



Canadian Food  
Inspection Agency

Agence canadienne  
d'inspection des aliments

Canada 



# Invasive Plant Field Guide





# Table of Contents

<b>Introduction</b> .....	5
<b>Family Amaranthaceae</b>	
<i>Alternanthera sessilis</i> (L.) R. Br. ex DC. – Sessile Joyweed.....	6
<b>Family Asteraceae</b>	
<i>Centaurea iberica</i> Trevir. ex Spreng. – Iberian Starthistle.....	8
<i>Centaurea solstitialis</i> L. – Yellow Starthistle.....	10
<i>Crupina vulgaris</i> Cass. – Common Crupina.....	12
<i>Senecio inaequidens</i> DC. – South African Ragwort.....	14
<i>Senecio madagascariensis</i> Poir. – Madagascar Ragwort.....	16
<b>Family Boraginaceae</b>	
<i>Echium plantagineum</i> L. – Paterson’s Curse .....	18
<b>Family Fabaceae</b>	
<i>Galega officinalis</i> L. – Goat’s-rue.....	20
<i>Pueraria montana</i> (Lour.) Merr. – Kudzu .....	22
<b>Family Nitrariaceae</b>	
<i>Peganum harmala</i> L. – African-rue.....	24
<b>Family Poaceae</b>	
<i>Aegilops cylindrica</i> Host – Jointed Goatgrass .....	26
<i>Alopecurus myosuroides</i> Huds. – Slender Foxtail .....	28
<i>Bothriochloa ischaemum</i> (L.) Keng – Yellow Bluestem .....	30
<i>Echinochloa colona</i> (L.) Link – Jungle-rice.....	32
<i>Eriochloa villosa</i> (Thunb.) Kunth – Woolly Cupgrass.....	34
<i>Microstegium vimineum</i> (Trin.) A. Camus – Japanese Stiltgrass.....	36
<i>Milium vernale</i> M. Bieb. – Spring Milletgrass .....	38
<i>Nassella trichotoma</i> (Nees) Hack. ex Arechav. – Serrated Tussock.....	40
<i>Paspalum dilatatum</i> Poir. – Dallis Grass .....	42
<b>Family Polygonaceae</b>	
<i>Persicaria perfoliata</i> (L.) H. Gross – Devil’s-tail Tearthumb .....	44

**Family Solanaceae**

*Solanum elaeagnifolium* Cav. – Silverleaf Nightshade ..... 46

**Family Zygophyllaceae**

*Zygophyllum fabago* L. – Syrian Bean-caper ..... 48

**Glossary**..... 50

**Photo Credits** ..... 52

**References** ..... 58

# Introduction

Invasive plants are plant species that have spread outside of their natural habitat. They may be imported from other countries, or spread between different areas within Canada.

The Government of Canada is committed to protecting Canada's plant resources from pests and diseases. As Canada's plant protection agency, the Canadian Food Inspection Agency (CFIA) regulates various invasive plant species under the *Plant Protection Act* and *Seeds Act*. These regulations restrict the importation of regulated species and commodities into Canada, and movement and sale within Canada.

Invasive plants can cause serious damage to Canada's agricultural, forestry and horticultural resources. Invasive plants in crops and pastures cost Canada an estimated \$2.2 billion each year due to productivity losses and the costs of controlling their spread. Some invasive plants can affect human health by causing skin reactions or allergies; in rare cases, they are toxic to humans. The health of animals may also be affected in some instances.

Invasive plants can invade natural areas (wetlands, forests and grasslands), managed areas (cultivated fields, gardens, lawns and pastures), and areas where the soil and vegetation have been disturbed (ditches, roadsides and rights-of-way). Invasive plants can reduce biological diversity and alter the structure and function of ecosystems. Changing landscapes can have a negative impact on recreational activities and tourism, as well as on aesthetics and property values.

Field surveys and reported sightings are effective tools that help the CFIA obtain information about the species of concern. We encourage you to be on the lookout for the plant species identified in this guide, and to report any findings to your local CFIA office or by email to [IAS.EEE@inspection.gc.ca](mailto:IAS.EEE@inspection.gc.ca).

To find out more, visit  
[www.inspection.gc.ca/invasive](http://www.inspection.gc.ca/invasive)  
or call 1-800-442-2342.

# *Alternanthera sessilis* (L.) R. Br. ex DC.

## Sessile Joyweed

### GENERAL

A creeping perennial or a short-lived annual, morphologically highly variable and able to tolerate both terrestrial and aquatic conditions.

### STEMS

Growth habit is creeping or ascending, 0.2–1.0 m tall. Lower stems are often prostrate, running along the ground with adventitious roots produced at the nodes and many weakly erect branches. Lower stems may be partly hollow, tinged purple, striped and hairy across the nodes.

### LEAVES

Opposite, sessile, variable in size and shape, and more or less hairless, usually linear-lanceolate to elliptic-ovate, 1.2–5.0 cm long and 0.5–2.2 cm wide. Leaves of the terrestrial forms may be more linear, serrated and shorter (about 1 cm long) than the leaves of the aquatic forms.

### FLOWERS

Flowers are silver-white to pinkish, occurring in compressed heads or spikes, 5–7 mm long, solitary or clustered, nestled in the leaf axils.

### FRUITS/SEEDS

Fruit is a thin, yellowish-brown, heart-shaped, one-seeded capsule, 1.5–2.5 mm long and wide. It is attached to the remnant flower parts, which consist of several pointed lobes attached to the base. Seeds are round and flat, smooth, shiny, reddish or brown, and about 1 mm in diameter.

### ROOTS

Aquatic forms have large numbers of adventitious roots that develop from each stem node. They are fibrous and 1–10 cm long. Terrestrial forms have fewer, longer nodal roots, averaging 50 cm long, with the thick, stout nature of a taproot.

### DISTRIBUTION

Native to Asia, it is widely distributed as a weed in tropical and subtropical areas, including Asia, Africa, Australia, Central and South America, the Caribbean and the southeastern United States. Its presence has not been reported in the naturalized flora of Canada.

### INTRODUCTION AND SPREAD

Spreads by seeds which are dispersed by wind, water and possibly ants. May also spread vegetatively, by stems that run along the soil surface and root at the nodes. The most likely pathway for introduction into Canada is intentional importation, as it is widely traded for use in aquaria or water gardens. It is also traded in Asian markets as a food and a medicinal plant.

### HABITAT

Habitats include a variety of agricultural crops (primarily rice, but also many others), as well as gardens, roadsides, ditches, swamps, ponds, canals and reservoirs. It prefers constant or periodically high humidity, but it can also tolerate dry conditions.

### SIMILAR SPECIES

May be confused with other *Alternanthera* species, but no species in the genus occur outside cultivation in Canada.

### FLOWERING TIME

Summer to early fall in the southeastern United States.



# Family Amaranthaceae



a

Sessile joyweed plants showing sprawling growth habit.



b

Sessile joyweed with ovate leaves and flowers nestled in the leaf axils.



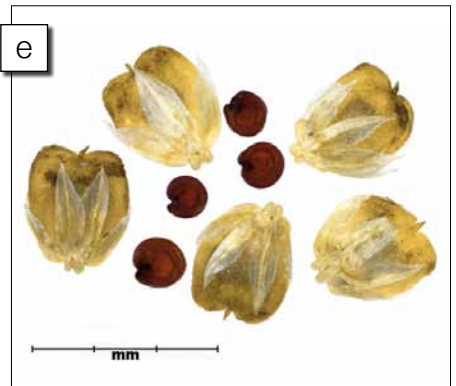
c

Sessile joyweed with linear-lanceolate leaves.



d

Sessile joyweed flower close-up.



e

Sessile joyweed fruits and seeds.

# *Centaurea iberica* Trevir. ex Spreng.

## Iberian Starthistle

### GENERAL

A biennial herbaceous plant. It may behave as an annual or short-lived perennial in some environments. The rosettes have spines in the centre.

### STEMS

Grow 30–200 cm tall. One to several very branched stems often form a rounded mound with a fuzzy or woolly surface.

### LEAVES

Divided into narrow linear segments, hairy, blades 10–20 cm long. Leaf margins 1–2 times lobed; distal blades linear to oblong, entire to coarsely toothed or shallowly lobed.

### FLOWERS

Inflorescence is a white, pink or pale purple flower head, 15–20 mm long, with straw-coloured, spine-tipped bracts. Heads borne singly or in leafy groups, stemless or on short stems. The bracts below the flowers are greenish, with frayed margins, spiny-fringed at base, each tipped by a stout spreading spine 1–3 cm long.

### FRUITS/SEEDS

The achenes are smooth, white- or brown-streaked, 3–4 mm long and have a white pappus that is 1.0–2.5 mm long.

### ROOTS

Stout taproot.

### DISTRIBUTION

Native to areas from eastern Europe to extreme western China and India. Introduced into the Pacific states, Wyoming and Kansas. Listed as a noxious weed in Arizona, California, Nevada and Oregon. Reported to be extirpated in Oregon and Washington. Its presence has not been reported anywhere in Canada.

### INTRODUCTION AND SPREAD

Seeds have a pappus for distribution by wind. Some *Centaurea* species are also found as seed contaminants. This is known to be a pathway for yellow starthistle.

### HABITAT

Iberian starthistle seems to be confined to disturbed areas, including over-grazed rangelands.

### SIMILAR SPECIES

Very similar to purple starthistle (*Centaurea calcitrapa*) (Figure e), but is distinguished by the Iberian starthistle's pappus on the achenes, lighter purple flower colour, rounder flower head and more robust plant. In Canada, purple starthistle has been found only in Ontario.

### FLOWERING TIME

June to September.



# Family Asteraceae



Iberian starthistle rosette.



Iberian starthistle flower head.



Iberian starthistle plants.



Iberian starthistle seeds.



Purple starthistle flower head.

# *Centaurea solstitialis* L.

## Yellow Starthistle

### GENERAL

An annual weed of dry habitats, forming extensive monocultural stands.

### SEEDLINGS

Cotyledons are oblong to spatulate, with a wedge-shaped base and a square tip. They are 6–9 mm long and 3–5 mm wide.

### STEMS

Erect, rigid, 15–200 cm tall, covered in cottony hairs, openly branched from near the base. Small plants can be unbranched. Leaf bases extend down stems, giving the stems a winged appearance. Largest wings are 3 mm wide.

### LEAVES

First leaves wider at the tip, tapering to the base. Subsequent rosette leaves similar in shape, up to 15 cm long; margins entire to deeply lobed, lobes mostly pointed; margins appear ruffled/wavy, terminal lobes largest, triangular to lance-shaped. Rosette leaves wither by flowering time. Upper leaves not lobed, sharply pointed. Leaves grey- to blue-green, covered with fine white, cottony hairs hiding thick, stiff hairs and glands when viewed under 10X magnification.

### FLOWERS

Yellow; heads placed singly on ends of branches, armed with sharp, stiff, straw-coloured spines beneath flower heads. Spines often longer than 2.5 cm long.

### FRUITS/SEEDS

Seeds from ray flowers are dark-coloured and without bristles; those from disc flowers are lighter, with a tuft of white bristles.

### ROOTS

Taproot can reach a depth of 1 m.

### DISTRIBUTION

Native to Eurasia, yellow starthistle is now found throughout Europe, in North and South America and in Africa. Its presence has been reported in at least 40 American states and in four Canadian provinces. No established, persistent populations appear to exist anywhere in Canada. Records are historic and scattered.

### INTRODUCTION AND SPREAD

Seeds with fluffy pappus bristles are wind-disseminated; bristleless seeds fall near the parent. Reported as a seed contaminant.

### HABITAT

Yellow starthistle is a serious weed of roadsides, pastures and rangelands in dry areas.

### SIMILAR SPECIES

Maltese starthistle (*C. melitensis*) also has yellow flowers and has been reported in southwestern BC (Figure d). The spines on the involucre bracts are 5–10 mm long, whereas those of the yellow starthistle are 10–25 mm long.

### FLOWERING TIME

June to October.

# Family Asteraceae



Yellow starthistle winged stems.



Yellow starthistle flower head.



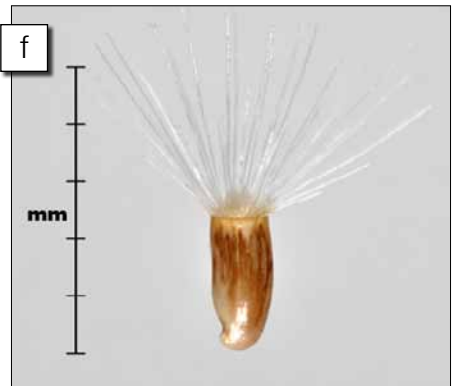
Yellow starthistle plants.



Maltese starthistle flower head.



Seed from yellow starthistle ray floret, without bristles.



Seed from yellow starthistle disc floret, with bristles.

# *Crupina vulgaris* Cass.

## Common Crupina

### GENERAL

A winter annual weed in the aster family. It infests hay and forage crops, grasslands and open forest sites, and decreases pasture capacity and livestock productivity.

### SEEDLINGS

Cotyledons fleshy, oblong, 1.3–2.5 cm long and have a red or purple midrib. As the plant grows, rosette leaves progress from being entire, to toothed, to lobed, to finely dissected.

### STEMS

Number of stems can range from 1–15, depending on growing conditions. Main flowering stem can range from 0.3–1.2 m tall.

### LEAVES

Stem leaves decrease in size with distance from the rosette and are variable in form. They generally measure 1.0–3.5 cm in length, range from entire to finely dissected, and taper to a slender, sharp tip. Blade margins are coarse and rough.

### FLOWERS

Three to 130 flower heads produced per plant. Flower heads sessile or on peduncles 1–3 cm long. Each flower head is narrow, cylindrical and about 1.3 cm long. Rose or purple petals partially protrude from the scaly floral bracts.

### FRUITS/SEEDS

Roughly cylindrical, banded in black and silvery beige, measuring 3–5 mm by 1.5–3.0 mm with a dense pappus of blackish-brown bristles at the apex. Seeds taper at the base, where there is an obvious attachment scar.

### ROOTS

A slender taproot that grows from 1 to several metres deep.

### DISTRIBUTION

Native to the Mediterranean region, it was introduced into the states of Washington, Idaho, Oregon and California. Previous reports of this species being present in Canada appear to have been erroneous; currently, it is not believed to be present in Canada.

### INTRODUCTION AND SPREAD

Seeds generally fall only a few metres away from the parent plant. However, seeds can be transported with animal and human movement (including machinery), in soil and in contaminated hay, grain and seed lots.

### HABITAT

Pastures, grasslands, rangelands, hayfields, open woodlands, orchards, vineyards, roadsides, railroads and waste areas. Rarely found in cultivated crops, but may be found in field margins. Does not tolerate disturbance well.

### SIMILAR SPECIES

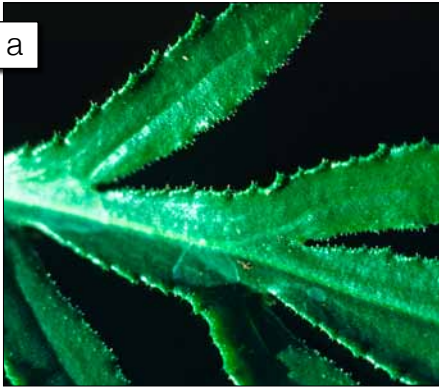
There are no other *Crupina* species in North America. Common crupina seedlings may be distinguished from knapweed seedlings (*Centaurea* spp.) by their larger size, thick and fleshy cotyledons, and by their prominent reddish or purplish midribs. In mature plants, floral bracts of knapweed are bristly (Figure g), whereas those of common crupina are not (Figure b). Leaf margins of common crupina are bristly, whereas those of knapweed are not. The size and appearance of the seeds are very distinctive (see “Fruits/Seeds” above).

### FLOWERING TIME

Mid-May to early June.



# Family Asteraceae



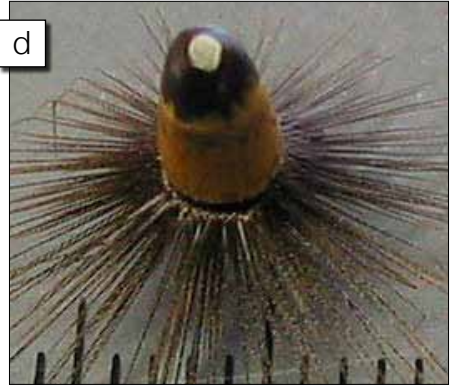
Common crupina leaf.



Common crupina flower head.



Common crupina seedlings.



Common crupina seed.



Bolting common crupina rosette.



Common crupina flower stalk.



Spotted knapweed flower head, with bristly floral bracts.

# *Senecio inaequidens* DC.

## South African Ragwort

### GENERAL

Short-lived, herbaceous or woody perennial shrub of the aster family. The plants contain pyrrolizidine alkaloids, which are toxic to livestock and humans.

### STEMS

Erect, leafy, more or less glabrous, often branching from the base. They can reach 100 cm tall.

### LEAVES

Bright green, alternate, simple, slightly thick and irregularly toothed; they usually clasp the stem. Their size is highly variable—they can grow up to 10 cm long and 1 cm wide. They taper from their base to their tip.

### FLOWERS

The inflorescence is an open, broad, flat-topped cluster of flower heads. Flower heads yellow, up to 25 mm in diameter, and composed of 7–13 female ray florets and numerous perfect disc florets.

### FRUITS/SEEDS

Achenes are linear, slightly narrowed at the ends and round in cross-section; they are 2.0–2.7 mm long and 0.5–0.7 mm in diameter. The surface is densely covered in white, worm-like hairs that tend to form 9–10 rows down the length. The rough surface is brown (green when immature), with a white rim at the apex and a short peg within the rim. The long, white pappus is absent from mature fruits.

### ROOTS

Shallow taproot.

### DISTRIBUTION

Native to southern Africa, South African ragwort has been introduced into many European countries. Reports from Mexico and parts of South America may refer to *Senecio madagascariensis*. It is not present in Canada.

### INTRODUCTION AND SPREAD

This species could be accidentally introduced into Canada with contaminated hay or grain or as a generalist contaminant on goods or travellers. Once established, seeds are dispersed naturally by wind and unintentionally by humans, in association with clothes, shoes, soil, road and rail vehicles, building materials, hay, grain, ornamental plants, livestock and wool.

### HABITAT

Able to colonize a wide range of open ruderal habitats, as well as stream banks, coastal dunes, grasslands, crops and pastures.

### SIMILAR SPECIES

South African ragwort is similar to other *Senecio* spp. and *Packera* spp. in Canada, for example, balsam groundsel (*Packera paupercula*) (Figure d); however, in most cases, it is taller and has larger flower heads and/or different leaf characteristics. Common groundsel (*Senecio vulgaris*) is a look-alike seed in Canada (Figure g); it has a similar size, a white apex and worm-like hairs. South African ragwort achenes have straighter sides and a darker surface colour, with longer hairs over much of the surface. Madagascar ragwort (*S. madagascariensis*) has a very similar morphology, but the achenes of South African ragwort are usually longer. Neither of these species is present in Canada.

### FLOWERING TIME

In Europe, two main flowering periods are observed: one starting in July and one starting in September.

# Family Asteraceae



South African ragwort plants.



South African ragwort flowers.



Mature seed head of South African ragwort.



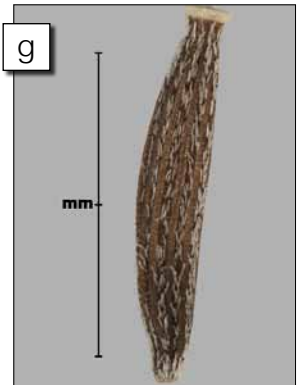
Balsam groundsel flowers.



South African ragwort foliage.



South African ragwort seed.



Common groundsel seed.



# *Senecio madagascariensis* Poir.

## Madagascar Ragwort

### GENERAL

Short-lived, perennial (sometimes annual or biennial) herbaceous plant in the aster family. It is toxic to humans and animals.

### STEMS

Erect and branched, reaching 60 cm tall.

### LEAVES

Bright green, alternate, lanceolate to elliptic, finely to coarsely toothed, and occasionally petiolate. They grow 12 cm long and 2.5 cm wide.

### FLOWERS

The inflorescence is a loose cluster of small, yellow, daisy-like flower heads. Each is 12–25 mm in diameter and has 12–13 ray florets.

### FRUITS/SEEDS

The achenes are 1.4–2.7 mm long and 0.3–0.6 mm in diameter; they are elliptical, narrowed at both ends and rounded in cross-section. Short, white, worm-like hairs stretch along the length in 9–10 rows. Surface is roughened and brown in colour, with a white rim at the apex and a short peg within the rim. The long, white pappus is absent from mature fruits.

### ROOTS

Shallow taproot.

### DISTRIBUTION

Native to southern Africa and Madagascar, Madagascar ragwort was introduced into Kenya, Réunion, Mauritius, United States (Hawaii), Argentina, Colombia and Australia. Its presence has not been reported in Canada.

### INTRODUCTION AND SPREAD

Potential pathways for introduction into Canada include imported grass or pasture seed, or imported livestock. It can also be carried on the clothing, shoes or personal effects of travellers. Seeds are small and light and are easily dispersed by wind, wildlife and humans in association with contaminated soil, fodder and vehicles.

### HABITAT

Colonizes a wide range of habitats, elevations and soil types. It is often found in arid or moist pastures, coastal plains, yards, fields and roadsides.

### SIMILAR SPECIES

See *Senecio inaequidens* for similar species. A look-alike seed in Canada is common groundsel (*S. vulgaris*), which has a similar size, the same elliptical shape, a white apex and worm-like hairs (Figure f). Madagascar ragwort achenes have a darker surface colour with longer hairs in discrete rows.

### FLOWERING TIME

Unknown for Canada. In Australia, it can flower year-round.

# Family Asteraceae



Madagascar ragwort seedling.



Madagascar ragwort flower and variable leaves.



Madagascar ragwort flowers.



Madagascar ragwort invading field.



Madagascar ragwort plants.



Common groundsel seed.

# *Echium plantagineum* L.

## Paterson's Curse

### GENERAL

Annual or biennial herbaceous weed of the borage family. Toxic to livestock.

### ROSETTES

Large, flat rosettes with broadly ovate leaves that reach 25 cm long, are hairy, stalked, and have distinct lateral veins.

### STEMS

One to several much-branched stems; 20–60 cm tall (sometimes up to 150 cm) and covered with coarse, white bristles.

### LEAVES

Basal (rosette) leaves die off as stems grow. Stem leaves are alternate, smaller and narrower than basal leaves, thick, rough, hairy, stalkless and almost stem-clasping.

### FLOWERS

Flowers are purple (sometimes blue, pink, or rarely white), trumpet-shaped, 2–3 cm long, with 5 fused petals and 5 stamens. Two of the stamens are longer and protrude from the petal tube. Flowers crowded along one side of a curved spike.

### FRUITS/SEEDS

Fruit consists of 4 nutlets (seeds) surrounded by a persistent calyx. Individual nutlets are strongly wrinkled and pitted, angular, 3-sided, brown to grey, and 2–3 cm long.

### ROOTS

One or several taproots, branching into many finer roots.

### DISTRIBUTION

Broad circum-Mediterranean native distribution. Cultivated for a variety of purposes. In Canada, historical records exist from Manitoba, Ontario and Newfoundland; has also been grown in field trials near Saskatoon, Saskatchewan.

### INTRODUCTION AND SPREAD

Paterson's curse is planted as a garden and forage species and for its unique seed oil. Paterson's curse produces seed over much of the growing season, resulting in large seed banks. The seeds can germinate under a wide range of temperatures and can survive up to 10 years in the soil. Seeds spread by attaching to animal wool or fur, by being ingested, and in association with seed, hay, grain, soil, gravel, vehicles and equipment.

### HABITAT

Pastures, roadsides and disturbed areas. May occur in agricultural fields.

### SIMILAR SPECIES

Paterson's curse is similar in appearance to blueweed (*Echium vulgare*), which is common in Canada (local in the prairies). The two species can be distinguished by the number of stamens projecting beyond the flower tube (2 in Paterson's curse, 4 in blueweed—see Figures c and e) and by the shape of the rosette leaves (broadly ovate in Paterson's curse, and narrower, linear leaves with less conspicuous lateral veins in blueweed—see Figures d and f).

### FLOWERING TIME

June to September.

# Family Boraginaceae



Paterson's curse seeds.



Paterson's curse plant.



Paterson's curse flower, showing two exerted stamens.



Paterson's curse rosette, with broadly ovate leaves.



Blueweed flower, showing four exerted stamens.



Blueweed rosette, with narrow linear leaves.



# *Galega officinalis* L.

## Goat's-rue

### GENERAL

A stout, erect perennial herb belonging to the pea family.

### SEEDLINGS

The first seedling leaves are large, oval and dark green.

### STEMS

Hollow and cylindrical, growing 60–150 cm tall.

### LEAVES

Alternate, oddly-pinnate, with 6–12 pairs of oblong leaflets. Each leaflet is 1–5 cm long and has a small, hair-like projection on its tip.

### FLOWERS

Multi-flowered raceme of 20–50 white to lilac flowers. Each flower is approximately 1 cm long, with 5 petals.

### FRUITS/SEEDS

Seed pods are glabrous, rough, long, narrow and round in cross-section. Each pod can contain up to 9 seeds. Seeds are dull yellow, oblong and 2.5–3.0 mm long. They resemble alfalfa seeds, but are much larger.

### ROOTS

Taproot.

### DISTRIBUTION

Native to southern Europe, and from North Africa to Pakistan, goat's-rue has been introduced to the United States and elsewhere. This species is not widely distributed in Canada. Populations have been reported in southern Ontario and Quebec.

### INTRODUCTION AND SPREAD

Introduced into the United States as a potential forage crop. This species could enter Canada as a contaminant in seed lots due to its resemblance to alfalfa. Waterways are a major means of dispersal, as pods can float. Once established, plants form dense crowns.

### HABITAT

Areas with high soil moisture in full sun, such as ditch-banks, irrigated pastures, natural seepage areas, fencelines and roadways. Plants are often found along waterways.

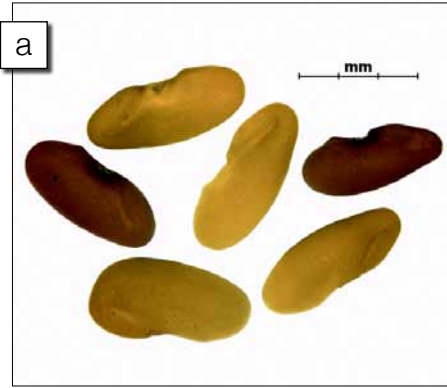
### SIMILAR SPECIES

Crown vetch (*Coronilla varia*) is similar to goat's-rue, but has pinker flowers and its inflorescence is composed of flowers that radiate from a central point (Figure f). Wild licorice (*Glycyrrhiza lepidota*) is also similar, but has solid stems, bur-like seed pods with hooked bristles, and mature leaves with glandular dots (Figure g).

### FLOWERING TIME

June to October.

# Family Fabaceae



Goat's-rue seeds.



Goat's-rue plant.



Goat's-rue flowers.



Goat's-rue plant with roots.



Goat's-rue seed pods.



Crown vetch flowers.



Wild licorice seed pods.

# *Pueraria montana* (Lour.) Merr.

## Kudzu

### GENERAL

An invasive, climbing, semi-woody, perennial vine in the pea family.

### SEEDLINGS

Cotyledons oval to oblong. The first true leaves are opposite; subsequent leaves are alternate.

### STEMS

Young vines are covered with tan to bronze hairs. Old vines are woody and can reach 10 cm in diameter and 30 m in length.

### LEAVES

Deciduous, alternate, with 3 broadly ovate leaflets measuring 8–20 cm long and 5–19 cm wide. The centre leaflet is often slightly larger and has a longer stalk than the lateral leaflets. Leaflets are entire or 2–3 lobed, and are pubescent beneath. There are 2 leafy stipules at the base of the leaf stalk (petiole) and 2 linear bracts (stipels) at the base of each leaflet, which are readily shed.

### FLOWERS

Individual flowers, which are about 2.0–2.5 cm long, are reddish-purple, highly fragrant and borne in racemes 10–20 cm long.

### FRUITS/SEEDS

Seed pods are 4–13 cm long and 0.6–1.3 cm wide. They are brown, flattened, hairy and contain 3–10 hard, reddish-brown, kidney-shaped seeds with a black mosaic pattern. Seeds are approximately 3–5 mm long.

### ROOTS

Develops an extensive root system with massive tuberous roots up to 45 cm wide and 2 m long at maturity, penetrating the soil to 3 m deep.

### DISTRIBUTION

Native to temperate and tropical Asia and parts of Oceania, kudzu was introduced into the United States and elsewhere. In Canada, it was discovered in 2009 along the shoreline of Lake Erie, west of Leamington, Ontario.

### INTRODUCTION AND SPREAD

Intentional planting of kudzu has been the most significant factor in its escape and spread. Once established in an area, its rapid vegetative growth allows it to spread locally. Movement of soil or equipment contaminated with kudzu seeds or plant parts can result in new introductions elsewhere.

### HABITAT

Found in a variety of natural and semi-natural habitats and disturbed areas, including urban areas, roadsides, river banks, other embankments, fencerows, abandoned fields, pastures, grasslands, field edges, shrublands, conifer plantations and natural broadleaved or mixed forests.

### SIMILAR SPECIES

Kudzu might be confused with other trifoliate legumes, including

- wild species, such as hog-peanut (*Amphicarpaea bracteata*) and trailing wild bean (*Strophostyles helvola*); and
- cultivated species, such as bean (*Phaseolus vulgaris*), scarlet runner bean (*P. coccineus*), and cow pea (*Vigna unguiculata*).

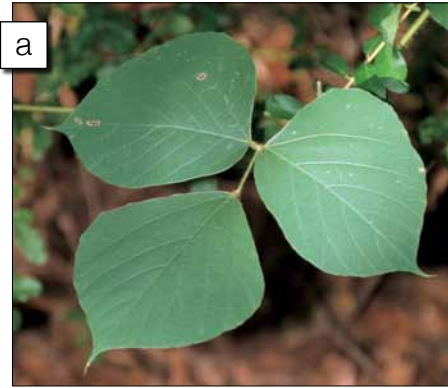
Poison ivy (*Toxicodendron radicans*) also has trifoliate leaves. Kudzu can be distinguished from other species by its climbing invasive habit, its hairy stems and leaves and its unique leaf characteristics.

### FLOWERING TIME

Kudzu plants flower in late summer, but usually not until their third year.



# Family Fabaceae



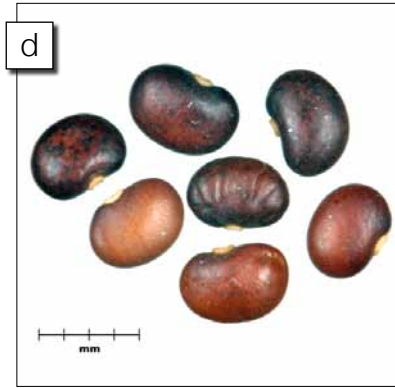
Kudzu leaf.



Kudzu plants in flower.



Kudzu seed pods.



Kudzu seeds.



Kudzu stem showing leafy stipules at base of leaf stalk.



Kudzu seedling.



Kudzu inflorescence.

# *Peganum harmala* L.

## African-rue

### GENERAL

African-rue is a bushy, perennial herbaceous plant. It is persistent, difficult to control, and can become the dominant plant in dry rangelands. Since the plants are very unpalatable and toxic, heavily infested rangelands lose much of their forage value.

### SEEDLINGS

Seedlings have 2 elongated oval cotyledons. The first true leaves are deeply dissected into 3 narrow lobes.

### STEMS

Plants are erect and stiff-stemmed, growing from 30–80 cm tall.

### LEAVES

Alternate, dissected and 2–5 cm long.

### FLOWERS

White, solitary 5-petaled flowers, about 2.5 cm in diameter.

### FRUITS/SEEDS

Numerous seeds are shed from a globose capsule that is 7–12 mm long and 12 mm wide. The long, slightly curved angular seeds are narrowly triangular in cross-section. They are 2.5–4.0 mm long and 1–2 mm wide, and look similar to orange segments under magnification. Their surfaces are rough and dull, with a honeycomb or bubbled texture. The seed colour varies from black to brown to red, likely depending on the amount of processing.

### ROOTS

The rootstock is thick and robust, and has a branching taproot.

### DISTRIBUTION

Native to the desert regions of northern Africa, Asia (Israel to western China and Pakistan), and southern and eastern Europe, African-rue was introduced into New Mexico and has spread to scattered locations across the southwest and Pacific states. The North American populations are currently concentrated in New Mexico, Texas and Arizona. It is not present in Canada.

### INTRODUCTION AND SPREAD

The most likely pathway for entry into Canada is as a seed contaminant. African-rue spreads primarily by seed. Most seeds fall close to the parent plant, but they can be moved with water flowing over soil. Animals can deposit the seeds in their droppings after feeding on the plant. Pieces of the rootstock can root and sprout if the plants are disturbed by cultivation.

### HABITAT

Occurs mainly in dry grasslands and saline waste areas, but is also common along roadsides, field edges and in degraded pastures. It prefers disturbed environments.

### SIMILAR SPECIES

Seedlings and small plants might be confused with some of the Asteraceae, for example, chamomile (*Matricaria chamomilla*), due to its dissected leaves. African-rue foliage is waxier and bluer than the bright green foliage of chamomile (Figure f). Flowering plants are readily distinguished, as chamomile has white daisy-like flowers.

### FLOWERING TIME

June to August.

# Family Nitrariaceae



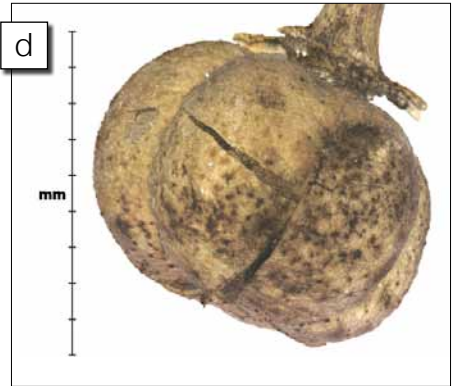
African-rue plant.



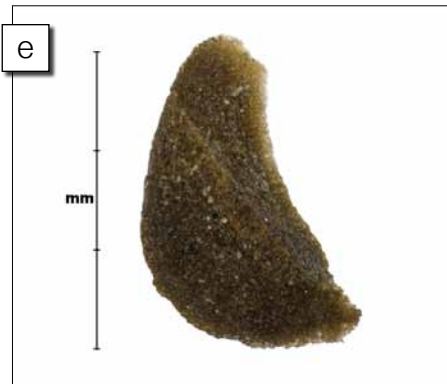
African-rue flowers.



African-rue flower.



African-rue capsule.



African-rue seed.



*Matricaria chamomilla* flowers.

# *Aegilops cylindrica* Host

## Jointed Goatgrass

### GENERAL

A winter annual grass. It is a serious weed of winter wheat in the United States.

### SEEDLINGS

The coleoptile and first leaf of jointed goatgrass seedlings are reddish to brownish-green.

### STEMS

Numerous, erect, 40–60 cm tall, and branching at the base.

### LEAVES

Alternate, 2–5 mm wide and 3–15 cm long. Glabrous or sparsely hairy, with hairs evenly spaced along the leaf blade margin. Auricles where the leaf sheaf meets the blade are also hairy. Leaves near the seed head and at the base of the plant are shorter than elsewhere on the plant.

### FLOWERS

The seed head, or spike, is a narrow cylinder usually 5–10 cm long with alternately arranged spikelets (or “joints”) on opposite sides of the rachis (main axis of the spike). Spikelets are 8–10 mm long and usually contain 2–4 florets each. Glumes on the lower spikelets are either awnless or have one awn (0.2–0.5 cm). Glumes of apical spikelets have long awns (3–9 cm). Each spikelet contains an average of 2 seeds.

### FRUITS/SEEDS

Reddish-brown caryopses, 6.5–9.0 mm long, 2 mm wide, and grooved. The lemma and palea adhere to the seed.

### ROOTS

The root mass is shallow and fibrous, smaller than that of wheat.

### DISTRIBUTION

Native to southeastern Europe and western Asia. Introduced into the United States in

the 1880s, likely in contaminated winter wheat seed. It is currently found in most states. In Canada, small populations have been found near ports in southern Ontario.

### INTRODUCTION AND SPREAD

Jointed goatgrass seed spreads primarily as a contaminant in wheat seed. It can also spread with farm machinery and when mixed in with grain, seed and straw of other cereals.

### HABITAT

Cultivated fields, pastures and disturbed areas along fences, ditches and roadsides.

### SIMILAR SPECIES

Jointed goatgrass and winter wheat are similar in appearance. Jointed goat grass seedlings may be identified by pulling up a plant and observing the joint attached near the base of the plant, just above the roots. Compared with winter wheat

- jointed goatgrass seedlings are reddish to brownish-green, whereas those of winter wheat are whitish-green;
- jointed goatgrass seedlings are thinner than those of winter wheat;
- in older seedlings, jointed goatgrass has evenly spaced hairs along the leaf margins near the base of the leaf blade, whereas winter wheat has few or no hairs;
- the midrib of the leaf blade is inconspicuous in jointed goatgrass, but conspicuous in winter wheat;
- leaves are often shorter in jointed goatgrass than in winter wheat;
- there are more tillers in jointed goatgrass than in winter wheat;
- the ligule is shorter in jointed goatgrass than in winter wheat (0.2–0.8 mm vs. 0.6–2.0 mm); and
- spikes of jointed goatgrass are much narrower and more cylindrical than those of winter wheat (Figure g).

### FLOWERING TIME

May to July.



# Family Poaceae



Jointed goatgrass spikelets in wheat.



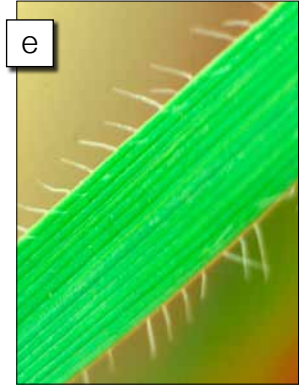
Jointed goatgrass plant.



Jointed goatgrass spikelets.



Jointed goatgrass spikes.



Hairs along margins of a jointed goatgrass leaf.



Jointed goatgrass seedlings.



Wheat (left) and jointed goatgrass (right) spikes.

# *Alopecurus myosuroides* Huds.

## Slender Foxtail

### GENERAL

An invasive winter annual belonging to the grass family.

### STEMS

Stems slender and round growing 20–85 cm tall.

### LEAVES

Leaf blade glabrous, pointed and flat; 3–17 cm long and 3.5–6.0 mm wide. Sheath is green or purplish and open. Auricles absent. Ligules are membranous with a jagged edge.

### FLOWERS

Spike-like panicles are 4–12 cm long, 3–7 mm wide, compact, dense and cylindrical. They are reddish-purple, appearing black from a distance. Small, delicate awns from the lemma give panicles the appearance of having short hairs.

### FRUITS/SEEDS

The lemma and glumes remain attached to the seed when it is shed.

### ROOTS

This species has a shallow root system.

### DISTRIBUTION

Native to northern Africa, Asia and Europe, slender foxtail has been introduced into the United States and elsewhere. Its presence had been reported in British Columbia and Manitoba; however, populations did not persist.

### INTRODUCTION AND SPREAD

This species was introduced into Canada as a contaminant of grass seed. Wind is the main means of seed dispersal.

### HABITAT

Moist meadows, deciduous forests, cultivated and disturbed ground. It is a significant weed of temperate cereal crops.

### SIMILAR SPECIES

Meadow foxtail (*Alopecurus pratensis*) is similar to slender foxtail; however, slender foxtail panicles have a smaller diameter in proportion to their length, and they are more tapered at each end (Figures e and g). Slender foxtail can also be distinguished by the reddish-purple colour of the panicle. Meadow foxtail grows taller (30–110 cm tall) than slender foxtail, and has longer leaf blades (6–40 cm long).

### FLOWERING TIME

June to August.

# Family Poaceae



Slender foxtail plant.



Slender foxtail seeds.



Slender foxtail plants.



Slender foxtail ligule.



Slender foxtail panicle.



Slender foxtail seedling.



Meadow foxtail panicle.



# *Bothriochloa ischaemum* (L.) Keng

## Yellow Bluestem

### GENERAL

A perennial bunchgrass, 30–80 cm tall (occasionally reaching 95 cm tall). It tends to sprawl horizontally when mown, sending up culms only when in bloom.

### STEM

Stiffly erect and slender, simple or sparingly branched, solid and grooved on one side. Nodes become brown to purple, and are either glabrous (*var. ischaemum*) or ringed with short hairs (*var. songarica*). Culms light green turning yellowish at maturity.

### LEAVES

Often basal, blades flat to folded, 5–25 cm long and 2.0–4.5 cm wide. Papilla-based hairs on the blade, just above the collar where the sheath and blade meet, are a distinctive feature.

### FLOWERS

Reddish-purple panicles reach 5–10 cm long and consist of 2–8 branches, each pair consisting of an awned sessile spikelet and a sterile pedicellate spikelet, both approximately 3.0–4.5 mm long. The base of sessile spikelets is hairy. Awns measure 9–17 mm long and become twisted and bent as they mature.

### FRUITS/SEEDS

Caryopses enclosed within the bracts of the spikelets.

### ROOTS

Occasionally almost rhizomatous.

### DISTRIBUTION

Native to southern Europe and Asia, introduced and cultivated in the United States. Its presence has not been reported in Canada.

### INTRODUCTION AND SPREAD

Yellow bluestem has been widely cultivated in the southern United States. It can also spread as a seed and grain contaminant, and in association with road construction and maintenance. Often abundant along roads, it tends to spread outwards from roadsides and into new areas. Yellow bluestem establishes easily from seed, which can survive a long time in soil.

### HABITAT

Dry stony places, borders of fields, waste ground, roadsides, rangelands and pastures.

### SIMILAR SPECIES

There are no *Bothriochloa* spp. present in Canada. Big bluestem (*Andropogon gerardii*) is similar, but gives rise to a much larger plant. Compared with yellow bluestem

- big bluestem is taller (1–3 m vs. less than 1 m);
- big bluestem has longer, wider leaf blades (5–50 cm long vs. 5–25 cm long; 5–10 mm wide vs. 2.0–4.5 mm wide); and
- the sessile spikelets of big bluestem are longer (5–11 mm vs. 3.0–4.5 mm) and has longer awns (8–25 mm vs. 9–17 mm).

In general, yellow bluestem can be distinguished from other grasses by the combination of reddish-purple panicles, spikelet characteristics and the papilla-based hairs on the blade just above the collar.

### FLOWERING TIME

August to September.

# Family Poaceae



Yellow bluestem spikes.



Yellow bluestem spikelet pairs, showing lower awned sessile spikelet and upper pedicellate spikelet.



Yellow bluestem panicle.



Yellow bluestem culm, sheath and blade.



Papilla-based hairs on yellow bluestem blade near junction of blade and sheath.



Yellow bluestem plants.

# *Echinochloa colona* (L.) Link

## Jungle-rice

### GENERAL

An invasive tufted annual in the grass family. Its rapid growth and competitive ability lead to substantial yield reductions in many crops.

### SEEDLINGS

Seedling leaves are greyish or dull green and resemble those of the mature plant.

### STEMS

Glabrous, growing prostrate or erect (10–100 cm tall).

### LEAVES

Leaf blades are flat, 5–30 cm long and 2–8 mm wide. Occasionally, purplish banding is present across the leaves. Ligule is absent.

### FLOWERS

The terminal panicle is composed of 1–6 spikes. Spikes are 0.5–3.0 cm long, pressed to the stem and directed upwards; each spike is composed of 4 rows of spikelets. Spikelets are ovate, dorsally compressed, 1.5–3.0 mm long and 1.5 mm wide, with a pointed tip. The spikelet consists of 3 papery, bristly outer bracts (2 glumes + sterile lemma) and 2 hard, shiny inner bracts (fertile lemma + palea). Outer bracts are green or purple and covered in short spines concentrated along the margins and nerves. Inner bracts are smooth, shiny and straw-yellow to greenish, with faint lines.

### FRUITS/SEEDS

Caryopses enclosed within the bracts of the spikelets are white to yellowish, oval or oblong, 2 mm long.

### ROOTS

Roots are fibrous. When the nodes come in contact with the soil, rooting occurs and new shoots develop.

### DISTRIBUTION

The origin of the species is obscure. It is widely naturalized throughout tropic, subtropic and warm-temperate regions, including south and southeast Asia, southern Australia and North America. The presence of jungle-rice had been reported in British Columbia, but no current sightings have been reported in Canada.

### INTRODUCTION AND SPREAD

Jungle-rice is reported as a common seed contaminant, and it is most likely to enter Canada as a contaminant of seed and grain lots. Once established, seeds are dispersed by wind, irrigation water and animals.

### HABITAT

This species grows in cultivated fields, waste ground, along ditches and in low-lying, damp to wet disturbed areas.

### SIMILAR SPECIES

Many species of *Echinochloa* are present in Canada. Jungle-rice can be distinguished by its unbranched, rather widely spaced panicle branches, and by the absence of awns.

### FLOWERING TIME

June to October.

# Family Poaceae



Jungle-rice inflorescence.



Jungle-rice seedling.



Jungle-rice leaf blades with banding.



Jungle-rice spikelets.



Jungle-rice growing prostrate.



Jungle-rice plants.



# *Eriochloa villosa* (Thunb.) Kunth

## Woolly Cupgrass

### GENERAL

An invasive annual plant belonging to the grass family.

### SEEDLINGS

Large in size. Similar to foxtails, but its leaves are larger.

### STEMS

Stems are erect or partially decumbent, growing 30–200 cm tall. They are smooth and hairless, except at the tip and at the inflorescence axis.

### LEAVES

Leaf blades are 10–20 cm long and 5–12 mm wide. One edge of the leaf blade is typically crinkled. Plants are densely hairy on both blades and sheath, giving them a velvety feel. Auricles are absent and the ligule is a fringe of fine hairs.

### FLOWERS

Panicles are 3–16 cm long, with 3–8 raceme-like branches extending out from 1 side. Branches are 2–7 cm long, with 2 rows of solitary spikelets on the lower side. The central axis of the panicle and the branches are very woolly.

### FRUITS/SEEDS

Ovate-elliptic, 4.5–5.0 mm long and 2–3 mm wide. Colour ranges from green to tan, depending on maturity. Seeds have a unique, cup-like depression at the base.

### ROOTS

Fibrous or thread-like.

### DISTRIBUTION

Native to Asia, woolly cupgrass has been introduced into the United States and elsewhere. In Canada, this species has been found at several sites in southern Quebec.

### INTRODUCTION AND SPREAD

The most likely means of introduction into Canada is contaminated farm machinery. Once established, plants are spread by seed; however, the means of natural seed dispersal is unknown.

### HABITAT

Weed of cultivated fields. Also found in open grassy places, hillsides, roadsides and wastelands.

### SIMILAR SPECIES

*Setaria* spp., *Paspalum* spp., *Digitaria* spp. and *Echinochloa crusgalli* (barnyard grass) are all similar to woolly cupgrass. Woolly cupgrass can be distinguished from the others by

- its wider leaf blades
- its terminal panicles with raceme-like branches
- its seeds with a cup-like callus at the base

### FLOWERING TIME

Early August to October.

# Family Poaceae



a

Woolly cupgrass plants in a field.



b

Woolly cupgrass ligule.



c

Woolly cupgrass panicle.



d

Woolly cupgrass plants.



e

Woolly cupgrass spikelets.



f

Woolly cupgrass seedling.



g

Woolly cupgrass seeds.

# *Microstegium vimineum* (Trin.)

## Japanese Stiltgrass

### GENERAL

Annual grass with a sprawling habit that typically grows 40–120 cm tall.

### STEMS

Stems are loosely branched, with short to long, green to reddish spreading stolons. Stem nodes appear glabrous. It reproduces vegetatively by rooting at lower stem nodes.

### LEAVES

Leaf blades are thin, pale green, tapered at both ends, 5–15 mm wide, 3.5–16.0 cm long, with a distinctive shiny midrib.

### FLOWERS

The slender inflorescence measures 5–9 cm long. The narrow spikelets are 4–6 mm long with pale green glumes that are 5 mm long. Upper lemmas are usually awned and often concealed by the glumes.

### FRUITS/SEEDS

The spikelet consists of two outer bracts (the glumes) and two thin inner bracts (the fertile lemma + palea). Two long and hairy stalks project from the base of the spikelet. The spikelet is straw-yellow, covered with small hairs, approximately 2.5–3.2 mm long and 0.7 mm wide, with short teeth along the edges of the upper half. A long awn may project from the top of the spikelet.

### ROOTS

Produces a sparse, fibrous and very short root system that is remarkably small compared to its above-ground biomass.

### DISTRIBUTION

Native to countries in tropical and temperate Asia, including Russia, China, Japan, India, Nepal, Thailand and the Philippines, Japanese stiltgrass is naturalized elsewhere, including the eastern United States. It is not present in Canada.

### INTRODUCTION AND SPREAD

This species could be accidentally introduced into Canada with contaminated hay or soil. Once established, plants are spread by rooting at the nodes along the stem. Seeds are dispersed by water and animals, and remain viable in the soil for many years.

### HABITAT

Occupies riparian habitats, lawns, woodland thickets, damp fields and roadside ditches. It is usually found under moderate to dense shade in moist conditions, but it does not persist in areas with periodic standing water or in full sunlight.

### SIMILAR SPECIES

Japanese stiltgrass can be distinguished from other grasses by its thin, pale green, tapered leaf blades and multiple spikelets. It is sometimes confused with white cutgrass, (*Leersia virginica*), which is native to New Brunswick, Ontario and Quebec, but which differs from Japanese stiltgrass by its glabrous nodes and the presence of hairs at the summit of the leaf sheaths (Figure f). In addition, Japanese stiltgrass flowers from August to September, whereas white cutgrass flowers from June through July.

### FLOWERING TIME

August to September.

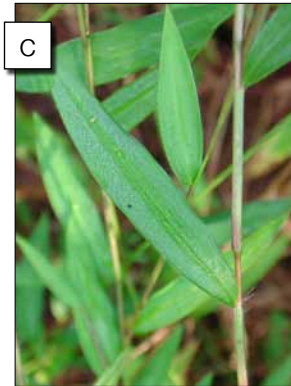




Japanese stiltgrass seeds.



Japanese stiltgrass inflorescence.



Japanese stiltgrass leaves.



Japanese stiltgrass foliage.



Forest infestation of Japanese stiltgrass.



White cutgrass, a Japanese stiltgrass look-alike.

# *Milium vernale* M. Bieb.

## Spring Milletgrass

### GENERAL

An invasive annual belonging to the grass family.

### STEMS

Stems grow erect, solitary or clumped, 10–70 cm tall and are slightly rough.

### LEAVES

Leaf blades are light green, flat, 1.7–8.2 cm long and 1.9–5.0 mm wide; veins and margins are slightly rough. The majority of leaf blades are concentrated at the base of the culms. Sheaths are slightly rough. Auricles absent. Ligules 2.4–4.5 mm long, blunt to pointed.

### FLOWERS

Panicles open, 4.0–11.5 cm long, with ascending or erect branches. Solitary spikelets are confined to the outer half of the branches. Spikelets are elliptical, compressed, 2.5–3.0 mm long. Glumes are 2.5–3.2 mm long, slightly rough, 3-veined and pointed. Lemma is 2.0–2.3 mm long.

### FRUITS/SEEDS

Glumes remain attached to the seed when it has shed.

### DISTRIBUTION

Native in areas from western Europe to central Asia, it was introduced into Idaho. It is not present in Canada.

### INTRODUCTION AND SPREAD

The most likely means of introduction into Canada is as a contaminant of grain or cereal seed lots from Idaho. Once established, plants spread by natural seed dispersal. Seeds do not appear to be well adapted for long-range seed dispersal.

### HABITAT

This plant is a serious weed of winter wheat, and can be found in areas near infested fields.

### SIMILAR SPECIES

Wood milletgrass (*Milium effusum*) is a similar species. Spring milletgrass can be distinguished from this species by its narrower leaf blades and smaller panicles (Figure c).

### FLOWERING TIME

May to June.

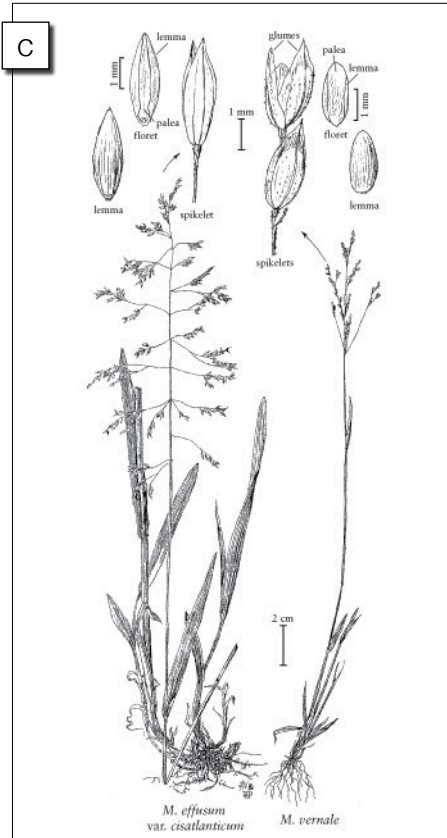
# Family Poaceae



Spring milletgrass seeds.



Spring milletgrass plant.



Wood milletgrass (left) and spring milletgrass (right) illustration.



Spring milletgrass specimens.

# *Nassella trichotoma* (Nees) Hack. ex Arechav.

## Serrated Tussock

### GENERAL

A perennial, drought-resistant, tussock-forming grass.

### STEMS

The tussocks are up to 70 cm high and 60–70 cm wide at the base. The stems stand erect until the seeds are mature. The stem bases are whitish and swollen. The flowering stems are up to twice as long as leaves.

### LEAVES

Leaves are bright green and upright in small plants, becoming duller and more drooping as plants mature. They feel rough when rubbed from tip to base. Leaves are narrow (0.5 mm in diameter), hard, tightly rolled and finely serrated. The leaf blade is linear with a pointed tip, 8–50 cm long. The leaf sheath is up to 16 cm long, rounded and smooth. The ligule is membranous, short (1 mm long), obtuse at the tip, white and glabrous.

### FLOWERS

The inflorescence is an open, much-branched panicle, 20–35 cm long, with fine, brittle branches. The panicles are erect when young, and droop over the leaves when mature. The spikelets are small and inconspicuous. Two purplish glumes enclose each spikelet, imparting a purple tinge to the inflorescences.

### FRUITS/SEEDS

The dispersed seed unit is a floret, with hard and shiny lemma and palea. The floret is 1.5–2.7 mm long and 1 mm wide, with a long awn (often broken during processing), 10–25 mm long. The florets are light brown, long, oval, with a hairy pointed base and a flat top; they are covered with bumps on the upper half and on a seam along 1 side.

### ROOTS

Fibrous, matted and deep.

### DISTRIBUTION

Native to South America, including parts of Argentina, Brazil, Chile and Uruguay, serrated tussock has been introduced into Australia, New Zealand, South Africa and, very locally, into Europe. It is not present in Canada.

### INTRODUCTION AND SPREAD

Serrated tussock is most likely to enter Canada as a seed contaminant in grass seed. Plants are most likely to be found around seed handling facilities or in forage grass fields where seed imported from South America has been planted. The panicle breaks off when mature, and the florets are dispersed as the panicle tumbles along the ground.

### HABITAT

Where introduced, it can become dominant in natural and planted pastures, native grasslands and open forests.

### SIMILAR SPECIES

Most related grasses, while having a general structural similarity, have florets that are much larger, with stouter awns. Mexican feathergrass (*Nassella tenuissima*), is sold by nurseries in North America as an ornamental plant. Uruguayan ricegrass (*Piptochaetium montevidense*) can occur as an impurity in imported grass seed of South American origin. Uruguayan ricegrass florets are almost round in outline, dark brown, wider and covered in bumps along the length of the floret (Figure f).

### FLOWERING TIME

In Australia, flowers in spring and produces mature seed in summer.



# Family Poaceae



Serrated tussock spikelets.



Serrated tussock seedlings.



Serrated tussock plant.



Serrated tussock inflorescence.



Serrated tussock seed.



Uruguayan ricegrass seed.

# *Paspalum dilatatum* Poir.

## Dallis Grass

### GENERAL

An invasive tufted perennial in the grass family. Its dense growth habit smothers other low-growing plants in turf areas.

### SEEDLINGS

Leaf blades may be hairy when young.

### STEMS

Stems arise from a knotted base of short rhizomes (less than 1 cm) and grow erect (50–175 cm tall).

### LEAVES

Mostly glabrous, with a few long hairs near the base on the upper surface. They are flat, 35 cm long and 2.0–16.5 mm wide. Ligules are membranous, 1.5–3.8 mm long. Auricles are absent.

### FLOWERS

Inflorescence is a terminal panicle composed of 2–7 spikes. Spikes are 4–10 cm long, branching at different points along the stalk; each spike is composed of 4 rows of spikelets. The spikelets are oval, compressed, 3–4 mm long and 2–3 mm wide. They comprise 2 leathery outer bracts (glume + sterile lemma) and 2 hard, inner bracts (fertile lemma + palea). The outer bracts have white silky hairs around the edges and a distinctive central nerve.

### FRUITS/SEEDS

Caryopses enclosed within the bracts of the spikelets are white to brown and 2.0–2.3 mm long.

### ROOTS

The roots are fibrous with short rhizomes.

### DISTRIBUTION

Native to Bolivia, Brazil, Chile, Paraguay, Uruguay and Argentina, dallis grass has been introduced into the southern United States, southern Europe, tropical and southern Africa, Asia, Australia, New Zealand, Macaronesia, the Mascarenes, Melanesia, and Polynesia. Its presence has not been reported in Canada.

### INTRODUCTION AND SPREAD

This species could potentially be introduced into Canada as a contaminant in turf grass seed. Its introduction elsewhere has mainly resulted from intentional planting as a forage grass. Once established, seeds are dispersed by attaching themselves to animals and people.

### HABITAT

In its native range, dallis grass grows in moist grassland. Where introduced, it invades heaths, shrubland, riparian habitats and freshwater wetlands. It is also found in waste places, lawns, golf courses and other turf areas.

### SIMILAR SPECIES

Thin paspalum (*Paspalum setaceum*) and Peruvian paspalum (*Paspalum racemosum*) have been reported from Ontario; however, both species are rare. Thin paspalum is a highly variable species with fewer (1–2) spikes than dallis grass and only 2 rows of alternately arranged spikelets (Figure g). Peruvian paspalum can be distinguished from dallis grass by its purple nodes and numerous (40–75) spikes.

### FLOWERING TIME

May to October.

# Family Poaceae



Dallis grass panicles.



Dallis grass seedling.



Dallis grass spikelets.



Dallis grass plants.



Dallis grass spikelets on a spike.



Dallis grass ligule.



Thin paspalum spikelets.

# *Persicaria perfoliata* (L.) H. Gross

## Devil's-tail Tearthumb

### GENERAL

Herbaceous annual or perennial vine of the buckwheat family. It is also known as mile-a-minute weed, and was formerly known as *Polygonum perfoliatum*.

### STEMS

Thin, elongate, branched, sprawling and armed with recurved barbs. They are usually 1–2 m long, but can reach 7–8 m long along forest edges. Distinctive circular, cup-shaped, leafy structures called ocreae surround the stem at the nodes.

### LEAVES

Alternate and roughly shaped like equal-sided triangles, 2.5–7.5 cm long and wide.

### FLOWERS

Terminal spikes, or racemes, emerging from the ocreae. Individual flowers are small (3–4 mm), white and generally inconspicuous.

### FRUITS/SEEDS

Fruits are a deep metallic blue colour and are arranged in clusters. Each berry-like fruit is about 5 mm in diameter and contains a single seed. Seeds are hard, glossy, black or reddish-black achenes, approximately 3 mm in diameter.

### ROOTS

Shallow, weak and fibrous.

### DISTRIBUTION

Native to the cool, temperate regions of eastern Asia, devil's-tail tearthumb has been established in the northeastern United States and Oregon. Although its presence has been reported in the past in southwestern British Columbia, no surviving populations are known to exist in Canada.

### INTRODUCTION AND SPREAD

Devil's-tail tearthumb reproduces by seed. It is also known for its remarkably

rapid vegetative growth. People may unintentionally transport devil's-tail tearthumb in association with nursery stock. The seeds may be transported in root balls, or its vines may be wound around the stems of other plants. People may also transport the seeds in association with ornamental seed, hay, mulch, vehicles, equipment, clothing and baggage. Natural means of dispersal include water, ants, birds, small animals and deer.

### HABITAT

Riparian areas as well as a wide variety of disturbed areas, including roadsides, hedges, fields, pasture and forest edges, early successional forests, plantations, gardens and parks.

### SIMILAR SPECIES

Devil's-tail tearthumb may be confused with several species in the same family, including wild buckwheat (*Fallopia convolvulus*), halberdleaf tearthumb (*Polygonum arifolium*) (Figure g), arrow-leaved smartweed (*Persicaria sagittata*), climbing false buckwheat (*Fallopia scandens*), fringed wild buckwheat (*Polygonum cilinode*) (Figure f), hedge bindweed (*Calystegia sepium*) and plants in the Convolvulaceae family, including field bindweed (*Convolvulus arvensis*), all of which are present in Canada. Two of these, halberdleaf tearthumb and arrow-leaved smartweed, are also barbed. However, devil's-tail tearthumb is easily distinguished from other vines by its

- roughly equilateral triangular leaves;
- recurved barbs on the stems and the undersides of its leaves;
- ocreae surrounding the nodes; and
- distinctive fleshy, metallic blue, berry-like fruits.

### FLOWERING TIME

In the northeastern United States, flowering begins in June.



# Family Polygonaceae



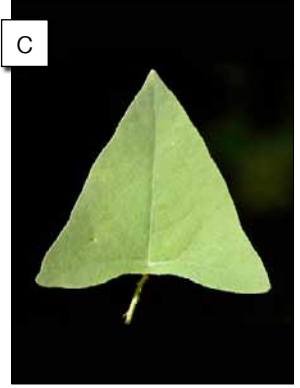
a

Devil's-tail tearthumb ocrea surrounding the stem.



b

Devil's-tail tearthumb fruits and recurved barbs.



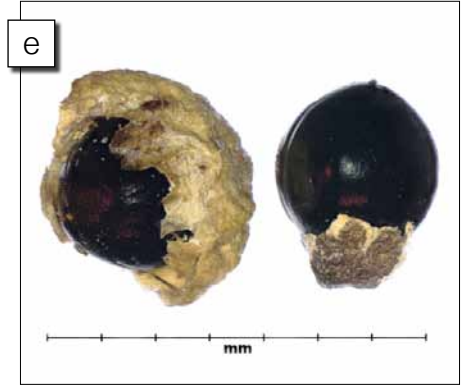
c

Devil's-tail tearthumb leaf.



d

Devil's-tail tearthumb plants.



e

Devil's-tail tearthumb seeds.



f

Fringed wild buckwheat leaf.



g

Halberdleaf tearthumb leaves.

# *Solanum elaeagnifolium* Cav.

## Silverleaf Nightshade

### GENERAL

An invasive, shrub-like, perennial plant in the potato family.

### SEEDLINGS

Cotyledons are linear and covered with hairs; stems below the cotyledons are covered with hairs and often purple tinged.

### STEMS

Plants are multi-stemmed, growing 30–60 cm tall. Stems are cylindrical, branched, and covered with short, dense, fine hairs that give the plant a silvery-white appearance. Stems have numerous, slender, yellow-to-red prickles.

### LEAVES

Alternate, stalked, about 2.5–10.0 cm long and 1.0–2.5 cm wide. They are lance-shaped with wavy or scalloped edges, and, like the stems, they are covered with short, dense, silvery-white hairs. The main veins have numerous, slender, yellow-to-red prickles.

### FLOWERS

Star-shaped, bright blue to purple/violet (or occasionally white), with 5 fused petals and 5 prominent yellow anthers.

### FRUITS/SEEDS

Clusters of smooth, globular berries are green with stripes when new and are mottled yellow/orange or brownish when ripe. Each berry contains 60–120 seeds that are flat and light, closely resembling the seeds of tomatoes.

### ROOTS

Extensive, spreading root system that penetrates to depths of more than 3 m.

### DISTRIBUTION

Native to southwestern United States and northeastern Mexico, silverleaf nightshade is widespread in the United States in all but the Great Lakes and New England regions. It is not present in Canada.

### INTRODUCTION AND SPREAD

The most likely means of introduction into Canada would be as a contaminant in seed lots. Once established, plants spread by seed and from cut root sections. Its berries are spread by birds, animals, water and wind.

### HABITAT

A variety of cultivated lands and disturbed areas, particularly in areas of low annual rainfall.

### SIMILAR SPECIES

Many species of nightshade are present in Canada. Silverleaf nightshade can be distinguished from other nightshade species by its silvery-white hairs.

### FLOWERING TIME

May to September.

# Family Solanaceae



Silverleaf nightshade plants.



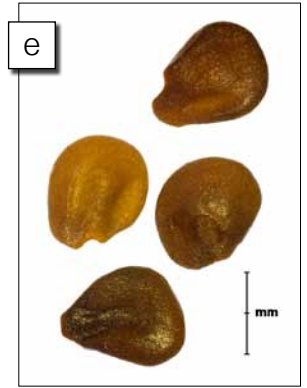
Silverleaf nightshade flower.



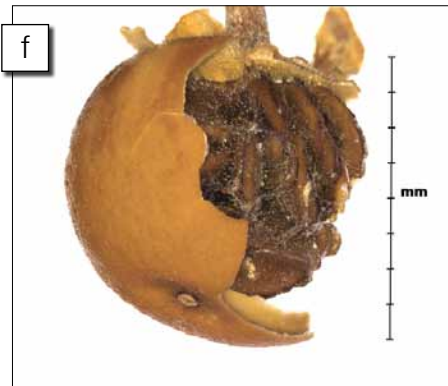
Silverleaf nightshade flowers.



Silverleaf nightshade fruit.



Silverleaf nightshade seeds.



Silverleaf nightshade fruit.



Silverleaf nightshade leaves.

# *Zygophyllum fabago* L.

## Syrian Bean-caper

### GENERAL

An invasive, multi-branched, herbaceous plant in the creosote bush family. In cold environments, this species can function as an annual.

### STEMS

Smooth and thickened, multi-branched, and grow up to 1 m tall. Plants grow as wide as they are tall and have a bushy appearance. Basal shoots are spreading and upper shoots are ascending.

### LEAVES

Succulent, opposite and compound, with 2 leaflets. Leaflets are oval, 15–26 mm long and 10–18 mm wide.

### FLOWERS

Individual flowers are borne from the leaf axis with 5 green sepals and 5 white petals with salmon markings. Ten orange stamens extend past the petals.

### FRUITS/SEEDS

Fruit is a 5-valved capsule with a single seed in each valve. Capsules are oblong, cylindrical and 5-sided; they are 20–35 mm long and 4–6 mm wide. Seeds are 3 mm long, oblong, compressed, rough and shiny.

### ROOTS

Stout, deep, well-developed taproot with creeping lateral roots. Lateral roots can produce new plants.

### DISTRIBUTION

Native to eastern Europe, the Middle East and central Asia, Syrian bean-caper has been introduced into Washington, Idaho and elsewhere. Its presence has not been reported in Canada.

### INTRODUCTION AND SPREAD

The most likely means of introduction is intentional planting in ornamental gardens. Plants can spread by root fragments and seed dispersal; however, the natural means of seed dispersal is unknown. Once established, plants form large, dense colonies.

### HABITAT

Disturbed areas, including roadsides, corrals and gravel pits.

### SIMILAR SPECIES

No similar species are present in Canada.

### FLOWERING TIME

May to August.



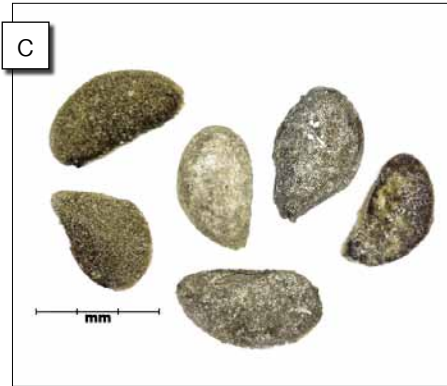
# Family Zygophyllaceae



Syrian bean-caper flowers and leaves.



Syrian bean-caper plant.



Syrian bean-caper seeds.



Syrian bean-caper flower.



Syrian bean-caper leaves and capsules.



Syrian bean-caper infestation.

# Glossary

**ANNUAL:** A plant that germinates and flowers, and whose seeds ripen, in one year.

**AURICLE:** An ear-shaped appendage (the “ear”) at the base of a leaf.

**AWN:** A bristle, often found on grass flowers.

**AXIL:** The upper angle formed where a leaf stalk or a branch joins a stem.

**BERRY:** A pulpy fruit with several seeds, such as a currant or grape.

**BIENNIAL:** Of two years’ duration.

**BLADE:** The expanded part of a leaf.

**CALYX:** The outer floral ring comprising sepals; usually green, but is sometimes brightly coloured.

**CAPSULE:** A dry fruit consisting of two or more chambers that open at maturity.

**CARYOPSIS:** A grain, as in the grasses.

**COLEOPTILE:** A protective, cylindrical, sheath-like structure that surrounds the shoot apex in cereal and grass embryos.<sup>1</sup>

**COLLAR:** The outer side of a grass leaf at the juncture of the blade and the sheath.<sup>2</sup>

**COTYLEDON:** The first leaf from the seed, sometimes called the seed leaf.

**CULM:** The stem of a grass or sedge.

**DECUMBENT (STEM):** A stem whose base lies on the ground and whose tip grows upright.

**DISC FLOWER:** A tubular, radially symmetric flower (i.e., floret) of the Asteraceae family, with male and female organs.<sup>2</sup>

**FILIFORM:** Thread-like, long and very slender.

**FLORET:** A single flower, usually part of a composite head or cluster.

**GLABROUS:** Smooth, without hairs.

**GLUME:** A scaly bract on the floral parts of grasses and sedges.

**INFLORESCENCE:** An arrangement of flowers in a cluster.

**LEAFLET:** A division of a compound leaf.

**LEMMA:** The lower of the two bracts enclosing a grass flower.

**LIGULE:** A strap-shaped organ, as in the collar of a grass blade.

**MIDRIB:** The central vein of a leaf or other organ.

**NODE:** The place on a stem where leaves grow or normally arise; the solid part of a culm.

**OBOVATE (LEAF):** An egg-shaped leaf, with the widest part near the tip.

**NUTLET:** A small nut.<sup>2</sup>

**PALEA:** The inner of two bracts enclosing a grass flower.

**PANICLE:** A branched cluster of flowers, each stalked; the lower branches are the longest and open first.

**PAPILLA:** A minute, nipple-shaped projection.

**PAPPUS:** The bristly or scale-like appendage on the fruits of the Asteraceae family.

**PEDICELLATE:** Having, or attached by, a pedicel.

**PERENNIAL:** A plant that persists for two or more years.

**PETIOLE:** The stalk of a leaf.

**PINNATE (COMPOUND LEAF):** With leaflets (pinnae) arranged on each side of a common axis.

**PUBESCENT:** Covered with hairs.

**RACEME:** A flower cluster, with each flower borne on a short stalk from a common stem.

**RAY FLOWER:** A flower (i.e., floret) of the Asteraceae family that has a pistil or is neutral, and that has a three-lobed, strap-shaped lip.<sup>2</sup>

**RHIZOME:** A creeping, underground stem.<sup>2</sup>

**ROSETTE:** A dense cluster of leaves on a very short stem or axis.

**SEPAL:** One of the separate parts of a calyx, usually green and leaf-like.

**SESSILE:** Without a stalk.

**SHEATH:** A long, tubular structure surrounding some part of a plant.

**SPIKE:** A flower cluster, the individual flowers of which are stalkless, borne on a common stalk.

**SPIKELET:** A secondary spike, especially in grasses and sedges.

**STIPEL:** A stipule of a leaflet.<sup>3</sup>

**STIPULE:** An appendage at the base of a leaf.

**TILLER:** A shoot growing from the base of the stem of a grass plant.<sup>2</sup>

**VALVE:** The units or pieces of a capsule or pod.

**WINTER ANNUAL:** A plant that germinates between late summer and early spring, and that flowers and produces seeds in mid- to late spring, after which it dies.<sup>2</sup>

## Sources for glossary:

### Primary source:

Looman, J. and K.F. Best, 1987. Budd's Flora of the Canadian Prairie Provinces. Minister of Supply and Services Canada. Research Branch, Agriculture Canada. Publication 1662, Hull, Quebec.

### Secondary sources (as indicated by superscripts):

<sup>1</sup> University of Bristol, School of Biological Sciences, 2009.  
[ <http://www.cerealsdb.uk.net/glossary.htm> ]

<sup>2</sup> Uva, R.H., J.C. Neal, and J. M. DiTomaso, 1997. Weeds of the Northeast. Cornell University Press, Ithaca, New York.

<sup>3</sup> University of Delaware Botanic Gardens, 2010.  
[ <http://ag.udel.edu/udbg/info/glossary.html> ]

# Photo Credits

## *Aegilops cylindrica* – Jointed Goatgrass

Caption: Jointed goatgrass spikelets in wheat.  
Source: <http://www.invasive.org/weedcd/species/5038.htm>  
Attribution: Phil Westra, Colorado State University, [www.bugwood.org](http://www.bugwood.org)

Caption: Jointed goatgrass plant.  
Attribution: Sam Brinker, Ontario Ministry of Natural Resources – Natural Heritage Information Centre.

Caption: Jointed goatgrass spikelets.  
Attribution: Sam Brinker, Ontario Ministry of Natural Resources – Natural Heritage Information Centre.

Caption: Jointed goatgrass spikes.  
Attribution: Sam Brinker, Ontario Ministry of Natural Resources – Natural Heritage Information Centre.

Caption: Hairs along margins of a jointed goatgrass leaf.  
Source: <http://www.invasive.org/weedcd/species/5038.htm>  
Attribution: Steve Dewey, Utah State University, [www.bugwood.org](http://www.bugwood.org)

Caption: Jointed goatgrass seedlings.  
Source: <http://www.invasive.org/weedcd/species/5038.htm>  
Attribution: Steve Dewey, Utah State University, [www.bugwood.org](http://www.bugwood.org)

Caption: Wheat (left) and jointed goatgrass (right) spikes.  
Source: <http://www.invasive.org/weedcd/species/5038.htm>  
Attribution: United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, [www.bugwood.org](http://www.bugwood.org)

## *Alopecurus myosuroides* – Slender Foxtail

Caption: Slender foxtail plant.  
Attribution: Richard Old, XID Services, Inc., [www.bugwood.org](http://www.bugwood.org)

Caption: Slender foxtail seeds.  
Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Slender foxtail plants.  
Source: <http://www.biolib.de/>  
Attribution: Kurt Stueber.

Caption: Slender foxtail ligule.  
Source: [http://www.jvsystem.net/app19/Species.aspx?pk=10055&lng\\_user=2](http://www.jvsystem.net/app19/Species.aspx?pk=10055&lng_user=2)  
Attribution: Luděk Tyšer, [www.weed-atlas.eu](http://www.weed-atlas.eu)

Caption: Slender foxtail panicle.  
Source: [http://www.jvsystem.net/app19/Species.aspx?pk=10055&lng\\_user=2](http://www.jvsystem.net/app19/Species.aspx?pk=10055&lng_user=2)  
Attribution: Pavel Hamouz, [www.weed-atlas.eu](http://www.weed-atlas.eu)

Caption: Slender foxtail seedling.  
Source: [http://www.jvsystem.net/app19/Species.aspx?pk=10055&lng\\_user=2](http://www.jvsystem.net/app19/Species.aspx?pk=10055&lng_user=2)  
Attribution: Pavel Hamouz, [www.weed-atlas.eu](http://www.weed-atlas.eu)

Caption: Meadow foxtail panicle.  
Source: <http://www.commanster.eu/commanster/Plants/Grasses/SpGrasses/Alopecurus.pratensis.html>  
Attribution: J.K. Lindsey.

## *Alternanthera sessilis* – Sessile Joyweed

Caption: Sessile joyweed plants showing sprawling growth habit.  
Source: [http://commons.wikimedia.org/wiki/File:Alternanthera\\_sessilis\\_W\\_IMG\\_3423.jpg](http://commons.wikimedia.org/wiki/File:Alternanthera_sessilis_W_IMG_3423.jpg)  
Attribution: J.M. Garg.

Caption: Sessile joyweed with ovate leaves and flowers nestled in the leaf axils.  
Source: <http://www.hear.org/starr/images/?o=plants>  
Attribution: Forest Starr and Kim Starr, Plants of Hawaii.

Caption: Sessile joyweed with linear-lanceolate leaves.  
Source: <http://riceweed.plantnet-project.org/showbyacno.php?acno=ALTSE>  
Attribution: Patrick Marnotte, CIRAD.

Caption: Sessile joyweed flower close-up.  
Source: [http://commons.wikimedia.org/wiki/File:Alternanthera\\_sessilis\\_W3\\_IMG\\_3422.jpg](http://commons.wikimedia.org/wiki/File:Alternanthera_sessilis_W3_IMG_3422.jpg)  
Attribution: J.M. Garg.

Caption: Sessile joyweed fruits and seeds.  
Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

## *Bothriochloa ischaemum* – Yellow Bluestem

Caption: Yellow bluestem spikes.  
Source: [http://www.wnmu.edu/academic/nspages2/gilafloa/bothriochloa\\_ischaemum.html](http://www.wnmu.edu/academic/nspages2/gilafloa/bothriochloa_ischaemum.html)  
Attribution: Russ Kleinman and Bill Norris, Western New Mexico University Department of Natural Sciences and the Dale A. Zimmerman Herbarium.

Caption: Yellow bluestem spikelet pairs, showing lower awned sessile spikelet and upper pedicellate spikelet.  
Source: <http://www.biosci.utexas.edu/prc/DigFlora/KR/BOISS-morph.html>  
Attribution: Bob Harms, University of Texas, Plant Resource Center.

Caption: Yellow bluestem panicle.  
Source: <http://www.biosci.utexas.edu/prc/DigFlora/KR/BOISS-morph.html>  
Attribution: Bob Harms, University of Texas, Plant Resource Center.

Caption: Yellow bluestem culm, sheath and blade.  
Source: <http://www.biosci.utexas.edu/prc/DigFlora/KR/BOISS-morph.html>  
Attribution: Bob Harms, University of Texas, Plant Resource Center.

Caption: Papilla-based hairs on yellow bluestem blade near junction of blade and sheath.  
Source: <http://www.biosci.utexas.edu/prc/DigFlora/KR/BOISS-morph.html>  
Attribution: Bob Harms, University of Texas, Plant Resource Center.

Caption: Yellow bluestem plants.  
Source: [http://www.tropicalforages.info/key/Forages/Media/Html/Bothriochloa\\_ischaemum.htm](http://www.tropicalforages.info/key/Forages/Media/Html/Bothriochloa_ischaemum.htm)  
Attribution: Bill Ocuppaugh.



## *Centaurea iberica* – Iberian Starthistle

Caption: Iberian starthistle rosette.

Source: <http://flora.huji.ac.il/browse.asp?action=specie&specie=CENIBE&fileid=6001>

Attribution: Avinoam Danin, The Hebrew University of Jerusalem.

Caption: Iberian starthistle flower head.

Source: [http://www.treknature.com/gallery/Middle\\_East/Turkey/photo188099.htm](http://www.treknature.com/gallery/Middle_East/Turkey/photo188099.htm)

Attribution: Ozgur Kocak, TrekNature.

Caption: Iberian starthistle plants.

Source: [http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=0seq\\_num=104265&one=T](http://calphotos.berkeley.edu/cgi/img_query?query_src=0seq_num=104265&one=T)

Attribution: Dean Kelch, California Department of Food & Agriculture.

Caption: Iberian starthistle seeds.

Source: [http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=0seq\\_num=103629&one=T](http://calphotos.berkeley.edu/cgi/img_query?query_src=0seq_num=103629&one=T)

Attribution: Dean Kelch, California Department of Food & Agriculture.

Caption: Purple starthistle flower head.

Source: <http://www.nwcb.wa.gov/detail.asp?weed=25>

Attribution: Washington State Noxious Weed Control Board.

## *Centaurea solstitialis* – Yellow Starthistle

Caption: Yellow starthistle winged stems.

Source: [http://www.wnmu.edu/academic/nspages2/gilaflo/centaurea\\_solstitialis.html](http://www.wnmu.edu/academic/nspages2/gilaflo/centaurea_solstitialis.html)

Attribution: Russ Kleinman.

Caption: Yellow starthistle flower head.

Source: [http://www.wnmu.edu/academic/nspages2/gilaflo/centaurea\\_solstitialis.html](http://www.wnmu.edu/academic/nspages2/gilaflo/centaurea_solstitialis.html)

Attribution: Russ Kleinman.

Caption: Yellow starthistle plants.

Source: [http://www.wnmu.edu/academic/nspages2/gilaflo/centaurea\\_solstitialis.html](http://www.wnmu.edu/academic/nspages2/gilaflo/centaurea_solstitialis.html)

Attribution: Russ Kleinman.

Caption: Maltese starthistle flower head.

Source: <http://www.pbases.com/lethrus/image/51281053/original>

Attribution: Guy Bruyca.

Caption: Seed from yellow starthistle ray floret, without bristles.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Seed from yellow starthistle disc floret, with bristles.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

## *Crupina vulgaris* – Common Crupina

Caption: Common crupina leaf.

Source: <http://www.forestryimages.org/browse/detail.cfm?imgnum=1459127>

Attribution: Utah State University Archive, [www.bugwood.org](http://www.bugwood.org)

Caption: Common crupina flower head.

Source: [http://www.stammer.nl/gallery13/225\\_2586\\_crupina\\_vulgaris\\_std.jpg](http://www.stammer.nl/gallery13/225_2586_crupina_vulgaris_std.jpg)

Attribution: [www.stammer.nl](http://www.stammer.nl)

Caption: Common crupina seedlings.

Attribution: Cindy Roché.

Caption: Common crupina seed.

Attribution: Cindy Roché.

Caption: Bolting common crupina rosette.

Attribution: Cindy Roché.

Caption: Common crupina flowers.

Source: <http://www.weedimages.org/browse/detail.cfm?imgnum=5231085>

Attribution: Richard Old, XID Services, Inc., [www.bugwood.org](http://www.bugwood.org)

Caption: Spotted knapweed flower head, with bristly floral bracts.

Source: [http://commons.wikimedia.org/wiki/File:Centaurea\\_stoebe\\_huellblaetter.jpeg](http://commons.wikimedia.org/wiki/File:Centaurea_stoebe_huellblaetter.jpeg)

Attribution: Kristian Peters.

## *Echinochloa colona* – Jungle-rice

Caption: Jungle-rice inflorescence.

Source: <http://www.conabio.gob.mx/malezasdemexico/poaceae/echinochloa-colona/imagenes/inflorescencias.jpg>

Attribution: Pedro Tenorio Lezama.

Caption: Jungle-rice seedling.

Source: <http://www.ipm.ucdavis.edu/PMG/WEEDS/junglerice.html>

Attribution: University of California Statewide Integrated Pest Management Program.

Caption: Jungle-rice leaf blades with banding.

Source: <http://www.ipm.ucdavis.edu/PMG/WEEDS/junglerice.html>

Attribution: University of California Statewide Integrated Pest Management Program.

Caption: Jungle-rice spikelets.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Jungle-rice growing prostrate.

Source: <http://www.forestryimages.org/browse/detail.cfm?imgnum=5233041>

Attribution: Richard Old, United States Department of Agriculture Forest Service, [www.bugwood.org](http://www.bugwood.org)

Caption: Jungle-rice plants.

Source: <http://www.hear.org/starr/images/image/?q=040217-0043&o=plants>

Attribution: Forest Starr and Kim Starr.

## *Echium plantagineum* – Paterson's Curse

Caption: Paterson's curse seeds.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Paterson's curse plant.

Source: [http://www.oregon.gov/ODA/PLANT/WEEDS/pr/ofile\\_pcurse.shtml](http://www.oregon.gov/ODA/PLANT/WEEDS/pr/ofile_pcurse.shtml)

Attribution: Tim Butler, Oregon Department of Agriculture.

Caption: Paterson's curse flower, showing two exerted stamens.

Attribution: Ken Allison, Canadian Food Inspection Agency.

Caption: Paterson's curse rosette, with broadly ovate leaves.

Source: [http://www.oregon.gov/ODA/PLANT/WEEDS/pr/ofile\\_pcurse.shtml](http://www.oregon.gov/ODA/PLANT/WEEDS/pr/ofile_pcurse.shtml)

Attribution: Tim Butler, Oregon Department of Agriculture.

Caption: Blueweed flower, showing four exerted stamens.

Attribution: Ken Allison, Canadian Food Inspection Agency.

Caption: Blueweed rosette, with narrow linear leaves.

Source: [http://www.co.stevens.wa.us/weedboard/htm\\_weed/bw.htm](http://www.co.stevens.wa.us/weedboard/htm_weed/bw.htm)

Attribution: Stevens County Noxious Weed Control Board.

## *Eriochloa villosa* – Woolly Cupgrass

Caption: Woolly cupgrass plants in a field.

Attribution: Mylène Bourgeois, Canadian Food Inspection Agency.

Caption: Woolly cupgrass ligule.

Source: <http://www.mapaq.gouv.qc.ca/dgpar/arico/herbierv/erbvi/F-erio/factsheetx.htm>

Attribution: Romain Néron, Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec.

Caption: Woolly cupgrass panicle.

Source: <http://www.mapaq.gouv.qc.ca/dgpar/arico/herbierv/erbvi/F-erio/factsheetx.htm>

Attribution: Romain Néron, Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec.

Caption: Woolly cupgrass plants.

Source: <http://www.mapaq.gouv.qc.ca/dgpar/arico/herbierv/erbvi/F-erio/factsheetx.htm>

Attribution: Romain Néron, Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec.

Caption: Woolly cupgrass spikelets.

Source: <http://www.mapaq.gouv.qc.ca/dgpar/arico/herbierv/erbvi/F-erio/factsheetx.htm>

Attribution: Romain Néron, Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec.

Caption: Woolly cupgrass seedling.

Source: <http://www.mapaq.gouv.qc.ca/dgpar/arico/herbierv/erbvi/F-erio/factsheetx.htm>

Attribution: Romain Néron, Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec.

Caption: Woolly cupgrass seeds.

Source: <http://www.mapaq.gouv.qc.ca/dgpar/arico/herbierv/erbvi/F-erio/factsheetx.htm>

Attribution: Romain Néron, Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec.

## *Galega officinalis* – Goat's-rue

Caption: Goat's-rue seeds.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Goat's-rue plant.

Source: <http://www.invasive.org/browse/detail.cfm?imgnum=1459193>

Attribution: Steve Dewey, Utah State University, [www.bugwood.org](http://www.bugwood.org)

Caption: Goat's-rue flowers.

Source: <http://www.insectimages.org/browse/detail.cfm?imgnum=1148056>

Attribution: United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, [www.bugwood.org](http://www.bugwood.org)

Caption: Goat's-rue plant with roots.

Source: <http://www.invasive.org/browse/detail.cfm?imgnum=1459190>

Attribution: Steve Dewey, Utah State University, [www.bugwood.org](http://www.bugwood.org)

Caption: Goat's-rue seed pods.

Source: <http://www.insectimages.org/browse/detail.cfm?imgnum=5376457>

Attribution: Julia Scher, United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, [www.bugwood.org](http://www.bugwood.org)

Caption: Crown vetch flowers.

Source: <http://www.invasive.org/browse/detail.cfm?imgnum=1211042>

Attribution: Dave Powell, United States Department of Agriculture Forest Service, [www.bugwood.org](http://www.bugwood.org)

Caption: Wild licorice seed pods.

Source: <http://www.suu.edu/faculty/martin/licorice/licorice.html>

Attribution: Ronald Martin.

## *Microstegium vimineum* – Japanese Stiltgrass

Caption: Japanese stiltgrass seeds.

Source: [http://plants.usda.gov/java/profile?symbol=MIVI&photoID=mivi\\_002\\_ahp.tif](http://plants.usda.gov/java/profile?symbol=MIVI&photoID=mivi_002_ahp.tif)

Attribution: Steve Hurst.

Caption: Japanese stiltgrass inflorescence.

Source: <http://flowers.la.coocan.jp/Poaceae/Microstegium%20vimineum.htm>

Attribution: Takato Natsui, [flowers.la.coocan.jp](http://flowers.la.coocan.jp).

Caption: Japanese stiltgrass leaves.

Source: <http://www.invasive.org/species/subject.cfm?sub=3051>

Attribution: David J. Moorhead.

Caption: Japanese stiltgrass foliage.

Source: <http://www.invasive.org/species/subject.cfm?sub=3051>

Attribution: Chuck Bargeron.

Caption: Forest infestation of Japanese stiltgrass.

Source: <http://extension.entm.purdue.edu/caps/pestInfo/japStiltGrass.htm>

Attribution: Chris Evans.

Caption: White cutgrass, a Japanese stiltgrass look-alike.

Source: [http://www.illinoiswildflowers.info/grasses/plants/white\\_grass.htm](http://www.illinoiswildflowers.info/grasses/plants/white_grass.htm)

Attribution: John Hilty.

## *Milium vernale* – Spring Milletgrass

Caption: Spring milletgrass seeds.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Spring milletgrass plant.

Attribution: T. Prather, S. Robins, and D. Morishita. 2010. Idaho's Noxious Weeds, 5th ed. Bulletin 816. University of Idaho Extension, Moscow. Idaho.

Caption: Wood milletgrass (left) and spring milletgrass (right) illustration.

Source: <http://herbarium.usu.edu/webmanual/default.htm>

Attribution: Utah State University (illustrators Linda A. Vorobik and Hana Pazdírková).

Caption: Spring milletgrass specimens.

Source: [http://herbarivirtual.uib.es/cat-med/imatges\\_esp/ecie/6762\\_131862.html](http://herbarivirtual.uib.es/cat-med/imatges_esp/ecie/6762_131862.html)

Attribution: Universitat de València, HerbarioVirtual del Mediterraneo Occidental.

## *Nassella trichotoma* – Serrated Tussock

Caption: Serrated tussock spikelets.

Source: <http://www.forestryimages.org/browse/detail.cfm?imgnum=5376564>

Attribution: Julia Scher, United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, [www.bugwood.org](http://www.bugwood.org)

Caption: Serrated tussock seedlings.

Source: <http://www.insectimages.org/browse/AutThumb.cfm?aut=4507&cat=50>

Attribution: United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, [www.bugwood.org](http://www.bugwood.org)

Caption: Serrated tussock plant.

Source: <http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/serrated-tussock/serrated-tussock-image-gallery>

Attribution: Birgitte Verbeek, Industry & Investment NSW (I&I NSW).

Caption: Serrated tussock inflorescence.

Source: <http://thebegavalley.org.au/plants.html>

Attribution: Jackie Miles and Max Campbell.

Caption: Serrated tussock seed.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Uruguayan ricegrass seed.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

## *Paspalum dilatatum* – Dallis Grass

Caption: Dallis grass panicles.

Source: [http://calphotos.berkeley.edu/cgi/img\\_query?enlarge=0000+0000+0509+1996](http://calphotos.berkeley.edu/cgi/img_query?enlarge=0000+0000+0509+1996)

Attribution: Barry Rice.

Caption: Dallis grass seedling.

Source: <http://www.forestryimages.org/browse/detail.cfm?imgnum=5387510>

Attribution: Joseph M. DiTomaso, University of California, Davis.

Caption: Dallis grass spikelets.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Dallis grass plants.

Source: [http://www.tropicalforages.info/key/Forages/Media/Html/Paspalum\\_dilatatum.htm](http://www.tropicalforages.info/key/Forages/Media/Html/Paspalum_dilatatum.htm)

Attribution: Byron Burson, United States Department of Agriculture.

Caption: Dallis grass spikelets on a spike.

Source: <http://www.forestryimages.org/browse/detail.cfm?imgnum=5391707>

Attribution: Barry Rice.

Caption: Dallis grass ligule.

Source: [http://www.ppws.vt.edu/scott/weed\\_id/pasdi.htm](http://www.ppws.vt.edu/scott/weed_id/pasdi.htm)

Attribution: Virginia Tech Weed Identification Guide.

Caption: Thin paspalum spikelets.

Source: <http://www.kswildflower.org/largePhotos.php?imageID=888&Category=g&lastModified=2007-09-18>

Attribution: Mike Haddock, Kansas Wildflowers and Grasses.

## *Peganum harmala* – African-rue

Caption: African-rue plant.

Source: [http://www.oregon.gov/ODA/PLANT/WEEDS/profile\\_africanrue.shtml](http://www.oregon.gov/ODA/PLANT/WEEDS/profile_africanrue.shtml)

Attribution: Bonnie Rasmussen, Oregon Department of Agriculture.

Caption: African-rue flowers.

Source: [http://plants.usda.gov/java/profile?symbol=PEHA&photoID=peha\\_2h.jpg](http://plants.usda.gov/java/profile?symbol=PEHA&photoID=peha_2h.jpg)

Attribution: W.L. Wagner, courtesy of Smithsonian Institution.

Caption: African-rue flower.

Source: [http://plants.usda.gov/java/profile?symbol=PEHA&photoID=peha\\_001\\_ahp.tif](http://plants.usda.gov/java/profile?symbol=PEHA&photoID=peha_001_ahp.tif)

Attribution: W.L. Wagner, courtesy of Smithsonian Institution.

Caption: African-rue capsule.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: African-rue seed.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: *Matricaria chamomilla* flowers.

Source: [http://en.wikipedia.org/wiki/File:Matricaria\\_February\\_2008-1.jpg](http://en.wikipedia.org/wiki/File:Matricaria_February_2008-1.jpg)

Attribution: Joaquim Alves Gaspar.

## *Persicaria perfoliata* – Devil's-tail Tearthumb

Caption: Devil's-tail tearthumb ocrea surrounding the stem.  
Source: <http://www.hort.uconn.edu/mam/speciesID.html>  
Attribution: Leslie J. Mehrhoff, University of Connecticut, [www.bugwood.org](http://www.bugwood.org)

Caption: Devil's-tail tearthumb fruits and recurved barbs.  
Source: <http://www.hort.uconn.edu/mam/speciesID.html>  
Attribution: Todd Mervosh, Connecticut Agricultural Experiment Station.

Caption: Devil's-tail tearthumb leaf.  
Source: <http://www.hort.uconn.edu/mam/speciesID.html>  
Attribution: Todd Mervosh, Connecticut Agricultural Experiment Station.

Caption: Devil's-tail tearthumb plants.  
Source: <http://www.invasive.org/browse/detail.cfm?imgnum=5273094>

Attribution: Leslie J. Mehrhoff, University of Connecticut, [www.bugwood.org](http://www.bugwood.org)

Caption: Devil's-tail tearthumb seeds.  
Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Fringed wild buckwheat leaf.  
Source: [http://calphotos.berkeley.edu/cgi/img\\_query?enlarge=0000+0000+0107+1373](http://calphotos.berkeley.edu/cgi/img_query?enlarge=0000+0000+0107+1373)  
Attribution: Louis-M Landry.

Caption: Halberdleaf tearthumb leaves.  
Source: [http://commons.wikimedia.org/wiki/File:Polygonum\\_arifolium\\_001.JPG](http://commons.wikimedia.org/wiki/File:Polygonum_arifolium_001.JPG)  
Attribution: SB Johnny.

## *Pueraria montana* – Kudzu

Caption: Kudzu leaf.  
Source: <http://www.invasive.org/browse/detail.cfm?imgnum=2307161>  
Attribution: James H. Miller, United States Department of Agriculture Forest Service, [www.bugwood.org](http://www.bugwood.org)

Caption: Kudzu plants in flower.  
Source: <http://www.invasive.org/browse/detail.cfm?imgnum=5160025>  
Attribution: Forest Starr and Kim Starr, Starr Environmental, [www.bugwood.org](http://www.bugwood.org)

Caption: Kudzu seed pods.  
Source: <http://www.invasive.org/browse/detail.cfm?imgnum=2307165>  
Attribution: James H. Miller, United States Department of Agriculture Forest Service, [www.bugwood.org](http://www.bugwood.org)

Caption: Kudzu seeds.  
Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Kudzu stem showing leafy stipules at base of leaf stalk.  
Source: <http://bioimages.vanderbilt.edu/>  
Attribution: Steve Baskauf.

Caption: Kudzu seedling.  
Attribution: Stephen Darbyshire, Agriculture and Agri-Food Canada.

Caption: Kudzu inflorescence.  
Attribution: Sam Brinker, Ontario Ministry of Natural Resources.

## *Senecio inaequidens* – South African Ragwort

Caption: South African ragwort plants.  
Source: [http://en.wikipedia.org/wiki/File:Senecio\\_inaequidens\\_1.jpg](http://en.wikipedia.org/wiki/File:Senecio_inaequidens_1.jpg)  
Attribution: Pieter Pelsler.

Caption: South African ragwort flowers.  
Source: <http://www.korseby.net/outer/flora/rosopsida/asteraceae/index.html>  
Attribution: Kristian Peters.

Caption: Mature seed head of South African ragwort.  
Source: <http://www.korseby.net/outer/flora/rosopsida/asteraceae/index.html>  
Attribution: Kristian Peters.

Caption: Balsam groundsel flowers.  
Attribution: Ken Allison, Canadian Food Inspection Agency.

Caption: South African ragwort foliage.  
Source: <http://sophy.u-3mrs.fr/photohtm/SI32785.htm>  
Attribution: SOPHY (Informatics and ecological database).

Caption: South African ragwort seed.  
Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Common groundsel seed.  
Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

## *Senecio madagascariensis* – Madagascar Ragwort

Caption: Madagascar ragwort seedling.  
Source: [http://www.rbgsyd.nsw.gov.au/science/Evolutionary\\_Ecology\\_Research/Ecology\\_of\\_Cumberland\\_Plain\\_Woodland/woodland\\_ecology/life\\_cycle\\_stages/seedling\\_picture\\_gallery/](http://www.rbgsyd.nsw.gov.au/science/Evolutionary_Ecology_Research/Ecology_of_Cumberland_Plain_Woodland/woodland_ecology/life_cycle_stages/seedling_picture_gallery/)  
Attribution: Royal Botanic Garden Sydney (Australia).

Caption: Madagascar ragwort flower and variable leaves.  
Source: [http://www.iewf.org/weedid/Senecio\\_madagascariensis.htm](http://www.iewf.org/weedid/Senecio_madagascariensis.htm)  
Attribution: International Environmental Weed Foundation.

Caption: Madagascar ragwort flowers.  
Source: <http://www.hear.org/starr/plants/images/image/?q=090521-8258>  
Attribution: Forest Starr and Kim Starr.

Caption: Madagascar ragwort invading field.  
Source: <http://www.hear.org/starr/plants/images/image/?q=040723-0532>  
Attribution: Forest Starr and Kim Starr.

Caption: Madagascar ragwort plants.  
Source: <http://www.hear.org/starr/images/image/?q=061223-2755&o=plants>  
Attribution: Forest Starr and Kim Starr.

Caption: Common groundsel seed.  
Attribution: National Seed Herbarium, Canadian Food Inspection Agency.



.....

## ***Solanum elaeagnifolium*** – Silverleaf Nightshade

Caption: Silverleaf nightshade plants.

Source: [http://www.wnmu.edu/academic/nspages2/gilaflo/solanum\\_elaeagnifolium.html](http://www.wnmu.edu/academic/nspages2/gilaflo/solanum_elaeagnifolium.html)

Attribution: Western New Mexico University Department of Natural Sciences and the Dale A. Zimmerman Herbarium.

Caption: Silverleaf nightshade flower.

Source: [http://en.wikipedia.org/wiki/File:Solanum\\_elaeagnifolium.jpg](http://en.wikipedia.org/wiki/File:Solanum_elaeagnifolium.jpg)

Attribution: P. Schemp.

Caption: Silverleaf nightshade flowers.

Source: [http://calphotos.berkeley.edu/cgi/img\\_query?query\\_src=photos\\_index&seq\\_num=172147&one=T](http://calphotos.berkeley.edu/cgi/img_query?query_src=photos_index&seq_num=172147&one=T)

Attribution: Robert Sivinski.

Caption: Silverleaf nightshade fruit.

Source: [http://www.wildflower.org/plants/result.php?id\\_plant=SOEL](http://www.wildflower.org/plants/result.php?id_plant=SOEL)

Attribution: Melody Lytle.

Caption: Silverleaf nightshade seeds.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Silverleaf nightshade fruit.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Silverleaf nightshade leaves.

Source: <http://www.invasive.org/browse/detail.cfm?imgnum=1391375>

Attribution: John D. Byrd, Mississippi State University.

.....

## ***Zygophyllum fabago*** – Syrian Bean-caper

Caption: Syrian bean-caper flowers and leaves.

Source: [http://www.flickr.com/photos/\\_mm\\_/896078531/](http://www.flickr.com/photos/_mm_/896078531/)

Attribution: Manuel M. Ramos.

Caption: Syrian bean-caper plant.

Source: [http://calphotos.berkeley.edu/cgi/img\\_query?enlarge=0177+3303+3353+0015](http://calphotos.berkeley.edu/cgi/img_query?enlarge=0177+3303+3353+0015)

Attribution: California Department of Food and Agriculture Archive.

Caption: Syrian bean-caper seeds.

Attribution: National Seed Herbarium, Canadian Food Inspection Agency.

Caption: Syrian bean-caper flower.

Source: [http://www.plantsystematics.org/imgs/jdelaet/r/Zygophyllaceae\\_Zygophyllum\\_fabago\\_31933.html](http://www.plantsystematics.org/imgs/jdelaet/r/Zygophyllaceae_Zygophyllum_fabago_31933.html)

Attribution: Jan De Laet.

Caption: Syrian bean-caper leaves and capsules.

Source: [http://www.plantsystematics.org/imgs/jdelaet/r/Zygophyllaceae\\_Zygophyllum\\_fabago\\_31934.html](http://www.plantsystematics.org/imgs/jdelaet/r/Zygophyllaceae_Zygophyllum_fabago_31934.html)

Attribution: Jan De Laet.

Caption: Syrian bean-caper infestation.

Source: [http://www.plantsystematics.org/imgs/jdelaet/r/Zygophyllaceae\\_Zygophyllum\\_fabago\\_31936.html](http://www.plantsystematics.org/imgs/jdelaet/r/Zygophyllaceae_Zygophyllum_fabago_31936.html)

Attribution: Jan De Laet.

# References

## *Aegilops cylindrica* – Jointed Goatgrass

Barkworth, M.E., 2006. Manual of Grasses for North America. Online manual. [ <http://www.herbarium.usu.edu/grassmanual/> ]

Darbyshire, S., 2006. Research Scientist, Agriculture and Agri-Food Canada, personal communication.

Donald, W.W. and A.G. Ogg, 1991. Biology and Control of Jointed Goatgrass (*Aegilops cylindrica*) A Review. Weed Technology 5: 3–7.

Hitchcock, A.S., 1950. Manual of the Grasses of the United States. 2nd ed. Dover Publications, New York, New York.

Lyon, D.J., R.N. Klein and G.A. Wicks, 1995–2002. Controlling Jointed Goatgrass. NebGuide– University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources. Lincoln, Nebraska, USA. Online publication. [ <http://www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=87> ]

National Jointed Goatgrass Research Program (NJGR), 2006. [ <http://www.jointedgoatgrass.org/> ]

Tutin, T.G., V.H. Heywood, N.A. Burges, D.M. Moore, D.H. Valentine, S.M. Walters and D.A. Webb (eds.), 1980. Flora Europaea. Vol. 5. Alismataceae to Orchidaceae (Monocotyledons). Cambridge University Press, Cambridge, United Kingdom.

Wicks, G., R. Anderson, T. White, P. Stahlman and D. Morishita, 2004. Jointed Goatgrass Control Tactics. Online publication. [ <http://jointedgoatgrass.wsu.edu/jointedgoatgrass/bulletins/index.htm> ]

## *Alopecurus myosuroides* – Slender Foxtail

Barkworth, M.E., 2006. Manual of Grasses for North America. Online manual. [ <http://www.herbarium.usu.edu/grassmanual/> ]

CAB International, 2007. Crop Protection Compendium. Online database. [ <http://www.cabi.org/cpc/> ]

Colbach, N. and I. Sache, 2001. Blackgrass (*Alopecurus myosuroides* Huds.) seed dispersal from a single plant and its consequences on weed infestation. Ecological Modelling 139(2–3): 201–219.

## *Alternanthera sessilis* – Sessile Joyweed

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [ <http://www.cabi.org/cpc/> ]

Canadian Food Inspection Agency (CFIA), 2008. Plants of Canada Database. Canadian Food Inspection Agency, Ottawa, Ontario.

Datta, S.C. and K.K. Biswas, 1979. Autecological studies on weeds of West Bengal India 8. *Alternanthera sessilis*. Bulletin of the Botanical Society of Bengal 33(1–2): 5–26.

Flora of North America Editorial Committee (ed.), 1993+. Flora of North America North of Mexico, New York and Oxford.

Holm, L., J. Doll, E. Holm, J. Pancho and J. Herberger, 1997. World Weeds: Natural Histories and Distribution. John Wiley & Sons, Inc., New York, New York.

Isaacson, R.T., and K. Allen, 2007. Plant Information Online. University of Minnesota Libraries. Online database. [ <https://plantinfo.umn.edu/> ]

Jansen, P.C.M., 2004. *Alternanthera sessilis* (L.) DC. [Internet] Record from Protbase. [ <http://database.prota.org/search.htm> ]

Maki, K., and S. Galatowitsch, 2004. Movement of invasive aquatic plants into Minnesota (USA) through horticultural trade. Biological Conservation 118(3): 389–396.

Scoggan, H.J., 1979. Flora of Canada. National Museums of Canada, Ottawa.

United States Department of Agriculture, Agricultural Research Service (USDA–ARS), 2010. Germplasm Resources Information Network–(GRIN). Online database. [ [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl) ]

United States Department of Agriculture, Natural Resources Conservation Service (USDA–NRCS), 2010. The PLANTS Database. Online database. [ <http://plants.usda.gov> ]

## *Bothriochloa ischaemum* – Yellow Bluestem

Cook, B.G., B.C. Pengelly, S.D. Brown, J.L. Donnelly, D.A. Eagles, M.A. Franco, J. Hanson, B.F. Mullen, L.J. Partridge, M. Peters and R. Schultze-Kraft, 2005. Tropical Forages: an interactive selection tool. CSIRO, DPI&F (Qld), CIAT and ILRI, Brisbane, Australia. [ <http://www.tropicalforages.info/> ]

eFloras.org, 2009. Missouri Botanical Garden, St. Louis, MO and Harvard University Herbaria, Cambridge, MA. [ <http://www.efloras.org> ]

Flora of North America Editorial Committee (ed.), 1993+. Flora of North America North of Mexico, New York and Oxford.

Harms, B., undated. *Bothriochloa ischaemum* var. *songarica* – King Ranch Bluestem Morphological Characteristics. University of Texas at Austin. [ <http://www.biosci.utexas.edu/prc/DigFlora/KR/BOISS-mo.rph.html> ]

## *Centaurea iberica* – Iberian Starthistle

Abrams, L. and R.S. Ferris, 1961. Illustrated Flora of the Pacific States, Washington, Oregon, and California. Stanford University Press. 4 vol.

Canadian Food Inspection Agency (CFIA), 2008. Plants of Canada Database. Canadian Food Inspection Agency, Ottawa, Ontario.

Flora of North America Editorial Committee (ed.), 1993+. Flora of North America North of Mexico, New York and Oxford.

Graham, J. and W.S. Johnson, 2003. Managing Purple and Iberian Starthistles. [ <http://www.unce.unr.edu/publications/files/nr/2003/FS0346.pdf> ]

Scoggan, H.J., 1979. Flora of Canada. National Museums of Canada, Ottawa, Ontario.

United States Department of Agriculture, Agricultural Research Service (USDA–ARS), 2009. Germplasm Resources Information Network–(GRIN) Online database. [ [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl) ]

Uygur, S., 2001. Importance and Distribution of *Centaurea* Species in Turkey. In: The First International Knapweed Symposium of the Twenty-First Century. Edited by L. Smith. United States Department of Agriculture, Agricultural Research Service, Coeur d'Alene, Idaho.

## *Centaurea solstitialis* – Yellow Starthistle

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [ <http://www.cabi.org/cpc/> ]

Douglas, G. W., G. B. Straley, et al., Eds. (1998). Illustrated Flora of British Columbia. Volume 1. Gymnosperms and Dicotyledons (Aceraceae through Asteraceae), Province of British Columbia.

Scoggan, H.J., 1979. Flora of Canada. National Museums of Canada, Ottawa, Ontario.

Uygur, S., 2001. Importance and Distribution of *Centaurea* Species in Turkey. In: The First International Knapweed Symposium of the Twenty-First Century. Edited by L. Smith. United States Department of Agriculture, Agricultural Research Service, Coeur d'Alene, Idaho.

Zouhar, K., 2002. *Centaurea solstitialis*. In: Fire Effects Information System. [ <http://www.fs.fed.us/database/feis/> ]

## *Crupina vulgaris* – Common Crupina

Miller, T. and D.C. Thill, 1983. Today's weed: common crupina. Weeds Today 14(3): 10–11.

Province of British Columbia, 2002. A Guide to Weeds in BC. Common Crupina. Online Description. [[http://www.weedsbc.ca/weed\\_desc/com\\_crup.html](http://www.weedsbc.ca/weed_desc/com_crup.html)]

Thill, D.C., C.T. Roché and D.L. Zamora, 1999. Common Crupina. In: Weeds and Management of Noxious Rangeland Weeds. R.L. Sheley and J.K. Petroff (eds.), Oregon State University Press, Corvallis, Oregon.

Whitson, T.D., L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee and R. Parker, 1992. Weeds of the West. Western Society of Weed Science; Newark, California.

Zamora D.L., 1988. The reproductive biology and seed longevity of *Crupina vulgaris* as it pertains to an eradication strategy for plant invasions. PhD Dissertation. University of Idaho, Moscow, Idaho.

## *Echinochloa colona* – Jungle-rice

Barkworth, M.E., 2006. Manual of Grasses for North America. Online manual. [<http://www.herbarium.usu.edu/grassmanual/>]

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [<http://www.cabi.org/cpc/>]

Clayton, W.D., K.T. Harman and H. Williamson, 2006+. GrassBase—The Online World Grass Flora. [<http://www.kew.org/data/grasses-db.html>]

Galinato, M.I., K. Moody and C.M. Pigginn, 1999. Upland Rice Weeds of South and Southeast Asia. International Rice Research Institute, Makati City, Philippines.

Holm, L.G., D.L. Plucknett, J.V. Pancho and J.P. Herberger, 1977. The World's Worst Weeds. The University Press of Hawaii, Honolulu, Hawaii.

## *Echium plantagineum* – Paterson's Curse

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [<http://www.cabi.org/cpc/>]

Canadian Food Inspection Agency (CFIA), 2008. Plants of Canada Database. Canadian Food Inspection Agency, Ottawa, Ontario.

Darbyshire, S.J., 2003. Inventory of Canadian Agricultural Weeds. Agriculture and Agri-Food Canada, Research Branch, Ottawa, Ontario.

Morley, T. and I. Faithfull, 2004. Landcare Notes. Paterson's curse—identification. State of Victoria, Department of Primary Industries.

Oregon Department of Agriculture, 2008. ODA Plant Division, Noxious Weed Control. Paterson's Curse. [[http://www.oregon.gov/ODA/PLANT/WEEDS/profile\\_pcurse.shtml](http://www.oregon.gov/ODA/PLANT/WEEDS/profile_pcurse.shtml)]

Parsons, W.T. and E.G. Cuthbertson, 1992. Noxious Weeds of Australia. Inkata Press, Melbourne and Sydney, Australia.

Pigginn, C.M., 1982. The biology of Australian weeds. 8. *Echium plantagineum* L. Journal of the Australian Institute of Agricultural Science 48(1): 3–16.

Weber, E., 2003. Invasive plant species of the world: A reference guide to environmental weeds. CABI Publishing, Wallingford, United Kingdom.

## *Eriochloa villosa* – Woolly Cupgrass

Barkworth, M.E., 2006. Manual of Grasses for North America. Online manual. [<http://www.herbarium.usu.edu/grassmanual/>]

Darbyshire, S.J., C.E. Wilson and K. Allison, 2003. The biology of invasive alien plants in Canada. 1. *Eriochloa villosa* (Thun b.) Kunth. Canadian Journal of Plant Science 83: 987–999.

## *Galega officinalis* – Goat's-rue

Clapham, A.R., T.G. Tutin and E.F. Warburg, 1962. Flora of the British Isles. Cambridge University Press, Cambridge.

Darbyshire, S.J. and C. Hanrahan, 2000. Goat's Rue, *Galega officinalis*, in the Ottawa district. Trail and Landscape 34(3): 106–109.

Klugh, K., 1998. Goat's-rue, *Galega officinalis*, in Pennsylvania, Weed Circular No. 22. Edited by Pennsylvania Department of Agriculture, Bureau of Plant Industry, Philadelphia. [[http://www.invasive.org/eastern/other/vol24\\_10.pdf](http://www.invasive.org/eastern/other/vol24_10.pdf)]

Oldham, M., 2009. Goatsrue (*Galega officinalis*) Seed Biology, Control and Toxicity. M.Sc. Thesis, Utah State University, Logan, Utah.

Reddoch, J.M. and A.H. Reddoch, 2000. A third colony of goat's rue in the Ottawa district. Trail and Landscape 34(4): 148.

## *Microstegium vimineum* – Japanese stiltgrass

Canadian Food Inspection Agency (CFIA), 2008. Plants of Canada Database. Canadian Food Inspection Agency, Ottawa, Ontario.

Flora of North America Editorial Committee (ed.), 1993+. Flora of North America North of Mexico, New York and Oxford.

Global Invasive Species Database, 2011. Invasive Species Specialist Group [<http://www.issg.org/database/welcome/>]

United States Department of Agriculture, Agricultural Research Service (USDA–ARS), 2011. Germplasm Resources Information Network— (GRIN) Online database. [[http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl)]

United States Department of Agriculture, Natural Resources Conservation Service (USDA–NRCS), 2011. The PLANTS Database. Online database. [<http://plants.usda.gov>]

Weber, E., 2003. Invasive plant species of the world: A reference guide to environmental weeds. CABI Publishing, Wallingford, United Kingdom.

## *Milium vernale* – Spring Milletgrass

Barkworth, M.E., 2006. Manual of Grasses for North America. Online manual. [<http://www.herbarium.usu.edu/grassmanual/>]

Pankhurst, R., 1998. Flora Europaea. Royal Botanic Garden Edinburgh. Online database. [<http://rbg-web2.rbge.org.uk/FE/fe.html>]

Prather, T., S. Robins and D. Morishita, 2008. Idaho's Noxious Weeds. University of Idaho Extension, Moscow, Idaho.

Tutin, T.G., V.H. Heywood, N.A. Burges, D.M. Moore, D.H. Valentine, S.M. Walters and D.A. Webb (eds), 1980. Flora Europaea; Vol. 5 Alismataceae to Orchidaceae (Monocotyledones). Cambridge University Press, Cambridge, UK.

## *Nassella trichotoma* – Serrated Tussock

Allison, K., 1995. Identification of seeds of serrated tussock *Nassella trichotoma* (Nees) Hackel. Seed Science and Technology 23: 697–703.

Barkworth, M.E., 2006. Manual of Grasses for North America. Online manual. [<http://www.herbarium.usu.edu/grassmanual/>]

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [<http://www.cabi.org/cpc/>]

Campbell, M.H., 1982. The biology of Australian weeds. 9. *Nassella trichotoma* (Nees) Arceh. Journal of the Australian Institute of Agricultural Science 48(2): 76–84.

Campbell, M.H., 1985. Serrated tussock identification and life history. Agfact P7.6.29, Department of Agriculture, New South Wales, Australia.

Caro, J., 1966. Las especies de Stipa (Gramineae) de la región central Argentina. Kurtziana 3: 7–119.

Kartesz, J.T., 1999. A Synonymized Checklist and Atlas with Biological Attributes for the Vascular Flora of the United States, Canada, and Greenland. First Edition. In: Kartesz, J.T., and C.A. Meacham. Synthesis of the North American Flora, Version 1.0. North Carolina Botanical Garden, Chapel Hill, North Carolina.

Parsons, W.T. and E.G. Cuthbertson, 1992. Noxious Weeds of Australia. Inkata Press, Melbourne and Sydney, Australia.

United States Department of Agriculture, Agricultural Research Service (USDA–ARS), 2011. Germplasm Resources Information Network—(GRIN) Online database. [ [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl) ]

United States Department of Agriculture, Natural Resources Conservation Service (USDA–NRCS), 2011. The PLANTS Database. Online database. [ <http://plants.usda.gov> ]

Wells, M. J. and H. de Beer, 1987. Nassella tussock, Weeds A.21. Department of Agriculture and Water Supply, Pretoria, South Africa.

### *Paspalum dilatatum* – Dallis Grass

Barkworth, M.E., 2006. Manual of Grasses for North America. Online manual. [ <http://www.herbarium.usu.edu/grassmanual/> ]

Burton, G.W., 1942. Observations on the Flowering Habits of Four *Paspalum* Species. American Journal of Botany 29(10): 843–848.

Clayton, W.D., K. T. Harman and H. Williamson, 2006+. GrassBase—The Online World Grass Flora. [ <http://www.kew.org/data/grasses-db.html> ]

Holm, L.G., D.L. Plucknett, J.V. Pancho and J.P. Herberger, 1977. The World's Worst Weeds. The University Press of Hawaii, Honolulu, Hawaii.

United States Department of Agriculture, Agricultural Research Service (USDA–ARS), 2011. Germplasm Resources Information Network—(GRIN) Online database. [ [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl) ]

Virginia Tech Weed Identification Guide, undated. Dallisgrass: *Paspalum dilatatum*. [ [http://www.ppws.vt.edu/scott/weed\\_id/pasdi.htm](http://www.ppws.vt.edu/scott/weed_id/pasdi.htm) ]

### *Peganum harmala* – African rue

Abbott, L.B., D. Lepar and D.L. Daniel, 2007. Vegetative and reproductive phenology of African rue (*Peganum harmala*) in the northern Chihuahuan Desert. The Southwestern Naturalist 52(2): 209–218.

Flora of North America Editorial Committee (ed.), 1993+. Flora of North America North of Mexico, New York and Oxford.

Guclu, C. and H. Ozbek, 2007. African Rue Projects. [ <http://epwps.nmsu.edu/african-rue-projects.html> ]

Pankhurst, R., 1998. Flora Europaea. Royal Botanic Garden Edinburgh. Online database. [ <http://rbg-web2.rbge.org.uk/FE/fe.html> ]

Parsons, W.T. and E.G. Cuthbertson, 1992. Noxious Weeds of Australia. Inkata Press, Melbourne and Sydney, Australia.

Rice, P., 1997–2008. Invaders Database System. [ <http://invader.dbs.umt.edu/> ]

United States Department of Agriculture, Natural Resources Conservation Service (USDA–NRCS), 2011. The PLANTS Database. Online database. [ <http://plants.usda.gov> ]

Zhirong, W. (ed.), 1991. Farmland Weeds in China: A collection of coloured illustrated plates. Thomson Publications.

### *Persicaria perfoliata* – Devil's-tail Tearthumb

Center for Invasive Species and Ecosystem Health, 2009. University of Georgia. [ <http://www.invasive.org/species/subject.cfm?sub=3065> ]

Hinds, H.R. and C.C. Freeman, 1993+. *Persicaria* (Linnaeus) Miller. In: Flora of North America North of Mexico. Edited by Flora of North America Editorial Committee, New York and Oxford.

Massachusetts Department of Agricultural Resources and University of Massachusetts Extension, 2008. Mile-a-minute weed. [ <http://massnr.org/pests/pestFAQsheets/mileaminut.e.html> ]

Moul, E.T., 1948. A dangerous weedy *Polygonum* in Pennsylvania. Rhodora 50: 64–66.

University of Connecticut, 2010. Similar Species Guide. [ <http://www.hort.uconn.edu/mam/similarspecies.html> ]

United States Department of Agriculture, Natural Resources Conservation Service (USDA–NRCS), 2009. The PLANTS Database. Online database. [ <http://plants.usda.gov> ]

Weber, E., 2003. Invasive plant species of the world: A reference guide to environmental weeds. CAB Publishing, Wallingford, United Kingdom.

### *Pueraria montana* – Kudzu

B.C. Ministry of Agriculture and Lands, 2007. Kudzu (*Pueraria lobata* var. *montana*). Weed Alert, Pest Management. [ <http://www.agf.gov.bc.ca/cropprot/kudzu.htm> ]

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [ <http://www.cabi.org/cpc/> ]

Mitich, L.W., 2000. Kudzu [*Pueraria lobata* (Willd.) Ohwi]. Weed Technology 14: 231–235.

Uva, R.H., J.C. Neal and J.M. DiTomaso, 1997. Weeds of the Northeast. Cornell University Press, Ithaca, New York.

Virginia Tech Weed Identification Guide, undated. Kudzu: *Pueraria lobata*. [ [http://www.ppws.vt.edu/scott/weed\\_id/puelo.htm](http://www.ppws.vt.edu/scott/weed_id/puelo.htm) ]

Weber, E., 2003. Invasive plant species of the world: A reference guide to environmental weeds. CAB Publishing, Wallingford, United Kingdom.

Weed Society of Queensland, 2006. Kudzu. [ <http://www.wsq.org.au> ]

### *Senecio inaequidens* – South African Ragwort

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [ <http://www.cabi.org/cpc/> ]

European Plant Protection Organization (EPPO), 2006a. EPPO data sheet on Invasive Plants: *Senecio inaequidens* (draft doc 05-11836). [ [http://www.eppo.org/QUARANTINE/Pest\\_Risk\\_Analysis/PRA\\_documents.htm](http://www.eppo.org/QUARANTINE/Pest_Risk_Analysis/PRA_documents.htm) ]

European Plant Protection Organization (EPPO), 2006b. Pest Risk Analysis for *Senecio inaequidens* (Cav.) (PRA 06-12954). [ [http://www.eppo.org/QUARANTINE/Pest\\_Risk\\_Analysis/PRA\\_documents.htm](http://www.eppo.org/QUARANTINE/Pest_Risk_Analysis/PRA_documents.htm) ]

Global Invasive Species Database, 2011. Invasive Species Specialist Group. [ <http://www.issg.org/database/welcome/> ]

Heger, T. and H. J. Böhrer, 2006. NOBANIS—Invasive Alien Species Fact Sheet—*Senecio inaequidens*. Online database of the North European and Baltic Network on Invasive Alien Species. [ [www.nobanis.org](http://www.nobanis.org) ]

Radford, I.J., P. Muller, S. Fiffer and P. W. Michael, 2000. Genetic relationships between Australian fireweed and South African and Madagascar populations of *Senecio madagascariensis* Poir. and closely related *Senecio* species. Australian Systematic Botany 13(3): 409–423.



United States Department of Agriculture, Agricultural Research Service (USDA–ARS), 2011. Germplasm Resources Information Network—(GRIN) Online database. [ [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl) ]

.....  
***Senecio madagascariensis*** – Madagascar Ragwort

Bega Valley Fireweed Association, undated. Impact on the Bega Valley. [ <http://thebegavalley.org.au/15824.html> ].

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [ <http://www.cabi.org/cpc/> ]

Plant, R. and S. Robertson, 2007. Fireweed. *Senecio madagascariensis*. Victorian Alert Weed Fact Sheet. State of Victoria Department of Primary Industries. [ [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au) ]

United States Department of Agriculture, Agricultural Research Service (USDA–ARS), 2011. Germplasm Resources Information Network—(GRIN) Online database. [ [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl) ]

.....  
***Solanum elaeagnifolium*** – Silverleaf Nightshade

CAB International (CABI), 2007. Crop Protection Compendium. Online database. [ <http://www.cabi.org/cpc/> ]

European Plant Protection Organization (EPPO), 2007. Data sheets on quarantine pests. *Solanum elaeagnifolium*. EPPO Bulletin 37(2): 236–245.

Maiti, P.C. and R. Mathew, 1967. Rich sources of solasodine. Current Science 36(26).

Parsons, W.T. and E.G. Cuthbertson, 2001. Noxious Weeds of Australia, Second Edition. CSIRO Publishing, Collingwood and Victoria, Australia.

.....  
***Zygophyllum fabago*** – Syrian Bean-caper

Washington State Noxious Weed Control Board, 2007. Syrian bean-caper (*Zygophyllum fabago* L.). [ <http://www.nwcb.wa.gov/detail.asp?weed=140> ]

Davison, J. and M. Wargo, 2001. Syrian Beancaper: Another New Noxious Weed Threatens Nevada; Fact Sheet FS–01–46. Edited by Cooperative Extension. University of Nevada, Reno, Nevada. [ <http://www.unce.unr.edu/publications/files/nr/2001/FS0146.pdf> ]

Jafri, S.M.H., 1973. Flora of Pakistan. Edited by S.I. Ali and M. Qaiser. University of Karachi and Missouri Botanical Garden. [ <http://www.tropicos.org/Project/Pakistan> ]

Pankhurst, R., 1998. Flora Europaea. Royal Botanic Garden Edinburgh. Online database. [ <http://rbg-web2.rbge.org.uk/FE/fe.html> ]

United States Department of Agriculture, Agricultural Research Service (USDA–ARS), 2010. Germplasm Resources Information Network—(GRIN) Online database. [ [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl) ]





