

Mini data sheet on *Eriochloa villosa* (Poaceae)

Added in 2008 - Deleted in 2012

Reasons for deletion:

Eriochloa villosa was added to the EPPO Alert List in 2008 but as no immediate risk was perceived, it was transferred to the Observation List in 2012.

Why

Eriochloa villosa (Poaceae) is a tall grass originating from temperate Asia. It is an annual species, but in areas where mature plants are not killed by frost, it may behave as a facultative perennial. Its common name is woolly cupgrass. The plant has been reported to have been introduced as a seed contaminant, and has been discovered during the Fifth National Weed Survey on Arable Land in Hungary in 2007. Within the EPPO region, its distribution is still limited. The species has been present in the USA in Oregon since the 1940s where it was apparently introduced through ship's ballast. About that time, it was also reported as adventive in Colorado where it probably escaped from forage trials. It appeared in 2000 in Canada: seeds of *E. villosa* were detected in single lots of imported seed of Japanese millet (*Echinochloa crus-galli* var. *frumentacea*). A Pest Risk Analysis has been performed for Canada, concluding that the species represents a medium risk. Because this plant has shown invasive behaviour where it has been introduced elsewhere in the world and is still limited in the EPPO region, it can be considered as a potential emerging invader in Europe.

Geographical distribution

EPPO region: Hungary, Romania, eastern Russian Federation (native).

Asia (native): eastern China, Japan, Mongolia, Korea Democratic People's Republic, Korea Republic, Taiwan.

North America (invasive): Canada (Quebec), USA (Colorado, Illinois, Iowa, Kansas, Minnesota, Mississippi, Missouri, Nebraska, Oregon, Pennsylvania, Wisconsin).

Note: the species is present in 11 States, and is considered an agricultural weed only in Illinois, Iowa, Minnesota and Wisconsin. The species has been present in the USA since the 1940s, and appeared in 2000 in Canada.

The species is recorded in the North-East of France where it is casual. The species is also recorded in Ukraine, but whether it is established or not is unknown.

Morphology

E. villosa is a tall grass which can reach 2 m. Seedlings are relatively robust with wide leaves that are covered with very short (1 mm or less) hairs. Mature plants have simple leaves which are dark green, with very short hairs on both sides. They measure 50-200 mm in length and 3-13 mm in width. Leaves have rough margins, without auricles, and have a small ligule that is a fringe of hairs. Flowers are borne in terminal panicles, with few to many raceme-like branches. Each raceme bears many spikelets in two rows on the lower side. Seeds are oval-elliptic in shape, relatively large, measuring 4.5-5 mm in length and 2-3 mm in width.

Biology and ecology

Seeds are reported to germinate earlier than most other annual grass species. Germination can occur from depths of 5-10 cm. In Iowa, it typically begins to germinate in mid-April to early May and reaches about 90 % emergence within 3-4 weeks. There is a small percentage of further emergences throughout June and July. Growth is rapid, the plants produce stolons early in the season and the extensive branching of stems allow single plants to occupy and disperse seeds over a large area. Multinodal rooting of the plant confers resistance to mechanical control since cutting or breaking the main stem does not kill the flowering branches. In Illinois, densities of 207 plants per m² have been reported. Flowering phenology in Canada appears to be similar to that of the Midwestern USA, where flowering starts in mid-July to early August and continues until frost kills the plant. Sexual reproduction is autogamous. In Iowa, it was found that seeds sown in May without competition produced as much as 164 000 seeds per plant, whereas less than 3000 seeds were produced by plants sown in July. Scattering of mature seeds occurs in August and September. Experimental results show

emergence from seeds at the soil surface, and to a depth of 15 cm, though optimum emergence is between 1-10 cm. It has been found that when seeds are subjected to a period of moist, cool, winter-like conditions, they germinate more easily afterwards. It utilizes the C4 photosynthetic pathway, conferring it a competitive advantage over plants utilizing a C3 photosynthetic pathway. The geographical distribution of the species indicates that it is adapted to a wide variety of climatic conditions since it thrives in subtropical and temperate climates.

Habitats

In its native range, *E. villosa* is reported to occupy banks of continental water, riverbanks/canalsides (e.g. moist meadows), road and rail networks and associated land, other artificial surfaces (wastelands, around houses, open grassy places). It occurs also in arable lands (including rice) and permanent crops (e.g. plantations,) as a weed.

In Midwestern USA where it has been introduced, *E. villosa* is present in cultivated fields of maize and soybean of many States. It is well adapted to maize monoculture and maize-soybean rotations. It also invades habitats adjacent to cropped land, such as field edges, hedgerows, terraces and water courses. It also invades road and rail networks and associated land. The species is well adapted to agro-ecosystems in arable lands, and may be a problem additionally in horticultural systems. It might also be able to invade open natural habitats characterized by disturbances (e.g. shore lines), or early succession habitats (e.g. post-fire communities).

Pathways

Seeds will generally fall close to the parent plants. Over long distances, they can be spread as contaminants of vehicles, particularly on farm machinery and possibly on footwear. It is assumed that the species has been introduced voluntarily in the past for trials as forage, and involuntarily with ship ballast and as a seed contaminant. Because *E. villosa* has large seeds (3x5 mm) which are difficult to separate from those of maize and soybean, it is likely that this species can be introduced with such commodities from countries where it occurs (e.g. USA).

Impacts

E. villosa is very difficult to control and causes significant losses in field crops in the USA through competition and increases the cost of weed control. In 1990, it was estimated to infest 7-10% of row crop acreage in Iowa. It can host several species of fungi which are generalist pathogens of grasses (e.g. *Pyricularia* spp., *Thanatephorus cucumeris*, *Uromyces* spp.). In its native range, the species is reported to be a common and serious weed in rice.

Control

The control of *E. villosa* can be very difficult as it is very prolific and tolerant of many herbicides. *E. villosa* is less susceptible than many other annual grass weeds of soil-applied herbicides, and can also survive exposure to some foliar-applied herbicides. Herbicide control strategies recommended in the USA involve repeated application of pre-emergence herbicides, followed by one or more treatments with a post-emergence foliar product. These multiple applications result in treatment being more costly than treatment of other annual grass weeds. Current management strategies in the Midwest USA recommend sequential herbicide applications combined with sanitation, crop rotation and mechanical control. Sanitation is crucial since most infestations result from contaminated machinery. Crop rotation can assist greatly since *E. villosa* is very difficult to manage in continuous crop. Mechanical control may include rotary hoeing prior to seedling emergence or shallow cultivation when plants are small.

Sources

- Darbyshire SJ, Wilson CE, Allison K (2003) The biology of invasive alien plants in Canada. 1. *Eriochloa villosa* (Thunb.) Kunth. *Canadian Journal of Plant Science* 83, 987-999.
- Partosfalvi P, Madarász J, Dancza I (2008) Occurrence of *Eriochloa villosa* (Thunb.) Kunth in Hungary. *Növényvédelem* 44(6), 304.
- Wilson CE (2002) Weed Risk Assessment. Woolly cupgrass (*Eriochloa villosa* (Thunb.) Kunth). Canadian Food Inspection Agency. Plant Health Risk Assessment Unit. PHPD request: 2001-42. 33pp.