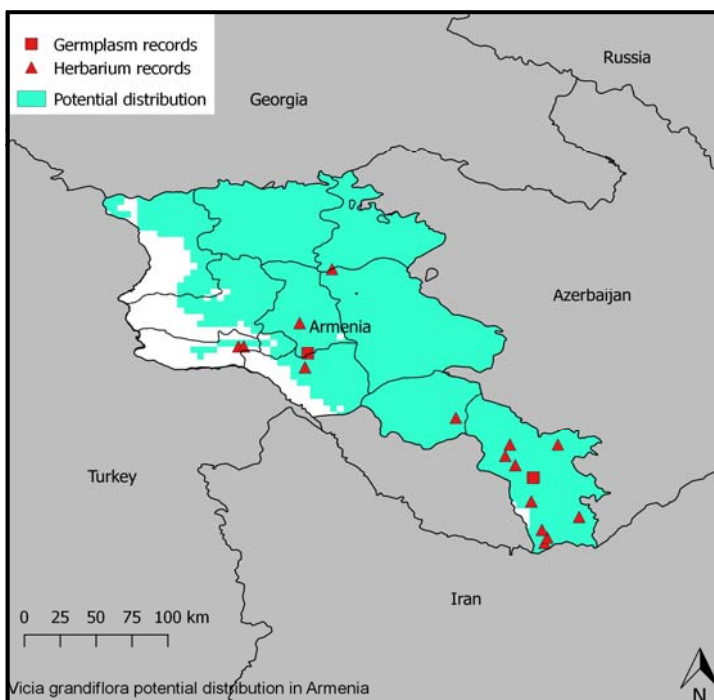
**Altitude:** 500 - 1600 m

*Vicia grandiflora*

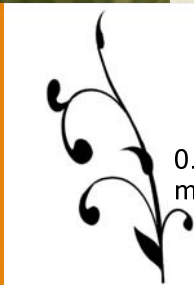
May be confused with:  
*Vicia sativa*

Corolla wings cream or yellow; fruit laterally flattened in cross-section.

Corolla wings purple; fruit rounded in cross-section.



**References:** Komarov, V.L., ed. (1948) Flora of the USSR (English version). Volume 13, p349; Maxted, N. (1995) An Ecogeographical Study of *Vicia* subgenus *Vicia*. Systematic and Ecogeographic Studies on Crop Gene-pools 8. International Plant Genetic Resources Institute, pp71-73.



0.2-0.6 m



Apr - Jun

May - Jul

Taxon Group 3 relative of *Vicia pannonica* Crantz

**HABIT:** Annual climbing herb, stems erect, 20-90 cm tall, vegetative parts glabrescent. Stipules minute, semi-sagittate to ovate.

**LEAVES:** Leaflets (4-)5-8 paired, 10-35 mm long by 3-12 mm wide, oblong, elliptic or linear, apex truncate to emarginate. Rachis ending in a branched tendril.

**INFLORESCENCES:** Flowers solitary or in pairs. Flowers 17-20 mm long; calyx 7-12 mm long, glabrous to sparsely pilose, mouth open, teeth unequal, longer or shorter than tube; corolla yellow with dark veins, standard limb slightly shorter than claw.

**FRUIT:** Pod 21-40 mm long, glabrous, oblong to linear, slightly compressed, apex with a short beak. **SEEDS:** 3-6 per pod, hilum about 1/8 of perimeter.

**Habitat:**

Cultivated areas, especially irrigated fields, disturbed ground.

**Distribution:**

Central Asia, Caucasus, Iran and Iraq.

**Altitude:** 1100 - 2400 m

<i>Vicia hyrcanica</i>	May be confused with:

Reported from  
Armenia but no  
localities known.

All population priority for  
collection

**References:** David, P.H. [ed.] (1969) Flora of Turkey, Volume 3, p 306.

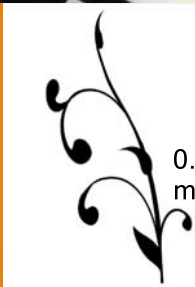
LEGUMINOSAE

*Vicia hyrcanica* Fisch. & C.A.Mey.

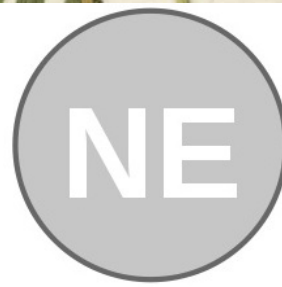
Taxon Group 3 relative of *Vicia pannonica* Crantz



No seed image available



0.2-0.9 m



**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.

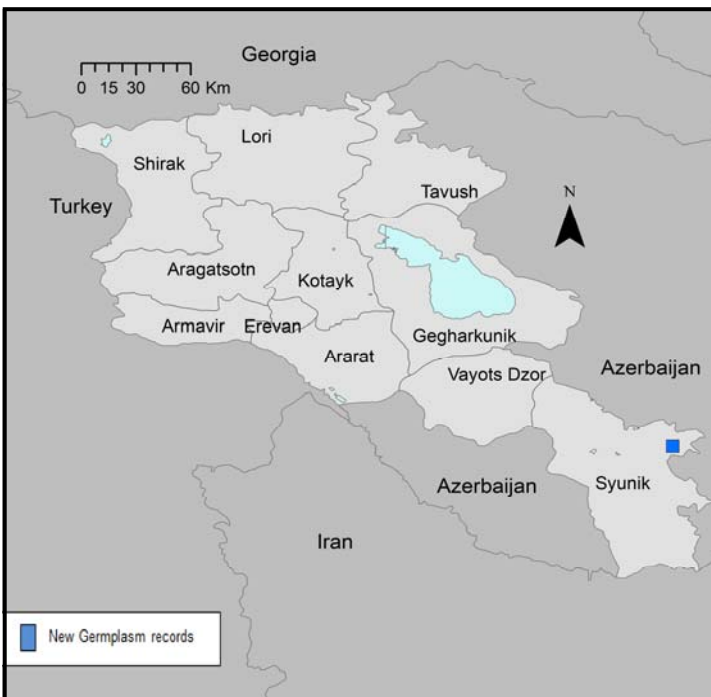
**Altitude:** 10 - 1500 m

*Vicia lathyroides*

May be confused with:  
*Vicia cuspidata*

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.

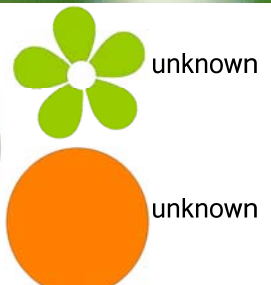
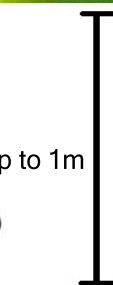
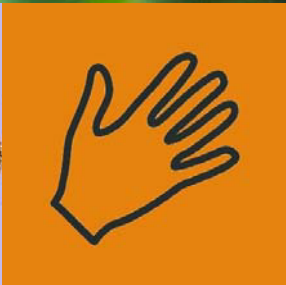


All population priority for collection

**References:** Mxated, 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 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.

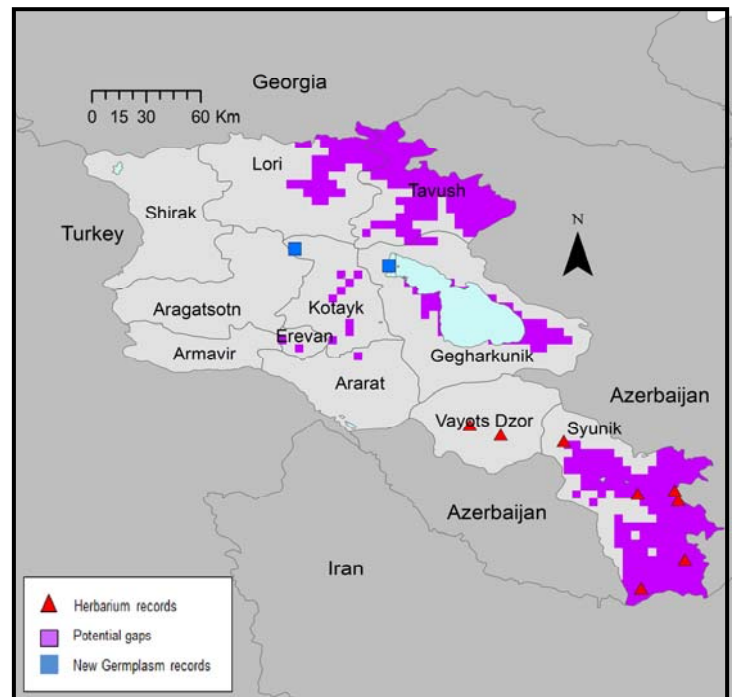
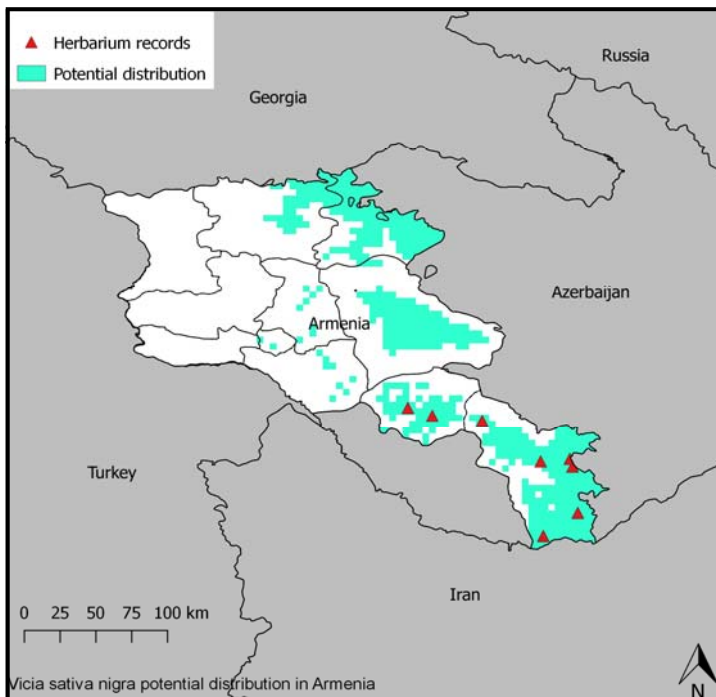
**Altitude:** 0 - 2900 m

*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.

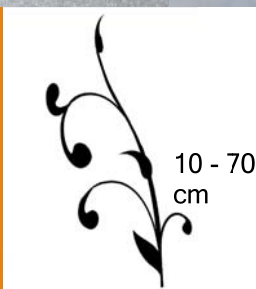
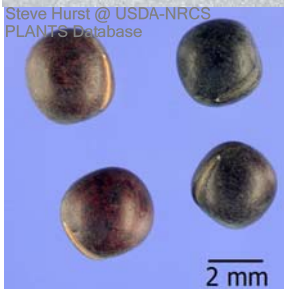
Pod brown or yellow-brown, contracted between seeds, 35-70 × 6-11 mm, usually hairy.



**References:** Macted, 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

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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.

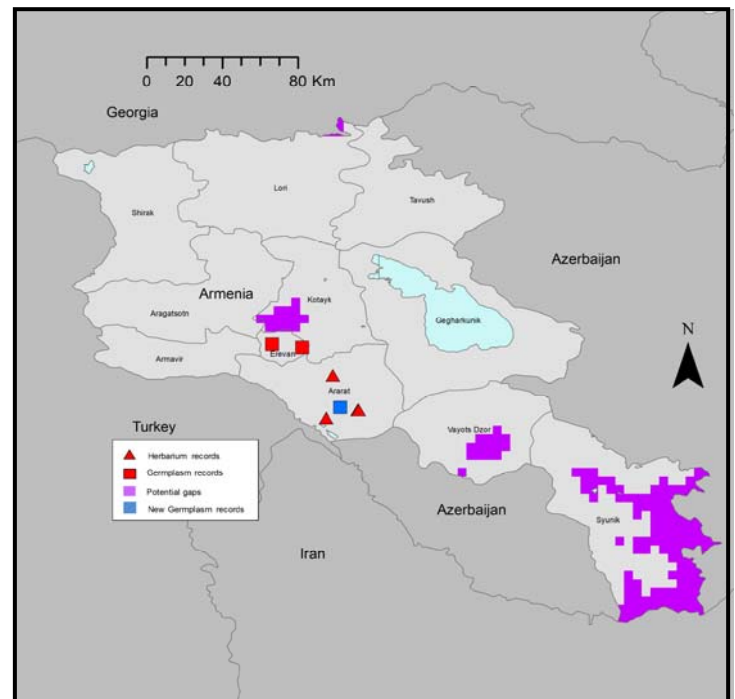
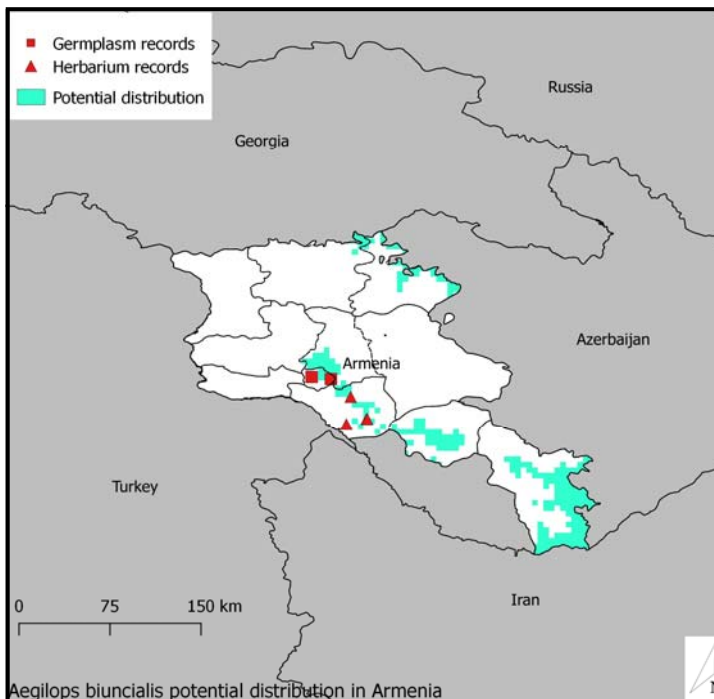
**Altitude:** 150 - 1030 m

*Aegilops biuncialis*

May be confused with:  
*Aegilops geniculata*

Spikelets 2(-3), all fertile, narrowly obovoid-ellipsoid, not constricted above; glume apex with 2-3 awns, longer towards apex of inflorescence.

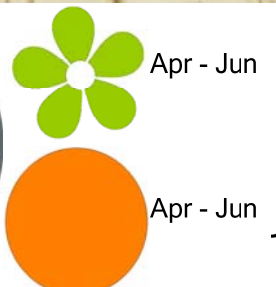
Spikelets (2-)3-4, upper one sterile, lowest 1-3 subventricose, widest at or below the middle, constricted above; glume apex with (3-)4-5 awns, becoming shorter towards apex of inflorescence.



**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>.



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

**HABIT** Annual herbs, caespitose. Culms geniculately ascending, or decumbent; 20-50 cm long.

**LEAVES:** Leaf-sheath oral hairs ciliate. Leaf-sheath auricles falcate. Ligule an eiliate membrane. Leaf-blades 2-6 cm long; 2.5-4.5 mm wide. Leaf-blade surface scabrous; rough on both sides; pilose; sparsely hairy; hairy on both sides.

**INFLORESCENCES:** Spikes single, narrowly ovoid to oblong, bilateral, 2-4 cm long, deciduous as a whole. 2-3 fertile spikelets per spike. Rhachis tough, internodes oblong. Spikelet packing broadside to rhachis.

Spikelets comprising 3-4 fertile florets, with diminished florets at the apex. Spikelets oblong, laterally compressed, 8-12 mm long, falling entire.

Glumes shorter than spikelet, 7-11 mm long, with 2-3 awns, 1 awns more developed than others, broad at base and often bifurcating above. Lemmas with 2-3 awns, shorter than those of glumes (30-40 mm).

**FRUIT:** Caryopsis with adherent pericarp, free from lemma and palea.

**Habitat:**

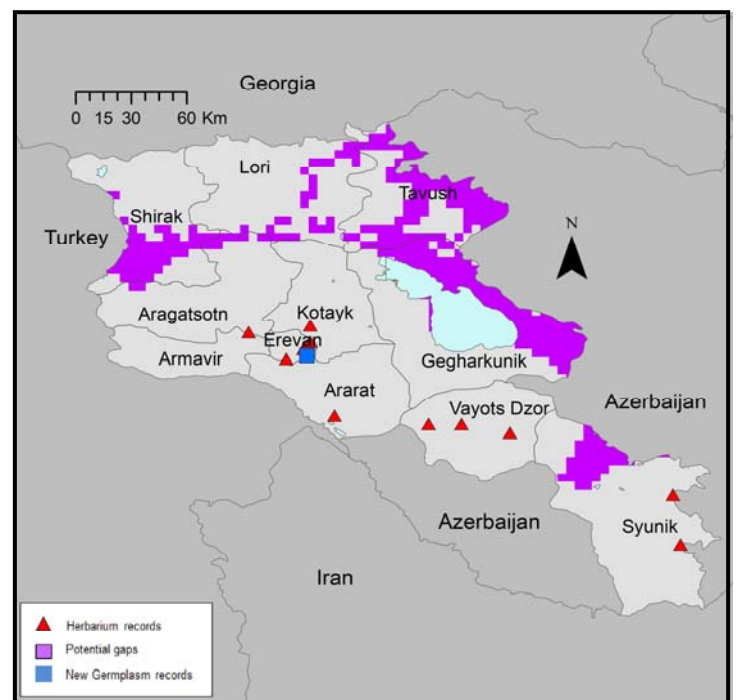
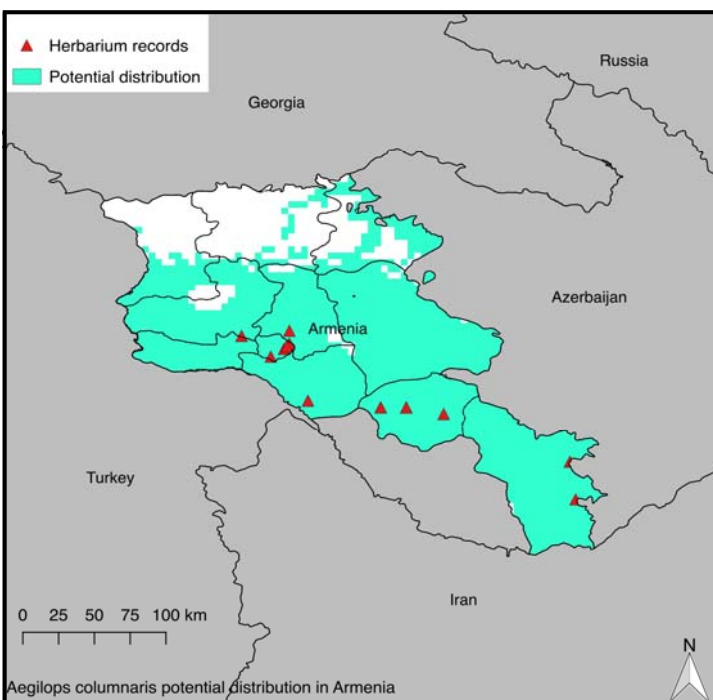
Dry open fields, roadsides and hillsides, occasionally in pine forests.

**Distribution:**

Crete, Turkey, Caucasus and northern Iran.

**Altitude:** 450 - 1990 m

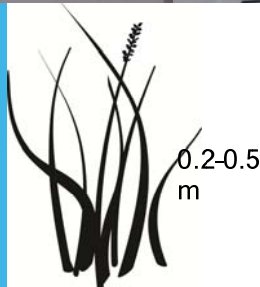
<i>Aegilops columnaris</i>	May be confused with: <i>Aegilops neglecta</i>
Spike ovoid in lower part, more linear in upper part; fertile spikelets 3-4, apical sterile spikelets very rudimentary; glumes of fertile spikelets elliptic-oblong, apex with 2 unequal awns.	Spike ovoid-ellipsoid, inflated in lower part, then abruptly constricted and almost linear; spikelets 3-6, of which upper 1-3 sterile; glumes of fertile spikelets obovate-elliptical, 3-awned, awns equal in length and width at base.



**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>.



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**HABIT:** Annual; caespitose; clumped loosely. Culms erect, or geniculately ascending; 30-50 cm. Leaf-sheath oral hairs ciliate. Leaf-sheath auricles falcate. Ligule an eciliate membrane. Leaf-blades 10-20 cm x 4-10 mm. Leaf-blade surface glabrous, or pilose; hairy on both sides; with tubercle-based hairs. Leaf-blade margins scabrous.

Inflorescence composed of 1 raceme.

**RACEME:** Single; moniliform; smoothly terete; bilateral; 4-8 cm; bearing 6-8 fertile spikelets on each. Rhachis fragile at the nodes; semiterete. Spikelet packing broadside to rhachis.

Spikelets appressed; solitary. Fertile spikelets sessile. Basal sterile spikelets absent, or rudimentary; 0-2 in number. Fertile spikelets comprising 3-5 fertile florets; with diminished florets at the apex. Spikelets ovate; laterally compressed; 10-14 mm; falling entire; deciduous with accessory branch structures.

Glumes similar; shorter than spikelet.

**FLORETS:** Fertile lemma oblong; 10-12 mm; coriaceous; keeled; 5 -veined. Lemma apex entire, or dentate; 2 -fid; with irregular lobes; truncate. Principal lemma awn flat below; 50-80 mm.

**FLOWER:** Lodicules 2; ciliate. Ovary with a fleshy appendage below style insertion; pubescent on apex.

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

#### Habitat:

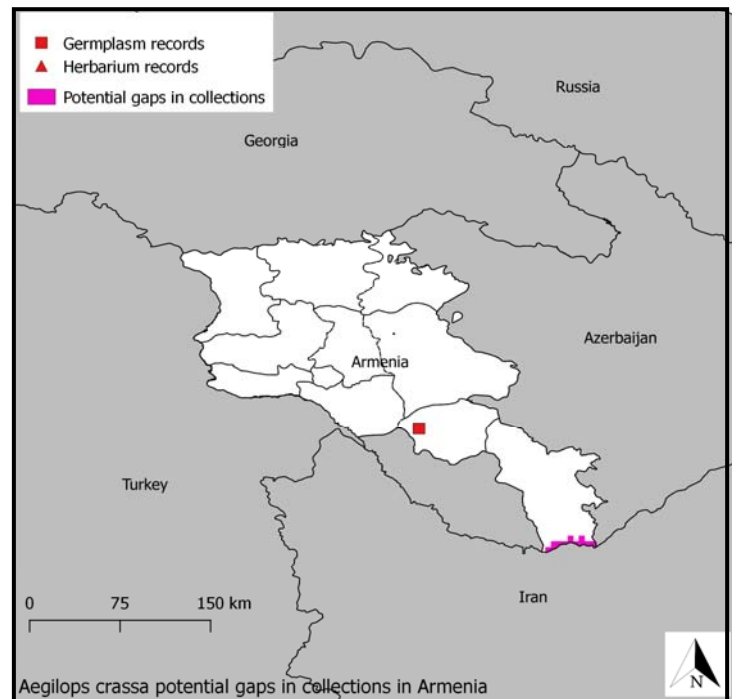
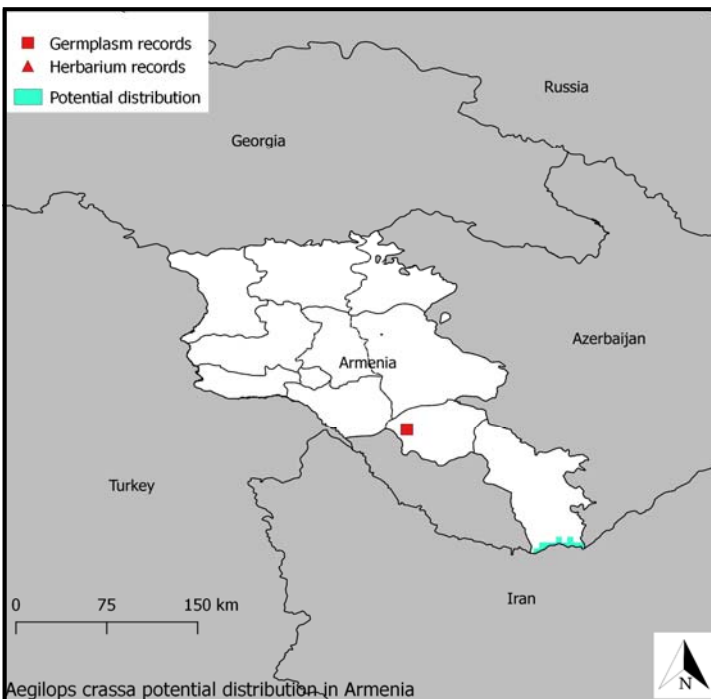
Fallow, arid grasslands, along roadsides, within margins of cultivation and on rocky slopes.

#### Distribution:

Asia-temperate: Soviet Middle Asia, Caucasus, and western Asia.

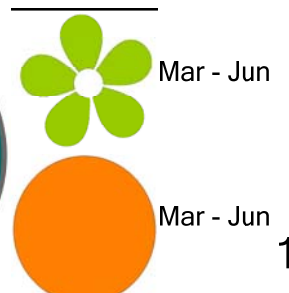
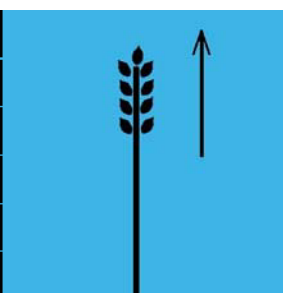
**Altitude:** 200 - 2500 m

<i>Aegilops crassa</i>	May be confused with: <i>Aegilops ventricosa</i>
Spicklets with 4-7 florest, the upper 2 sterile. Apex of lemmas of fertile florets in the apical spike with a clearly flat awn of up to 8.5 cm.	Spicklets with 2-5 florets, the upper one sterile. Apex of lemmas of fertile florets in the apical spikelet with a clearly triangular awn of up to 4 cm.



#### References:





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

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

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

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

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

### Habitat:

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

### Distribution:

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

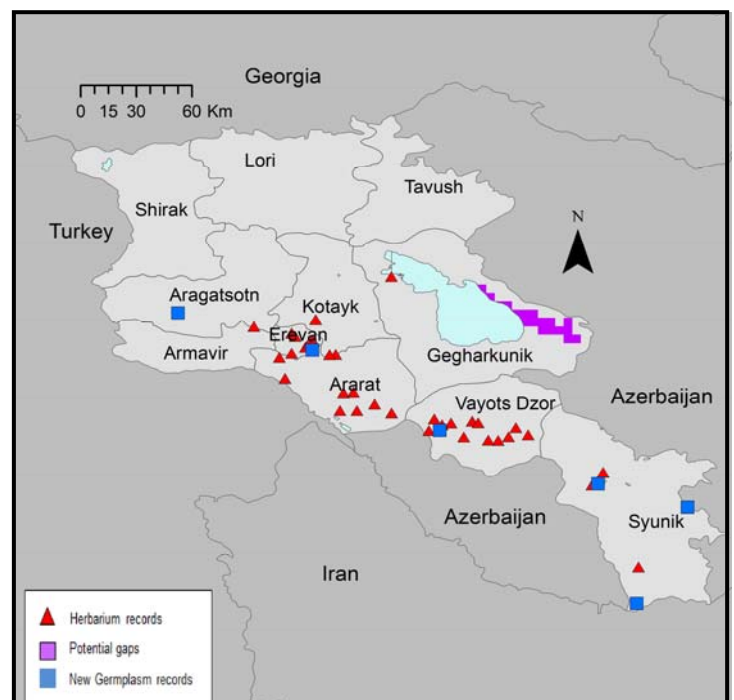
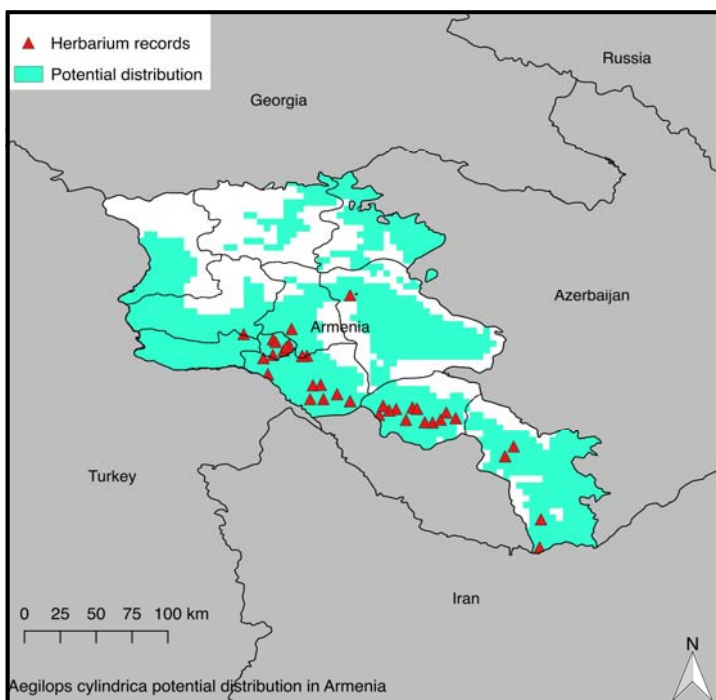
**Altitude:** 100 - 1750 m

#### *Aegilops cylindrica*

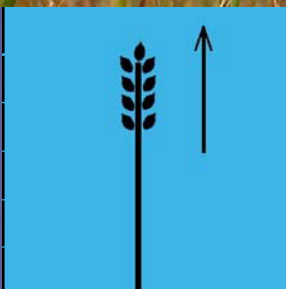
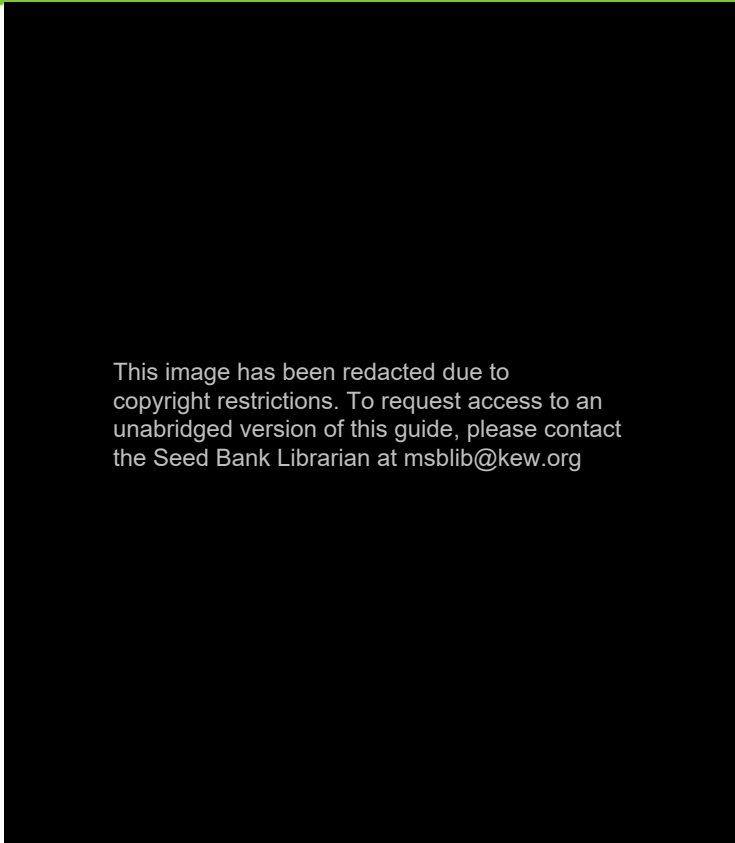
May be confused with:  
*Aegilops caudata*

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

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



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



**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:**

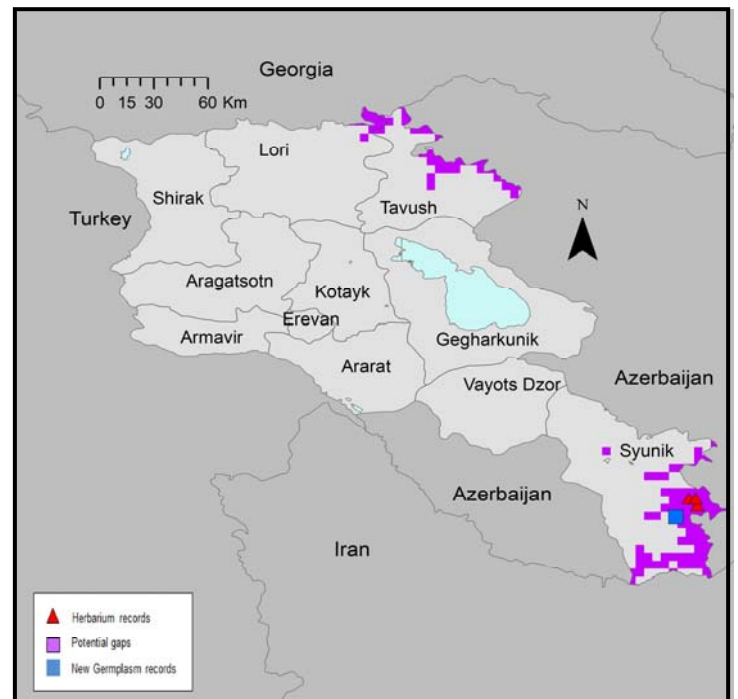
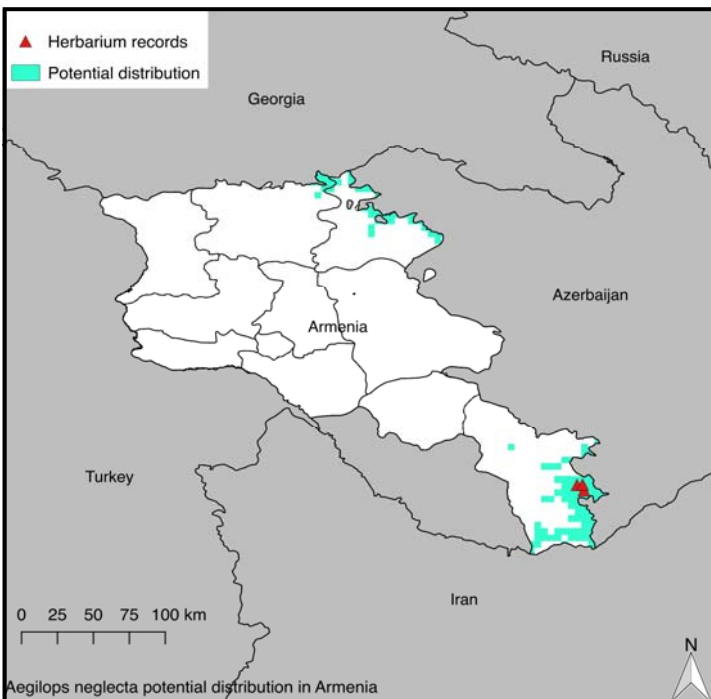
Dry, disturbed habitats e.g. wastelands, formerly cultivated sites, roadsides, dry rocky slopes, field edges, woodland, forest and scrub, often on limestone.

**Distribution:**

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

**Altitude:** 0 - 1700 m

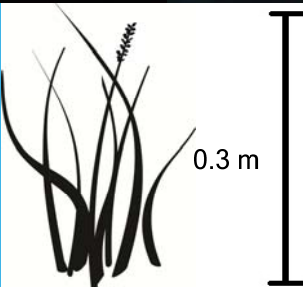
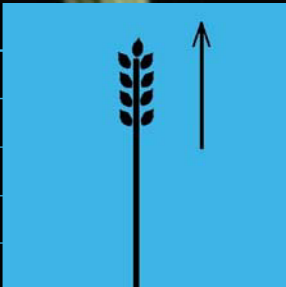
<i>Aegilops neglecta</i>	May be confused with: <i>Aegilops columnaris</i>
Glumes of lower, fertile spikelets obovate-elliptical, apex with 3 equal awns; spike obovoid-ellipsoid and inflated in lower part, upper part narrowly cylindrical; spikelets 3-6; upper 1-3 sterile.	Glumes of lower 2-3 spikelets 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>.



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**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:

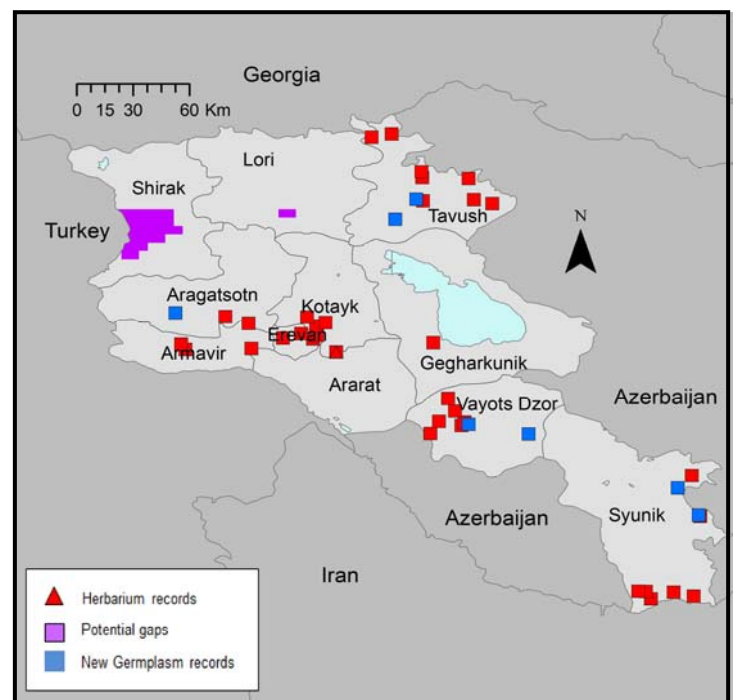
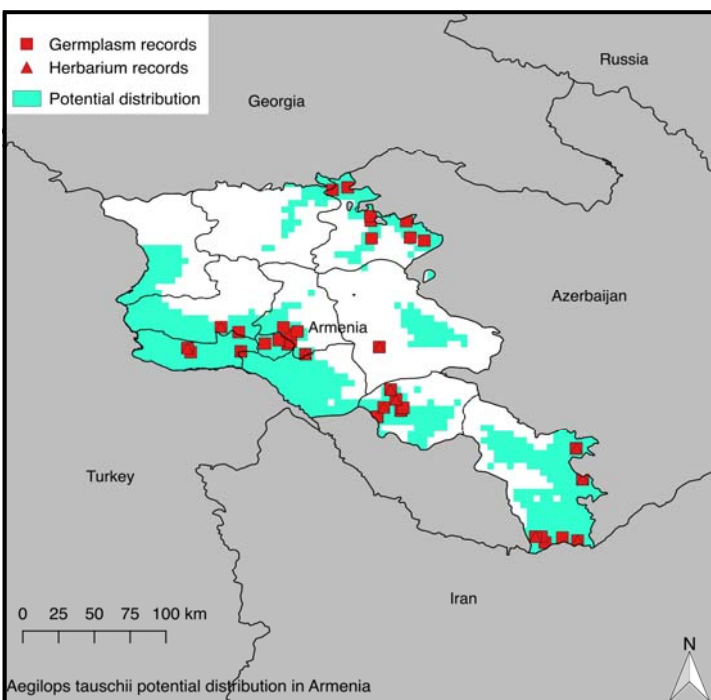
A wide range of habitats including: grasslands, fallow ground, steppes, wastelands, roadsides, within cultivation, forests, stony slopes.

### Distribution:

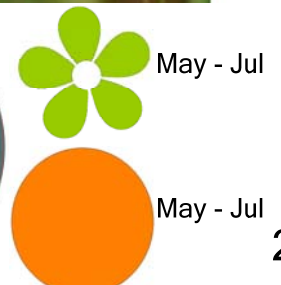
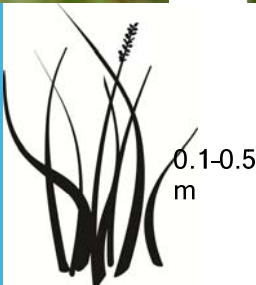
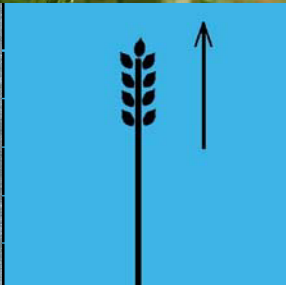
Eastern Europe, Central and Western Asia, from the Caucasus to India and China.

**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.

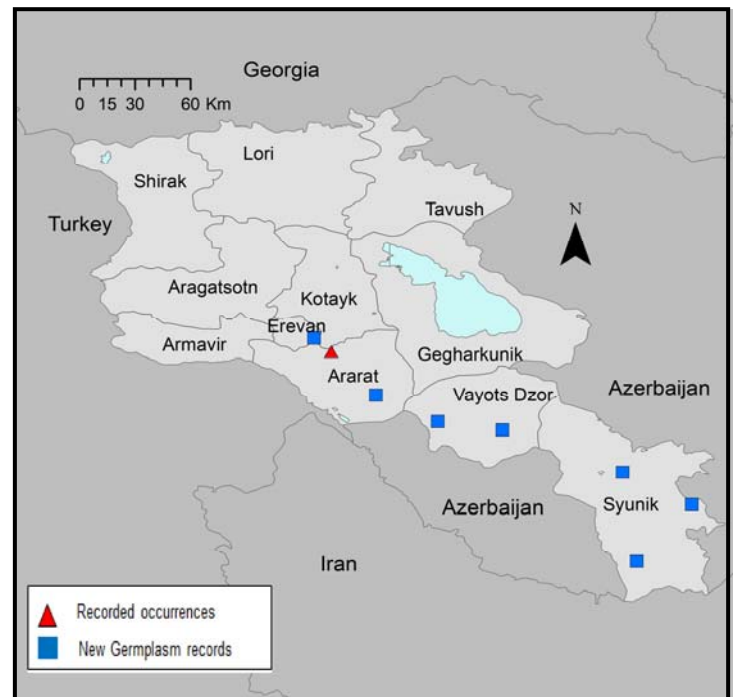
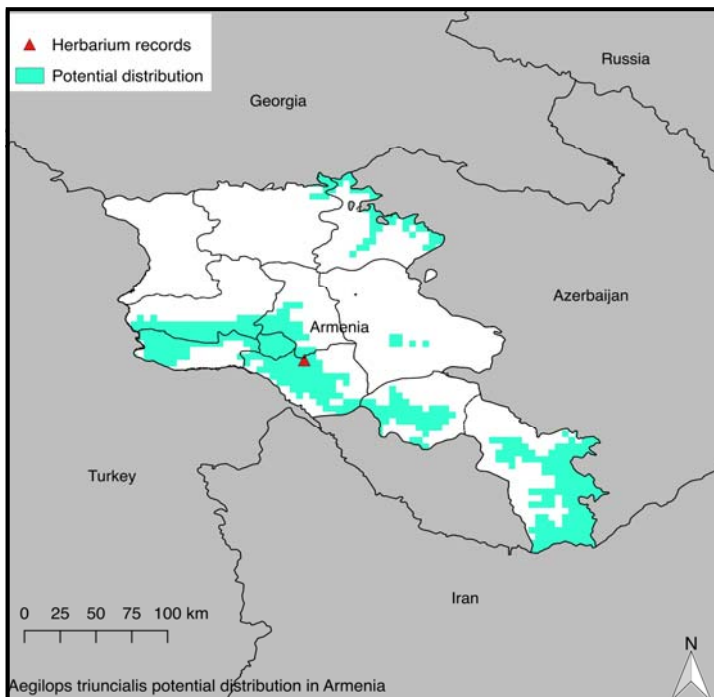
**Altitude:** 500 - 1200 m

*Aegilops triuncialis* var. *triuncialis*

May be confused with:  
*Aegilops neglecta*

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

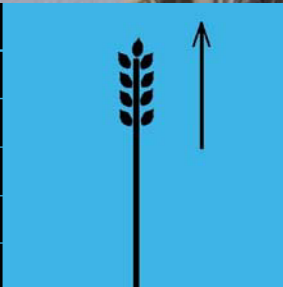
Inflorescence ovoid to oblong, 1.5–4.5(–6) cm long; glumes of apical spikelets with 2–3 awns.



**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*



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

**HABIT:** Annual herbs, caespitose, with many tillers. Culms erect, or decumbent, 10-30 cm long. **LEAVES:** Leaf-sheath oral hairs ciliate. Leaf-sheath auricles falcate. Ligule an eciliate membrane. Leaf-blades 3-10 cm long; 1-2 mm wide. Leaf-blade surface glabrous, or pilose.

**INFLORESCENCES:** A single, narrowly ovoid spike, bilateral, deciduous as a whole, 1.5-4 cm long, with (3-)5-6 spikelets of which upper 1-2 sterile and an additional (2-)3 rudimentary spikelets. Spikelets obovate, laterally compressed; 7-11 mm long, falling entire, deciduous with accessory branch structures.

**GLUMES:** Coriaceous, margins hyaline, obovate, 5-8 mm long, widest above middle and then abruptly constricted, those of apical spikelets much reduced. Lemmas 6-8mm long, narrowly ovate-elliptical. Glumes awns 3-4(-5), 20-35 mm long, lemma apex with 1-3 awns, 2 as long as glume awns, 1 reduced.

**FRUIT:** Caryopsis with adherent pericarp, free from lemma and palea, ellipsoid, hairy at apex. Disseminule comprising an inflorescence.

**Habitat:**

Grasslands, fallow fields, margins of cultivation, within forests and plantations.

**Distribution:**

Turkey, Caucasus, Aegean islands and northern Middle East.

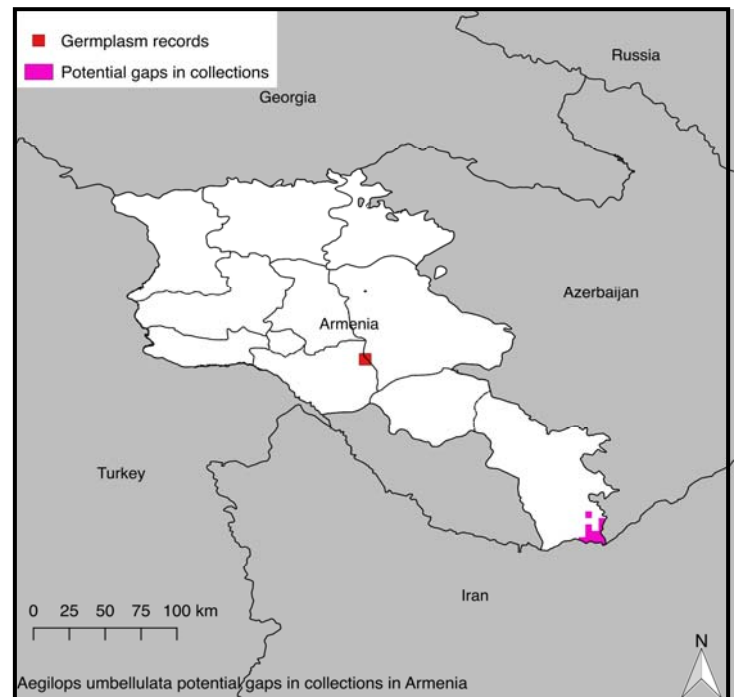
**Altitude:** 0 - 1800 m

*Aegilops umbellulata*

May be confused with:  
*Aegilops geniculata*

Spikes with 5-6 spikelets of which lower 2-3 are fertile; rudimentary spikelets usually 3; fertile spikelets obovoid-ellipsoid, widest above the middle, then abruptly constricted.

Spikes with (2-)3-4 spikelets of which lower (1-)2-3 are fertile; rudimentary spikelets usually 1; fertile spikelets ovoid, widest at or below middle.



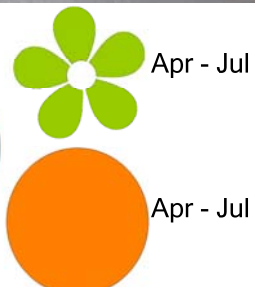
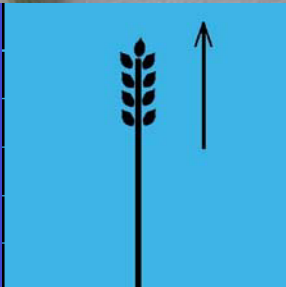
**References:** Slageren, M.W. van (1994) Wild Wheats: A Monograph of *Aegilops* L. and *Amblyopyrum* (Jaub. & Spach) Eig. Wageningen Agricultural University Papers; GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>.



RBG Kew



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Secondary gene pool of *Triticum aestivum* subsp. *compactum*

**HABIT:** Loosely tufted annual. Culms unbranched, slender, erect, 40-70 cm tall excluding spikelets with 3-5 nodes; foliage sparse, more dense at base of culm.

**LEAVES:** Glaucous-green 8-25cm x 0.6-1.1 cm, with ciliate venation and margins at the base of the culm.

**INFLORESCENCE:** A narrowly cylindrical spike, 20-35 cm x 3-4 mm, with 12-20 awnless fertile spikelets; spike at maturity disarticulating wedge-type into groups of spikelets. Rachis segments noded, 12-22mm long. Spikelets all alike, oblong-cylindrical, sessile, alternate, laterally compressed, closely appressed to the concave rachis internode, 8-15mm long.

**GLUMES:** 2, truncate, cuneate, widest at the apex, concave, coriaceous but with hyaline margins, rounded at the back, 4-9mm long; outer surface hispid, glabrous. Lemmas elliptic-obtuse to -emarginate, the lower ones 7-10mm long.

**FRUIT:** Caryopsis obovate-oblong approx 4mm long, compressed, adaxially grooved over the entire length, adherent to lemma and palea; hilum linear, almost as long as the grain.

**Habitat:**

Open places near roadsides, dry igneous hill slopes.

**Distribution:**

Turkey and Armenia.

**Altitude:** unknown

<i>Amblyopyrum muticum</i> var. <i>loliaceum</i>	May be confused with: <i>Amblyopyrum muticum</i> var. <i>muticum</i>
Glume and lemmas glabrous	Glumes and apical parts of lemmas covered with short, whitish, stiff hairs.

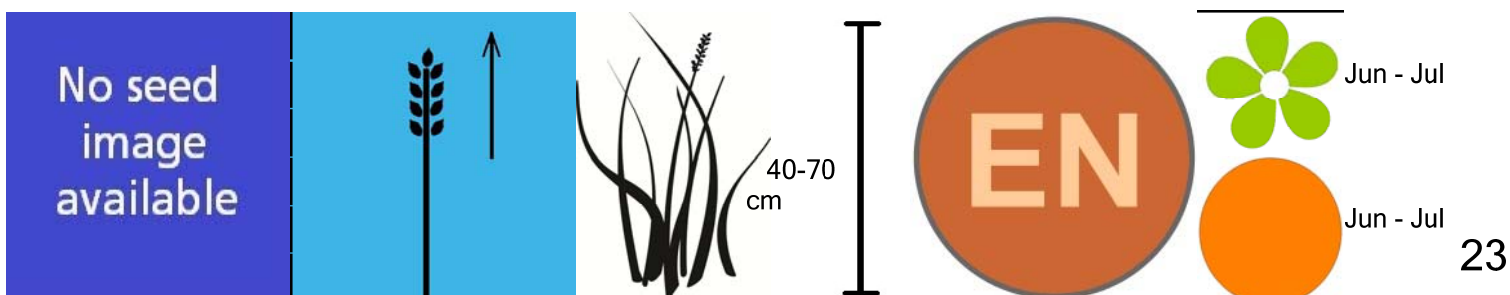
Reported from  
Armenia but no  
localities known.

All population priority for  
collection

References:

NO IMAGE AVAILABLE

If you know of an image or link to an image of this species please let us know [cropwildrelatives@kew.org](mailto:cropwildrelatives@kew.org)



Secondary gene pool of *Triticum aestivum* subsp. *compactum*

**HABIT:** Loosely tufted annual. Culms unbranched, slender, erect, 40-70 cm tall excluding spikelets with 3-5 nodes; foliage sparse, more dense at base of culm.

**LEAVES:** Glaucous-green 8-25cm x 0.6-1.1 cm, with ciliate venation and margins at the base of the culm.

**INFLORESCENCE:** A narrowly cylindrical spike, 20-35 cm x 3-4 mm, with 12-20 awnless fertile spikelets; spike at maturity disarticulating wedge-type into groups of spikelets. Rachis segments noded, 12-22mm long. Spikelets all alike, oblong-cylindrical, sessile, alternate, laterally compressed, closely appressed to the concave rachis internode, 8-15mm long.

**GLUMES:** 2, truncate, cuneate, widest at the apex, concave, coriaceous but with hyaline margins, rounded at the back, 4-9mm long; outer surface hispid with long, white stiff, whitish, pointed hairs. Lemmas elliptic-obtuse to -emarginate, the lower ones 7-10mm long.

**FRUIT:** Caryopsis obovate-oblong approx 4mm long, compressed, adaxially grooved over the entire length, adherent to lemma and palea; hilum linear, almost as long as the grain.

**Habitat:**

Open places near roadsides, dry igneous hill slopes.

**Distribution:**

Turkey and Armenia.

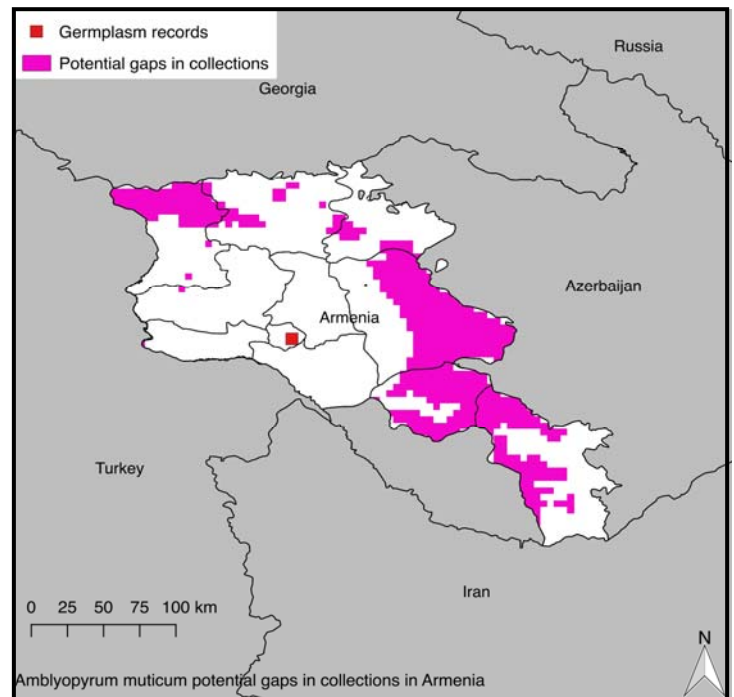
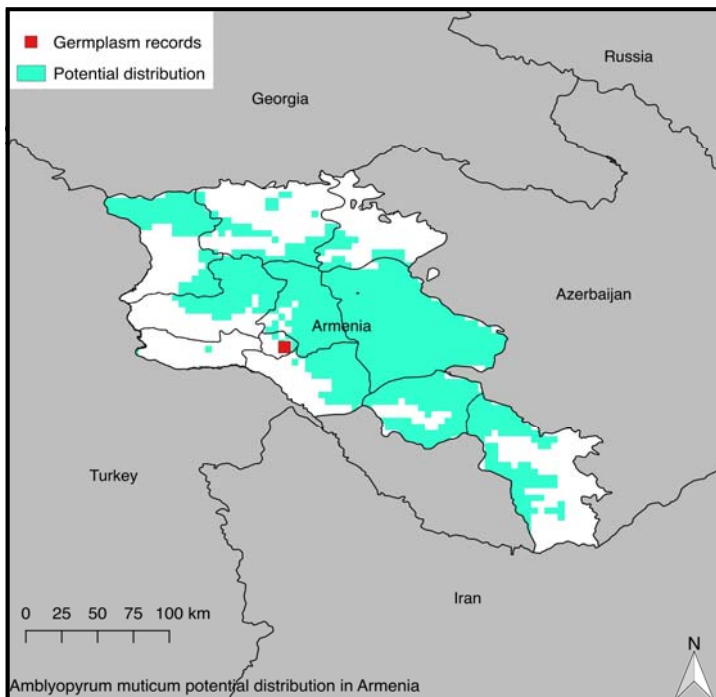
**Altitude:** 800 - 1200 m

*Amblyopyrum muticum* var. *muticum*

May be confused with:  
*Amblyopyrum muticum* var. *loliaceum*

Glumes and apical parts of lemmas covered with short, whitish, stiff hairs.

Glume and lemmas glabrous

**References:**



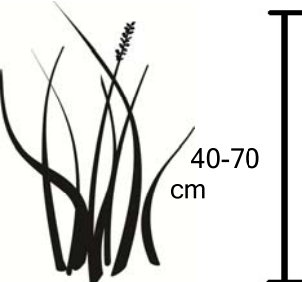
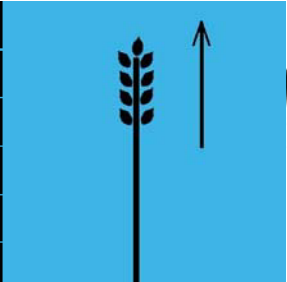
*Amblyopyrum muticum* var. *muticum* (Boiss.) Eig

Secondary gene pool of *Triticum aestivum* subsp. *compactum*




RBGE herbarium material

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Jun - Jul



Jun - Jul

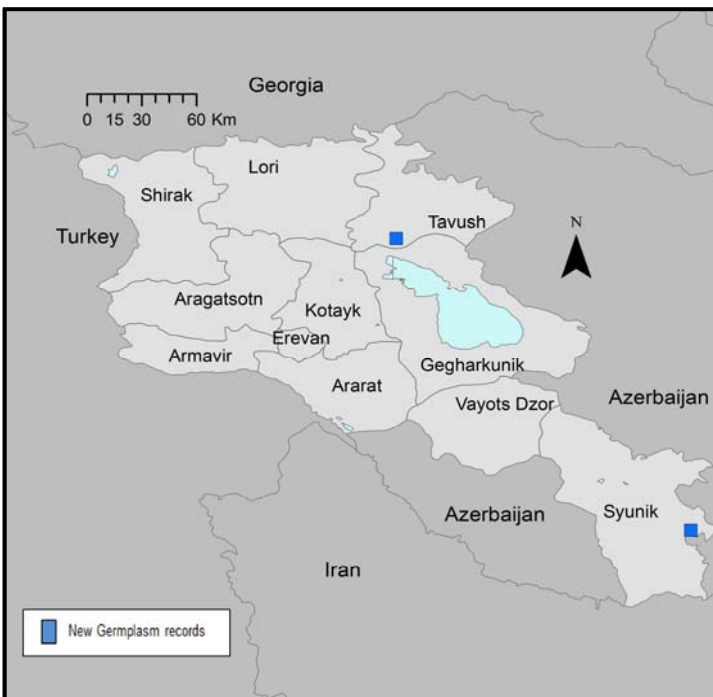
24

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.

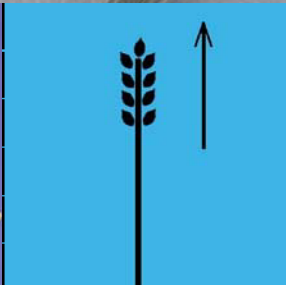
**Altitude:** 0 - 240 m*Avena barbata*May be confused with:  
*Avena fatua*Ligule obtuse; lemma tip biaristulate;  
epiblast 0.3-0.4 mm wide.Ligule acute; lemma tip bidenticulate;  
epiblast 0.45-0.7 mm wide.

Reported from  
Azerbaijan,  
but no localities  
known.

**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.



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.

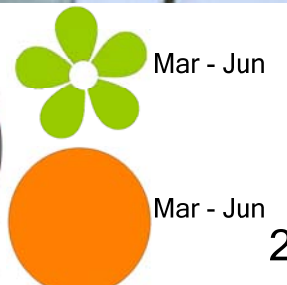
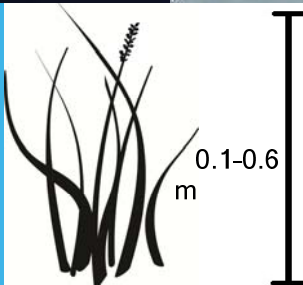
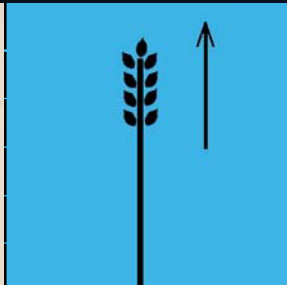
**Altitude:** 200 - 1100 m

<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  
Armenia but no  
localities known.

All population priority for  
collection

Tertiary 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:**

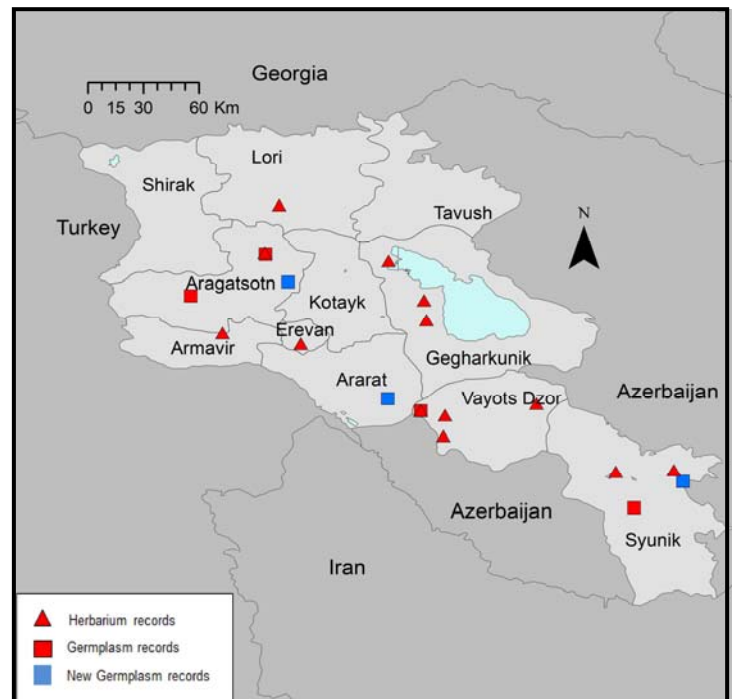
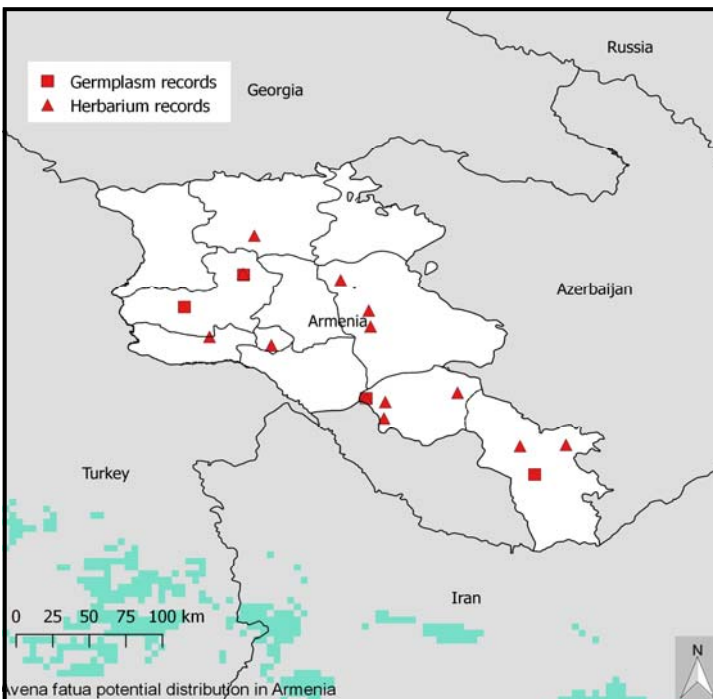
Roadside weed or weed of arable land.

**Distribution:**

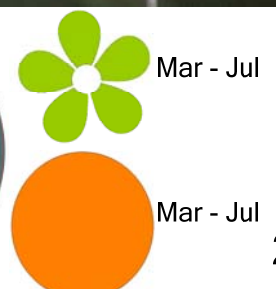
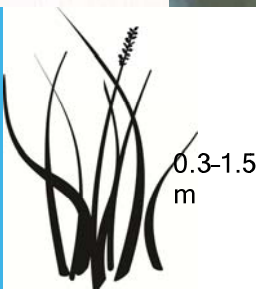
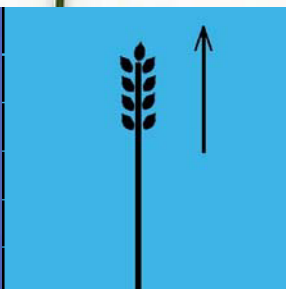
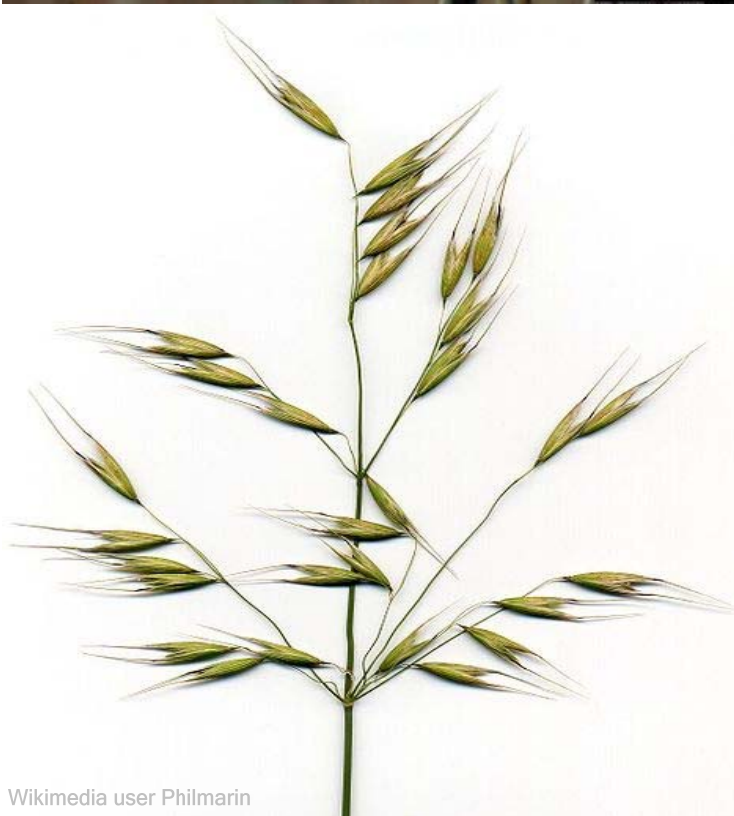
Distributed globally.

**Altitude:** 0 - 2400 m

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



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



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

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

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

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

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

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

**Habitat:**

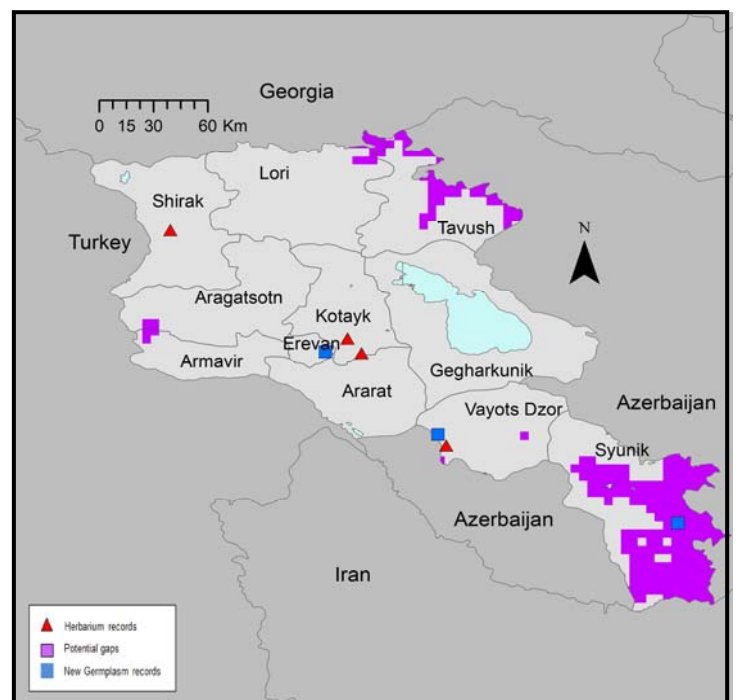
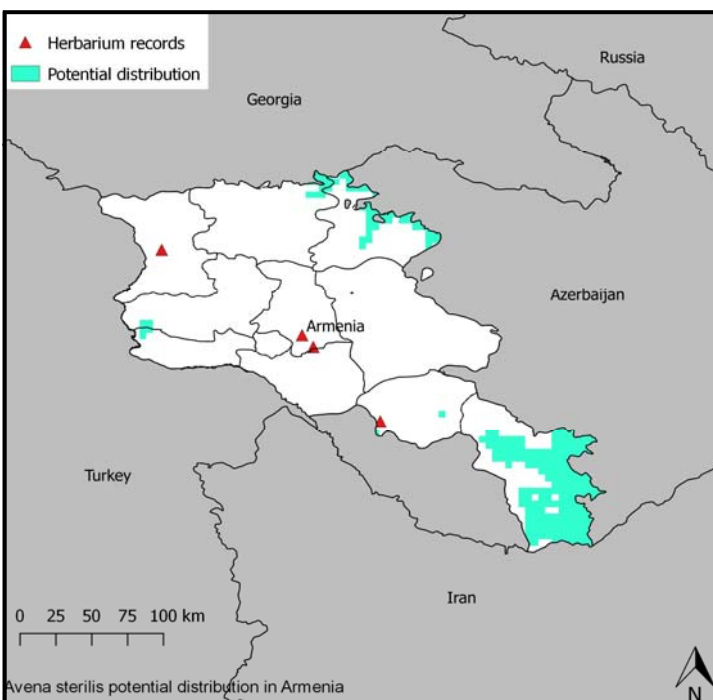
Arable land, especially fields of cereals, disturbed open ground, roadsides and field edges.

**Distribution:**

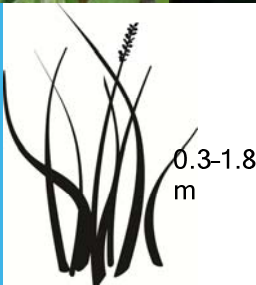
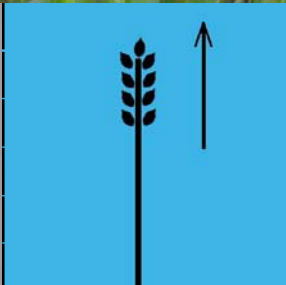
Distributed globally.

**Altitude:** 2100 - 2400 m

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



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



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

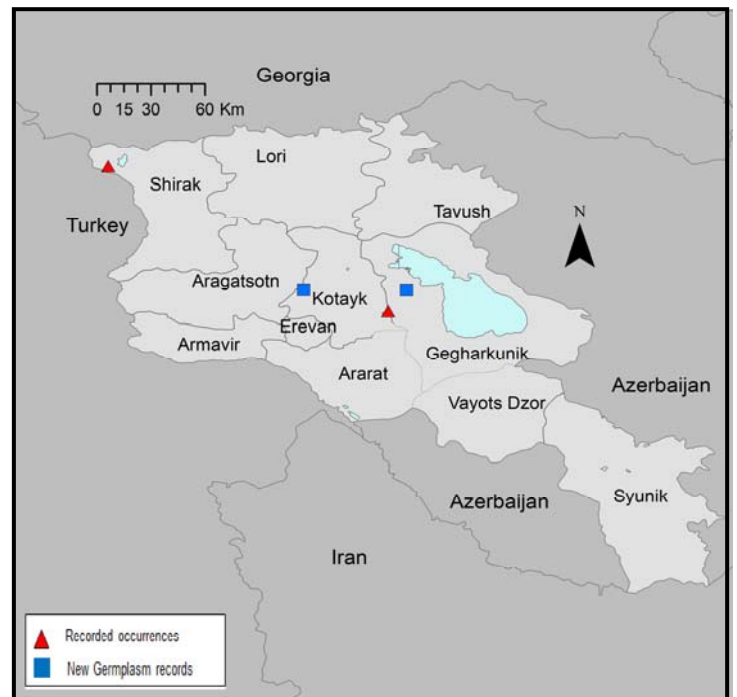
Steppe valleys at timberline, wet meadows, saline meadows, stream banks, salt steppes, dry valleys, dry stony slopes and other dry habitats, rarely as a weed.

**Distribution:**

Throughout Eastern Europe and Asia.

**Altitude:** 1400 - 5000 m

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



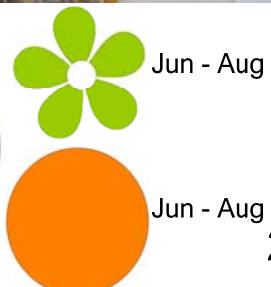
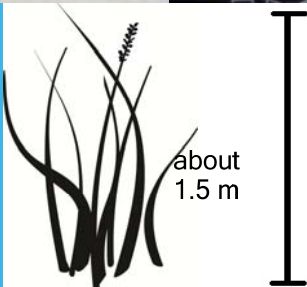
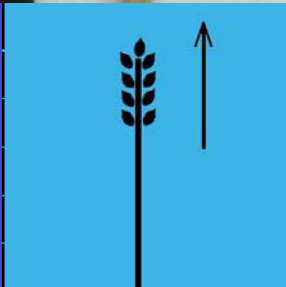
**References:** Flora of China, Volume 22, p396 via [www.efloras.org](http://www.efloras.org)  
[http://www.efloras.org/florataxon.aspx?flora\\_id=2&taxon\\_id=200025533](http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200025533)



Tertiary Gene Pool relative of *Hordeum vulgare* L.



No seed image available



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

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

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

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

**FLOWER:** Ovary apex pubescent.

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

**Habitat:**

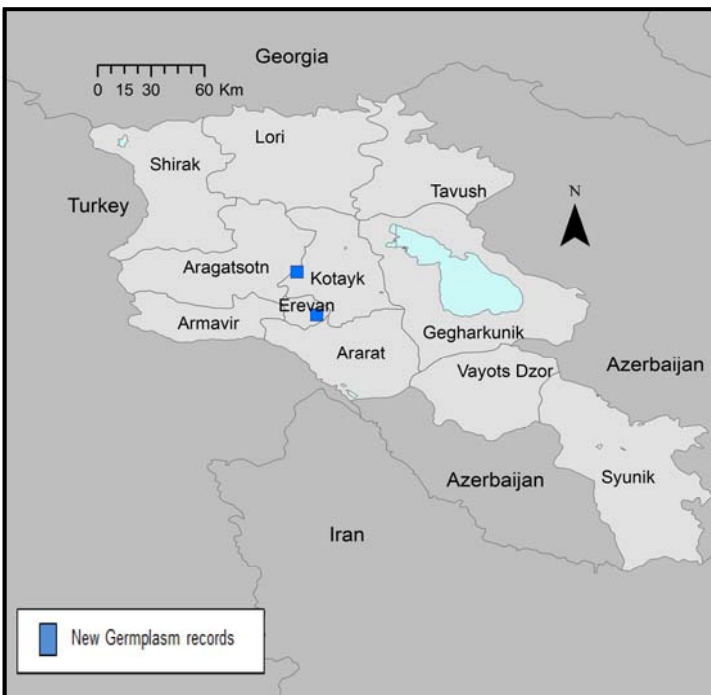
Inland or coastal marshes, meadows and river beds, as a weed in pastures and on waste ground.

**Distribution:**

Distributed globally.

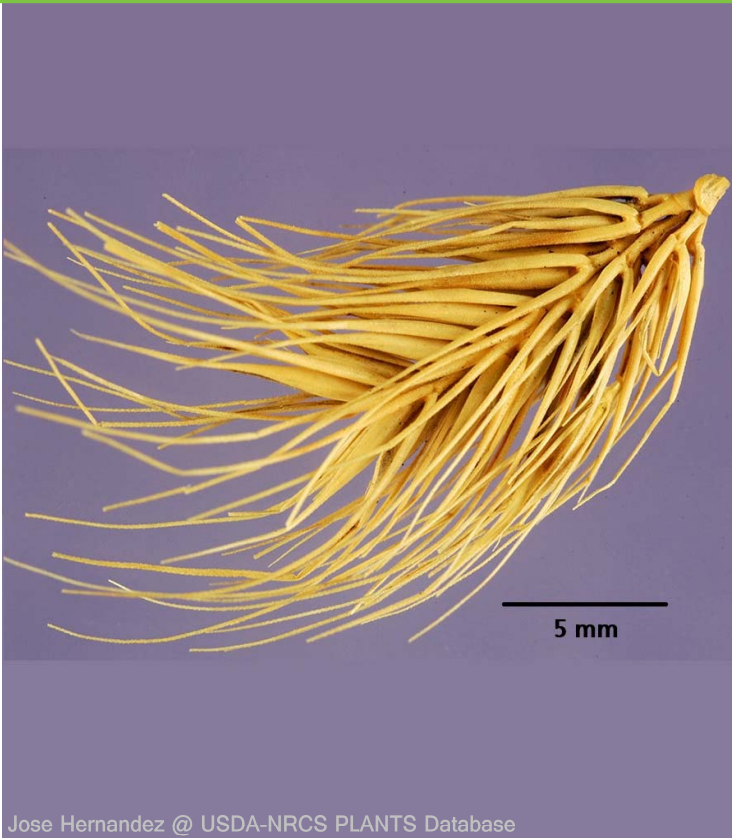
**Altitude:** 0 - 130 m

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

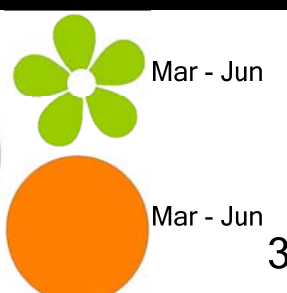
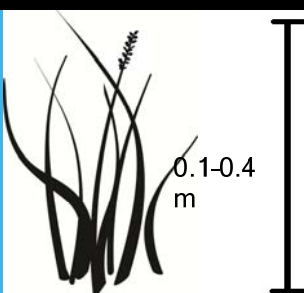
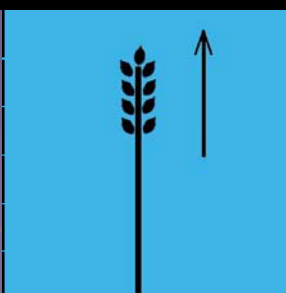


All population priority for collection

**References:** Bothmer, R. von et al. (1991) An Ecogeographical Study of the Genus *Hordeum*. IBPGR, Rome.; GrassBase - The Online World Grass Flora. <http://www.kew.org/data/grasses-db.html>.



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

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

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

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

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

### Habitat:

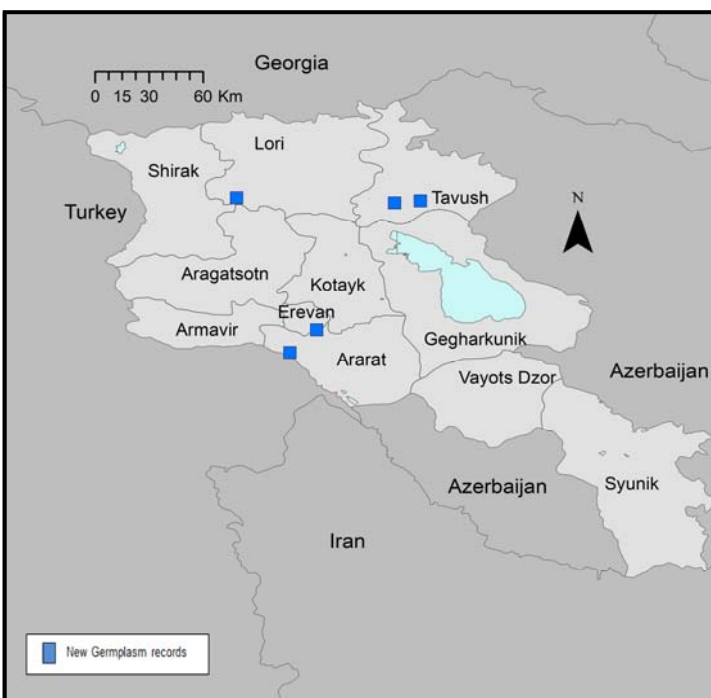
Found as a weed in disturbed habitats and cultivated land, but probably originally native to coastal areas, sandy riversides and grazed areas in wetlands.

### Distribution:

Distributed globally.

**Altitude:** 0 - 1700 m

<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.

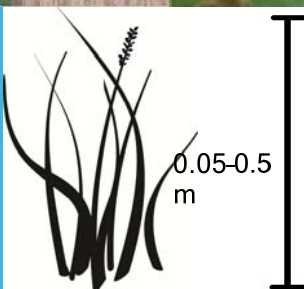
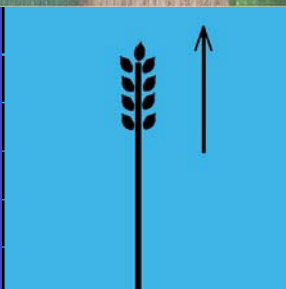


All population priority for collection

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



No seed image available



*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:**

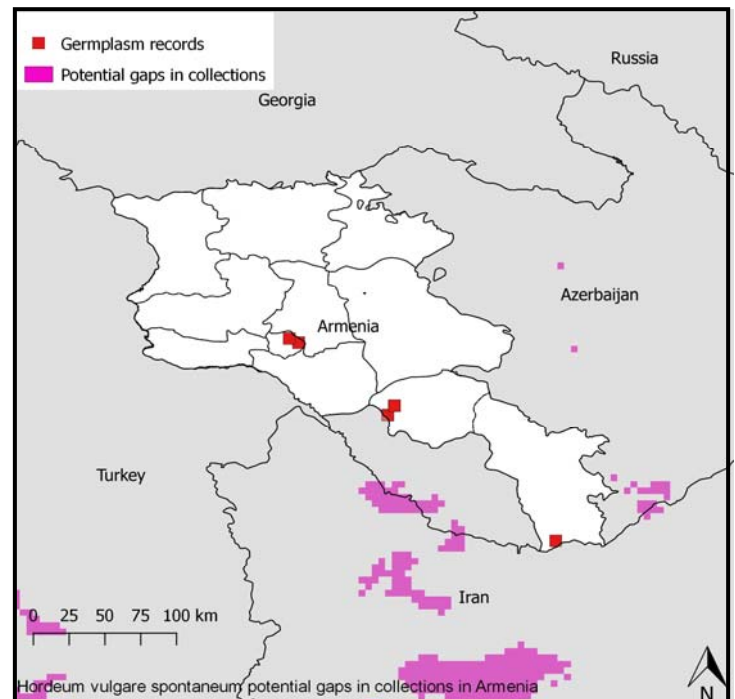
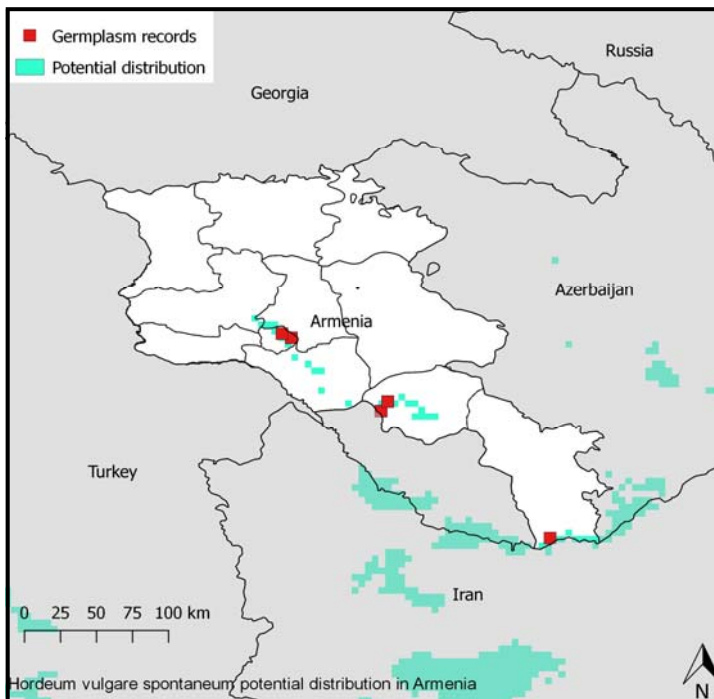
Greece, Turkey, Egypt, South-west Asia from Iran through to Pakistan, northern India and Nepal.

**Altitude:** 0 - 4500 m*Hordeum vulgare* subsp. *spontaneum*May be confused with:  
*Hordeum vulgare* subsp. *vulgare*

Rachis brittle; spikelets 2-rowed.

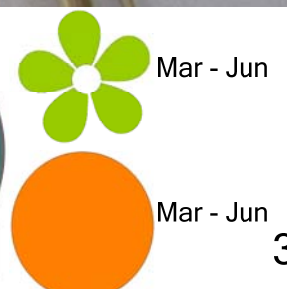
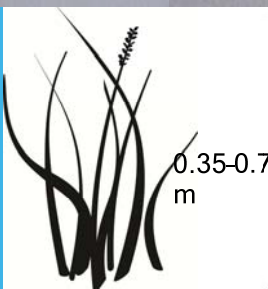
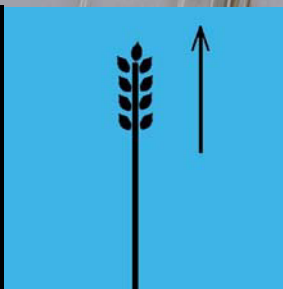
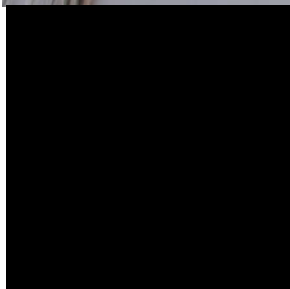


Rachis tough; spikelets 6-rowed.

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

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

Primary Gene Pool relative of *Hordeum vulgare* L.



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

Oriental fountain grass

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

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

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

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

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

**Habitat:**

Well drained soil, sandy loams with good drainage.

**Distribution:**

Native to Asia and North Africa.

**Altitude:** unknown

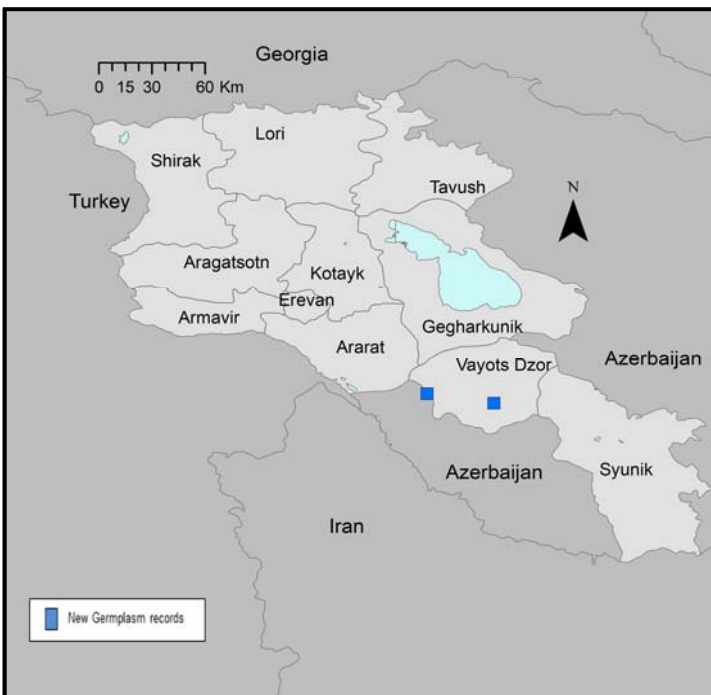
*Pennisetum orientale*

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.



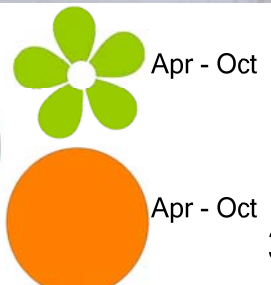
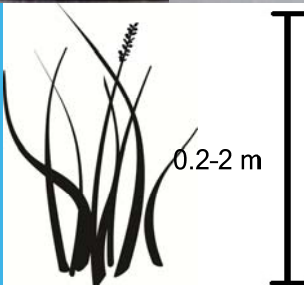
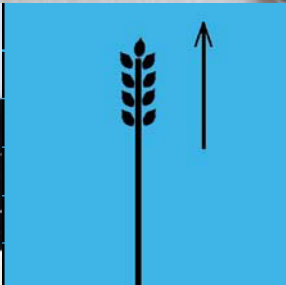
Reported from  
Armenia but no  
localities known.

**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>.





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Taxon Group 3 relative of *Secale cereale* L.

**HABIT:** Annual. Culms erect, or geniculately ascending; 20-50 cm. Leaf-sheath auricles falcate. Ligule an eciliate membrane. Leaf-blades flat, or convolute; 10-20 cm x 2-5 mm; glaucous. Leaf-blade surface scabrous; rough adaxially; pilose; hairy on both sides.

**INFLORESCENCE:** Composed of single raceme. Raceme erect; bilateral; 4-8 cm x 6-8 mm wide. Rhachis fragile at the nodes; ciliate on margins. Spikelet packing broadside to rhachis. Rhachis internodes oblong; 2-2.5 mm. Spikelets solitary. Fertile spikelets sessile. Fertile Spikelet comprising 2 fertile florets; with a barren rhachilla extension, or with diminished florets at the apex.

**SPIKLETS:** Lanceolate; laterally compressed; 10-12 mm; breaking up at maturity.

**GLUMES:** Similar; shorter than spikelet; thinner than fertile lemma.

**FLORETS:** Fertile lemma lanceolate; 10-11 mm long; coriaceous; keeled; 5 -veined. Lemma midvein pectinately ciliate. Lemma apex acuminate; awned; 1 -awned. Principal lemma awn 10-20 mm long overall; limb scabrous. Palea 1 length of lemma; 2 -veined. Apical sterile florets 1 in number; barren.

**FLOWER:** Lodicules 2; ciliate. Anthers 3; 5-6 mm long.

**FRUIT:** Caryopsis with adherent pericarp. Hilum linear.

**Habitat:**

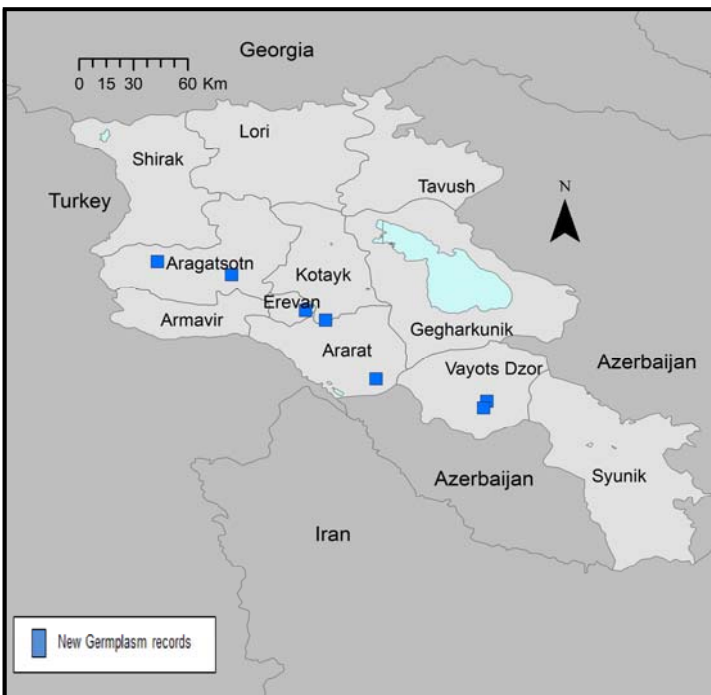
Eroded volcanic slopes, dry gorges, irrigation ditches.

**Distribution:**

Asia-temperate: Caucasus. Armenia, Turkey.

**Altitude:** 1200 - 2200 m

<i>Secale vavilovii</i>	May be confused with:



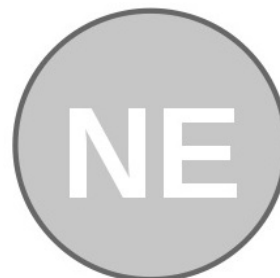
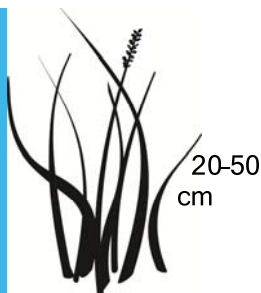
All population priority for collection

**References:**

Taxon Group 3 relative of *Secale cereale* L.



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image  
available



Jun - Aug

Jun - Aug

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

**Habitat:**

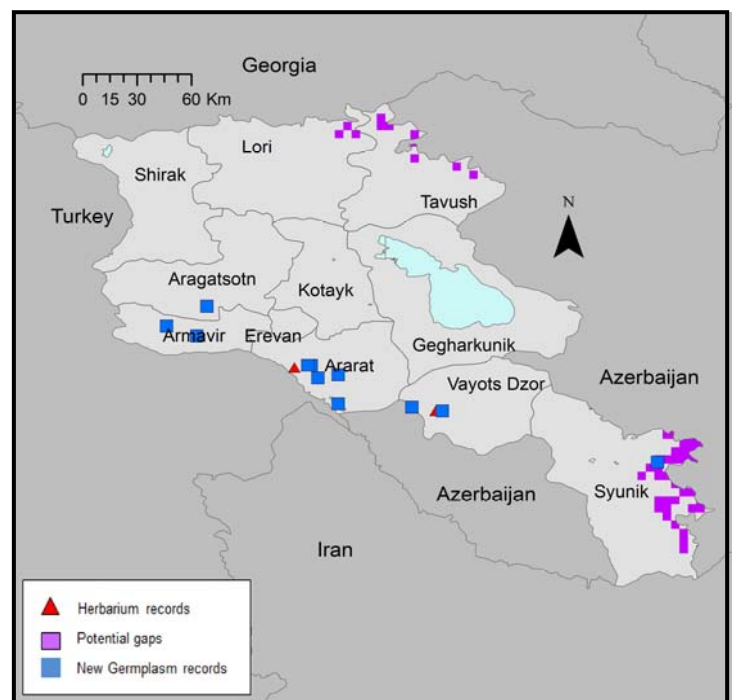
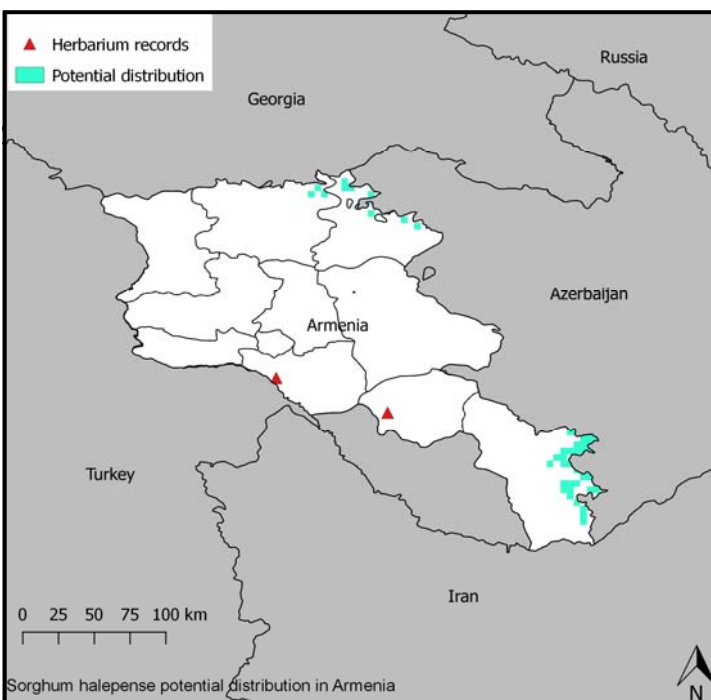
Streams, valleys, waste ground, and as a weed in fields.

**Distribution:**

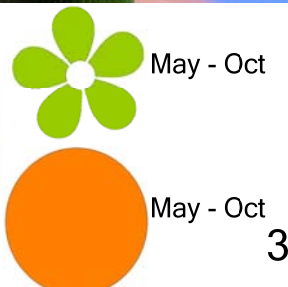
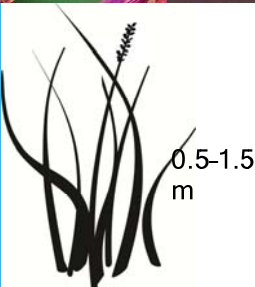
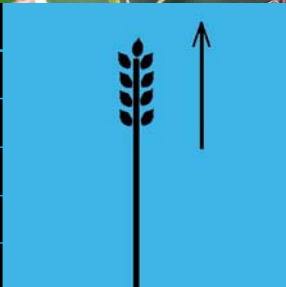
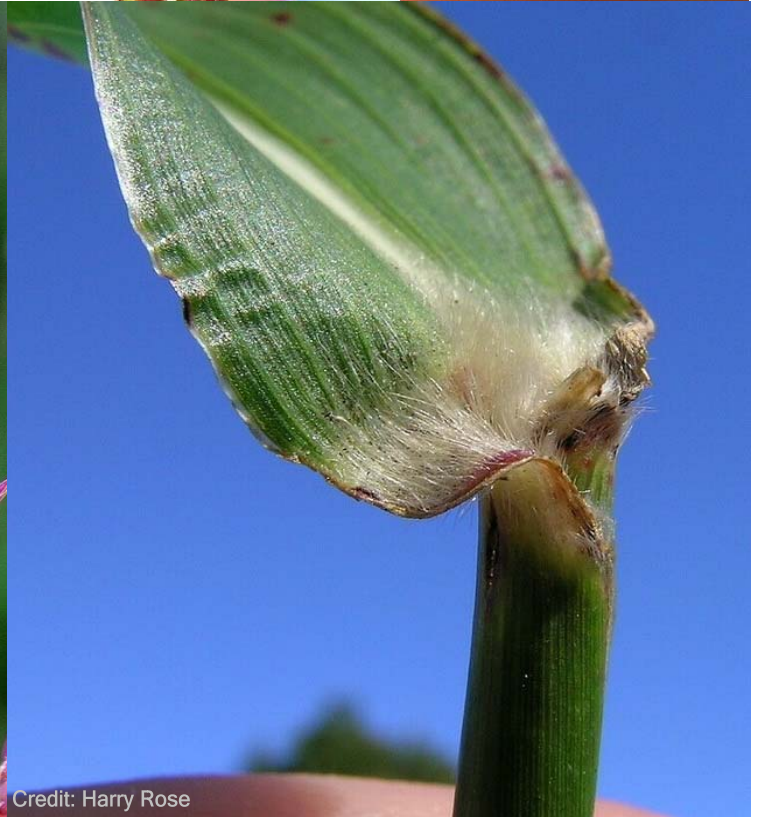
Native to North Africa, South-central and Western Asia.

**Altitude:** unknown

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



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



*Triticum timopheevii* subsp. *armeniacum* (Jakubz.) van SlagerenPrimary Gene Pool relative of *Triticum aestivum* L.

**HABIT:** Annual; caespitose. Culms erect; 71-90 cm long. Culm-internodes distally pilose. Ligule an eciliate membrane; 1 mm long. Leaf-blades 20-45 cm long; 2-5 mm wide. Leaf-blade surface smooth, or scaberulous; pilose; hairy on both sides.

**INFLORESCENCE:** Composed of racemes. Peduncle pubescent above.

**RACEMES:** 1; single; bilateral; (3.5-)5-6.5 cm x 10-15 mm. Rhachis fragile at the nodes; flattened; ciliate on margins. Spikelet packing broadside to rhachis. Rhachis internodes oblong; 1.5-1.75 mm. Spikelets solitary. Fertile spikelets sessile, comprising 2 fertile florets.

**GLUMES:** Similar; shorter than spikelet. Lower glume oblong; asymmetrical; 7-10 mm long; 1 length of upper glume; coriaceous; 2-keeled; keeled all along; winged on keel (1 keel); winged near apex, or above; 5-9 -veined. Lower glume apex with a unilateral tooth. Upper glume oblong; asymmetrical.

**FLORETS:** Fertile lemma elliptic; 10-12 mm long; coriaceous; without keel; 9-11 -veined. Lemma surface pubescent. Lemma apex dentate. Principal lemma awn 50-60(-90) mm long.

**FLOWER:** Anthers 3.

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

**Habitat:**

Dry mountain slopes.

**Distribution:**

South-eastern Turkey, north Iraq, west Iran and Transcaucasia

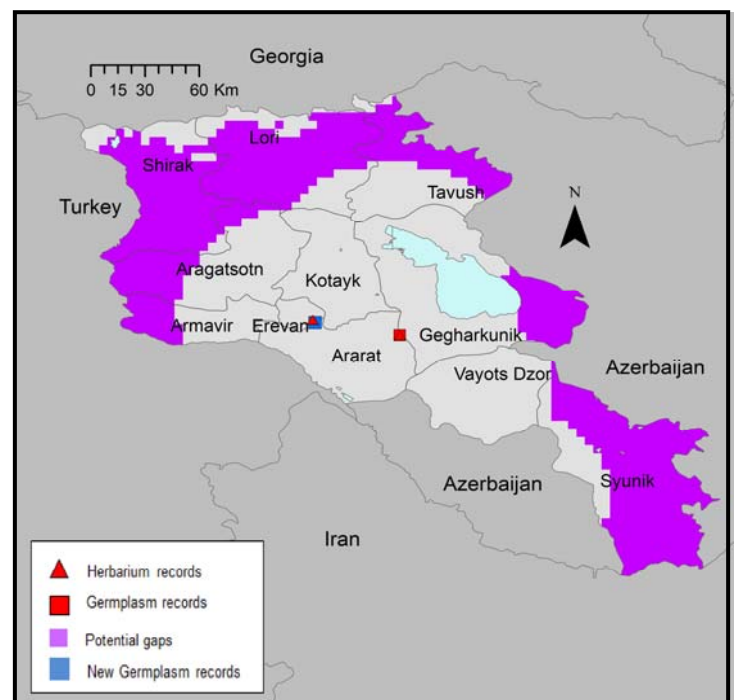
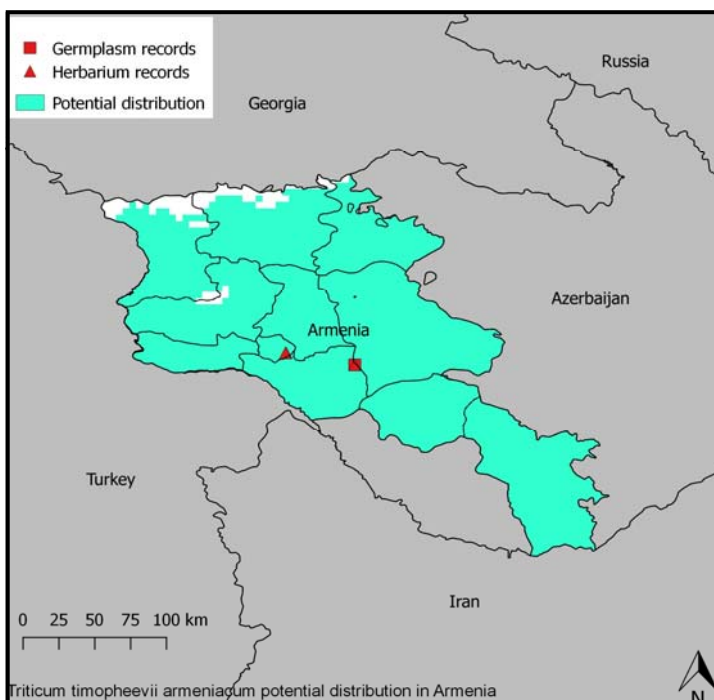
**Altitude:** unknown*Triticum timopheevii* subsp. *armeniacum*

May be confused with:

*Triticum timopheevii* subsp. *timopheevii*

subsp. *armeniacum* is the wild form, found across south-eastern Turkey, north Iraq, west Iran and Transcaucasia

Cultivated form restricted to western Georgia

**References:**

*Triticum timopheevii* subsp. *armeniacum* (Jakubz.) van Slageren

Primary Gene Pool relative of *Triticum aestivum* L.



RBGE herbarium material

No seed image available

90 cm

LC

unknown

unknown

36

Primary Gene Pool relative of *Triticum aestivum* L.

**HABIT:** Annual. Culms geniculately ascending; 60-90 cm. Culm-internodes distally glabrous. Leaf-sheaths pubescent. Leaf-sheath oral hairs ciliate. Leaf-sheath auricles falcate. Ligule an eciliate membrane. Leaf-blades 30-45 cm x 7-10 mm. Leaf-blade surface puberulous.

**INFLORESCENCE:** composed of single raceme. Raceme bilateral; 7-9 cm x 6-7 mm. Rhachis fragile at the nodes; flattened; ciliate on margins. Spikelet packing broadside to rhachis. Rhachis internodes oblong; falling with spikelet above. Spikelets solitary. Fertile spikelets sessile.

Fertile spikelets comprising 1-2 fertile florets; with diminished florets at the apex. Spikelets oblong; laterally compressed; 17-20 mm; falling entire; deciduous with accessory branch structures.

**GLUMES:** Similar; shorter than spikelet.

**FLORETS:** Fertile lemma elliptic; 15 mm long; coriaceous; keeled. Lemma apex dentate; 2 -fid; with lobes 1.5-2.5 mm long; awned; 1 -awned. Principal lemma awn from a sinus; 60-80 mm long overall. Palea 2 -veined. Palea keels wingless.

**FLOWER:** Anthers 3. Ovary with a fleshy appendage below style insertion; pubescent on apex.

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

**Habitat:**

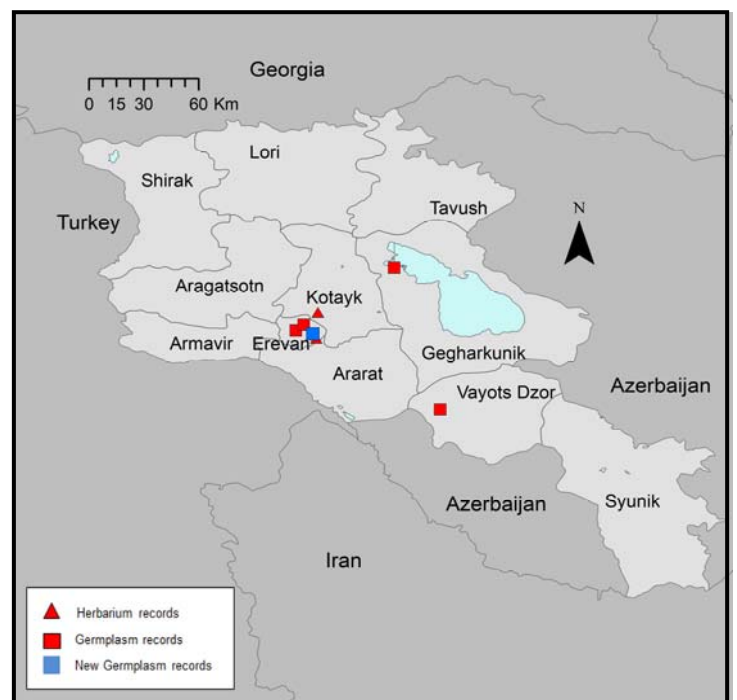
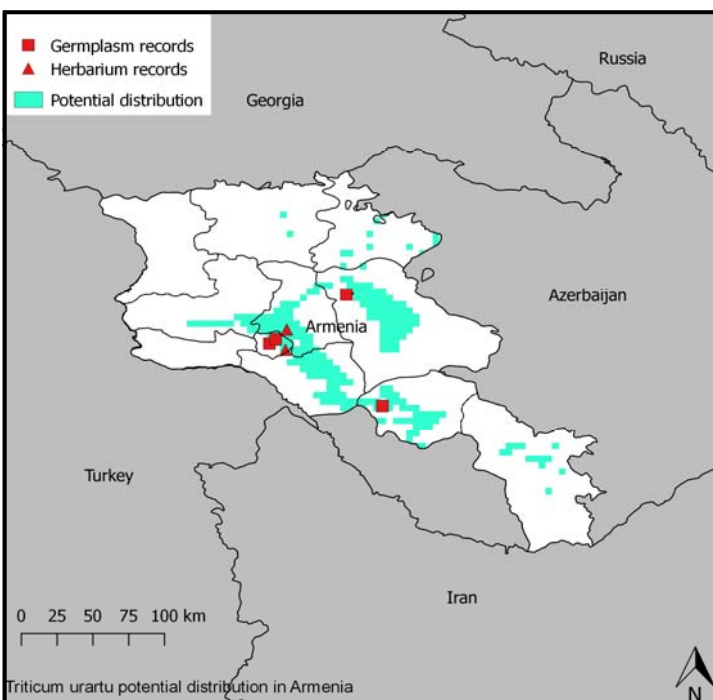
Dry stoney slopes.

**Distribution:**

Asia-temperate: Caucasus.

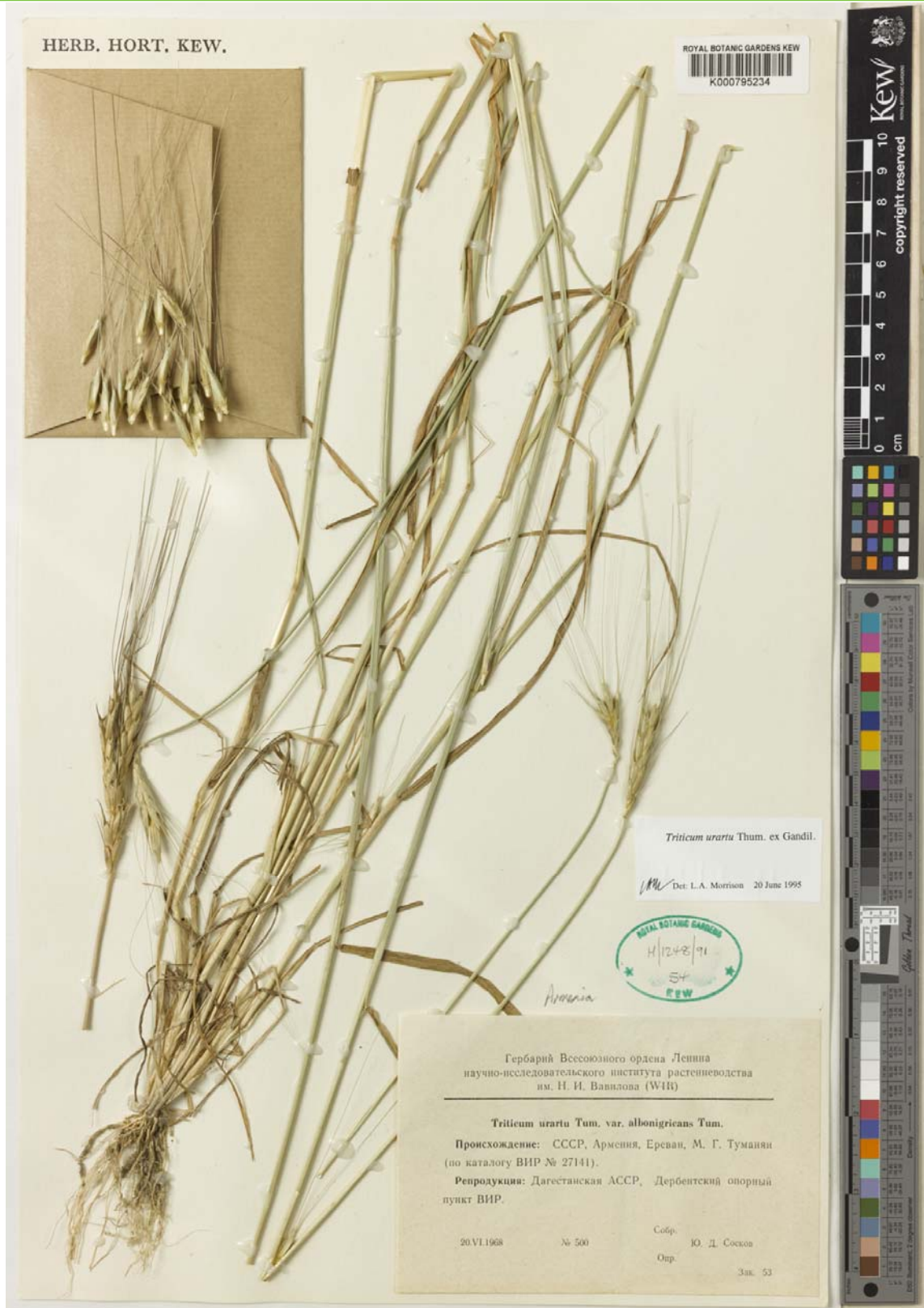
**Altitude:** c. 1300 m

<i>Triticum urartu</i>	May be confused with:

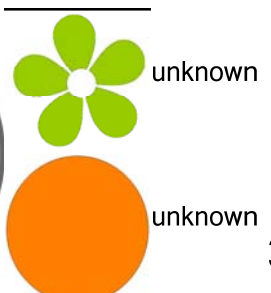
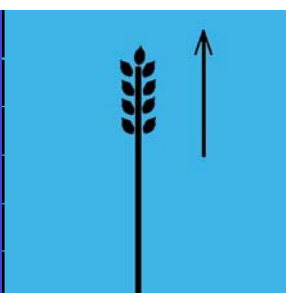
**References:**



Primary Gene Pool relative of *Triticum aestivum* L.



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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:**

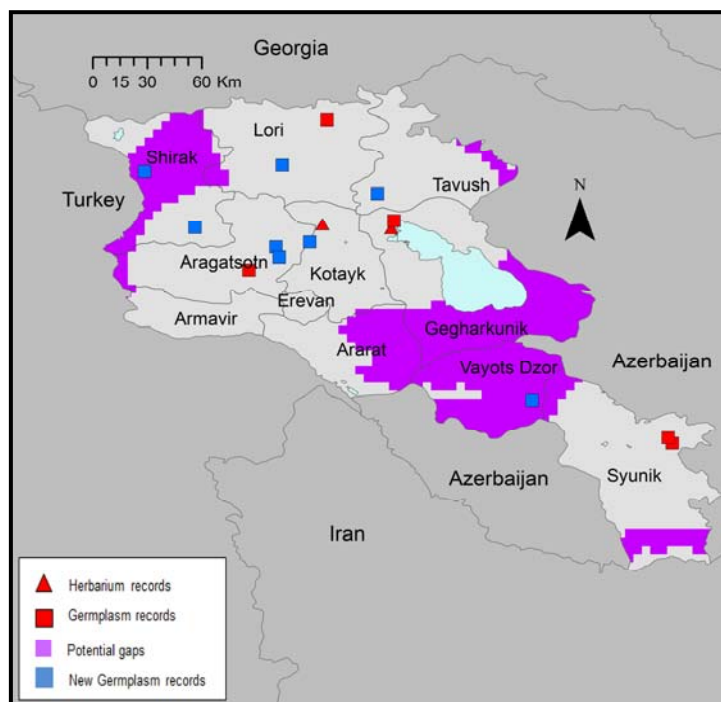
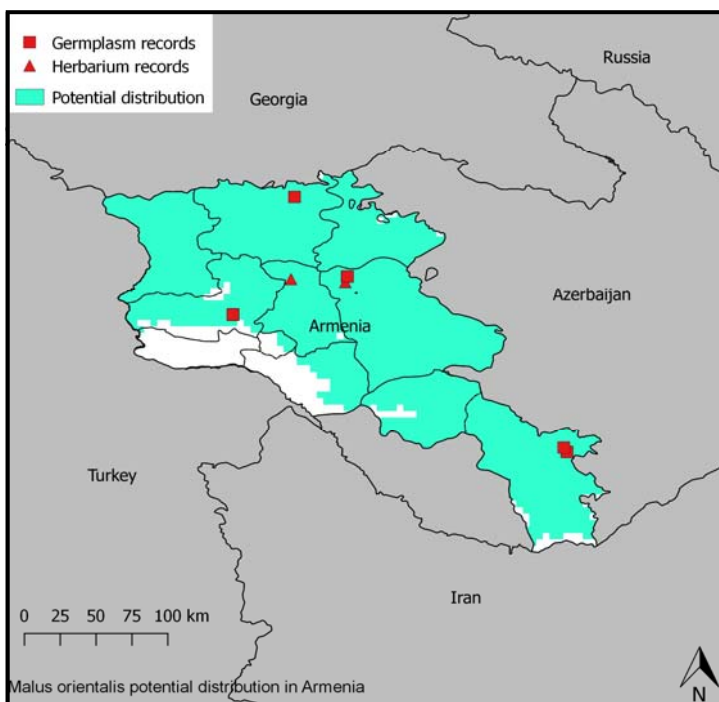
Deciduous woodland, scrub and thickets, rocky slopes, field edges and along streams, often locally common.

**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.

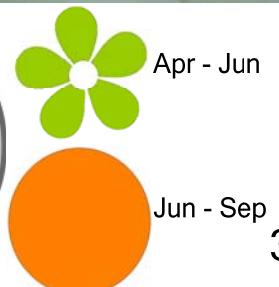


**References:** Yuzepchuk, S.V. (Ed.) Flora of the USSR (English version), Volume IX p275.

Primary Gene Pool relative of *Malus domestica* Borkh.



No seed image available



# 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>brevisetata</i> DC.; <i>Medicago littoralis</i> Rohde ex Loisel. subsp. <i>brevisetata</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>longisetata</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

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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