EPPO Datasheet: *Zizania latifolia*

Last updated: 2025-01-08

IDENTITY

Preferred name: *Zizania latifolia*
Authority: (Grisebach) Hance ex F. Mueller
Taxonomic position: Plantae: Magnoliophyta: Angiospermae: Commelinids: Poales: Poaceae: Ehrhartoideae
Other scientific names: *Hydropyrum latifolium* Grisebach, *Zizania aquatica var. latifolia* (Grisebach) Komarov, *Zizania caduciflora* Handel-Mazzetti, *Zizania mezii* Prodoehl
Common names: Manchurian wild rice
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EPPO Categorization: A2 list, List of Invasive Alien Plants (formerly)
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EPPO Code: ZIZLA



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GEOGRAPHICAL DISTRIBUTION

History of introduction and spread

Zizania latifolia is native to Eastern Siberia, and the Russian Far East (Afonin *et al.*, 2008; Komarov, 1934; Tzvelev, 1976; Tzvelev & Probatova, 2019). In these areas, the species is distributed sporadically in the natural environment. Native populations of *Z. latifolia* are also distributed in the east of China along a wide stretch of latitudinal zones (21–50°?N). The species can be found in the river basins of the Heilongjiang, Liaohe, Huanghe and Yangtze Rivers (Chen *et al.*, 2017; Wagutu *et al.*, 2022; Yang *et al.*, 2020; Zhang *et al.*, 2016). *Z. latifolia* has been domesticated and is cultivated in China as an aquatic vegetable (Guo *et al.*, 2007). At present, in China, *Z. latifolia* is cultivated on more than 60?000?ha (Xie *et al.*, 2023).

In the invasive range, *Z. latifolia* is locally established in New Zealand in the North Island, namely in Northland, Auckland, Waikato, and Wellington (Freshwater Pests of New Zealand, 2020; New Zealand Plant Conservation Network, 2023). In North America, *Z. latifolia* is considered established in Hawaii on the islands of Kauai, likely on Oahu, and Hawaii Island. One location has been detected in Canada, British Columbia in 2004 where it is locally abundant in shallow tidal water along the edges of Widgeon Slough on Siwash Island (https://search.museums.ualberta.ca/12-116227).

In the EPPO region, *Z. latifolia* has been intentionally introduced as an aquatic ornamental since the turn of the 20th century. It was also intentionally introduced from the 1930s onwards in water reservoirs in countries of the former Soviet Union to provide habitat for biota in managed waterbodies (Dubyna *et al.*, 2017). *Zizania latifolia* was reported in Belarus for the first time in 1966 (Dubovik *et al.*, 2021). *Zizania latifolia* was planted in Lake Endla (Central Estonia) between 1953 and 1955 (Kuusk *et al.*, 2003). This population is still present in this area (eElurikkus, 2023). In Lithuania, *Z. latifolia* was recorded in the Dotnuv?l? stream near the Akademija lake in the city of Akademija in 2006 (Liatukas & Stukonis, 2009). It is reported in other countries, e.g. Azerbaijan and Kazakhstan, though the status of the species is unclear.

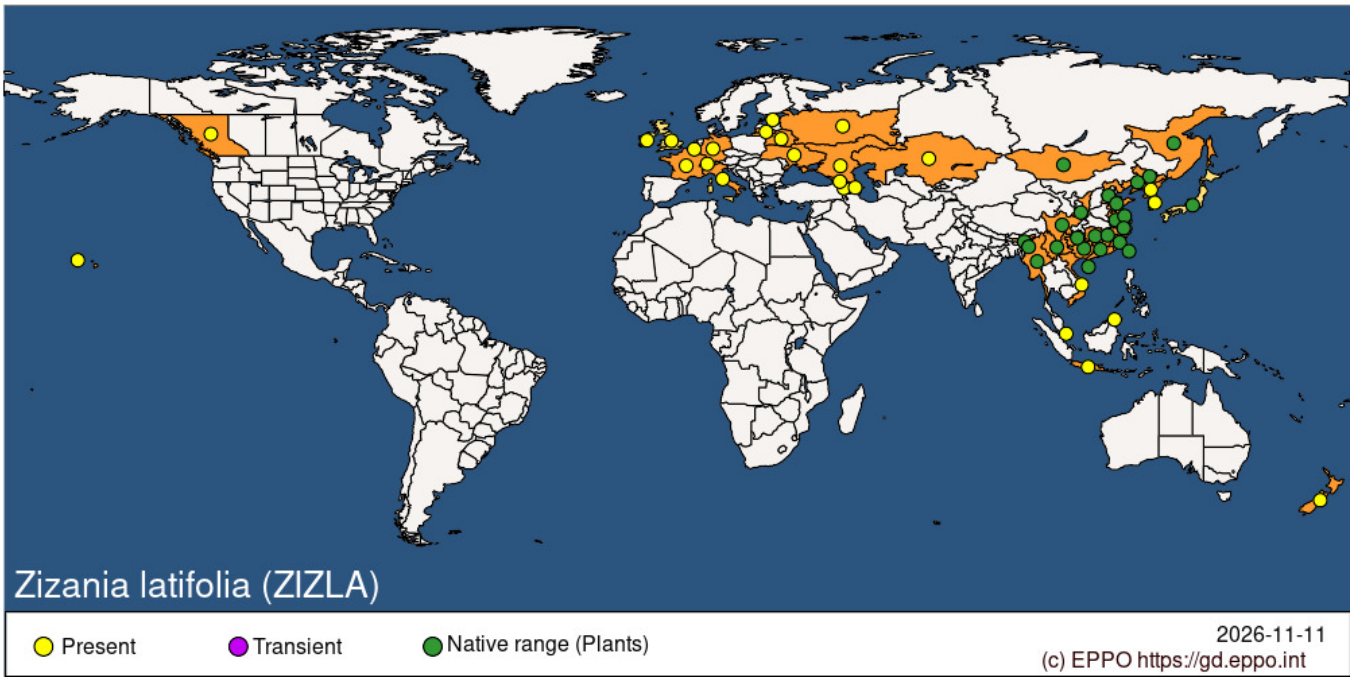
Zizania latifolia was first introduced in 1934 into the European part of Russia to provide habitat for biota in managed waterbodies (Maltseva & Bobrov, 2017; Morozova, 2014). The introduction of *Z. latifolia* into the Rybinsk Reservoir started in the late 1950s and in the Middle Volga region in 1957. At present, *Z. latifolia* can be found along a wide stretch of latitudinal zones (45–60°?N). The species can be found in nine regions (oblasts) according to Vinogradova *et al.* (2018): Bryansk, Vladimir, Kaluga, Kostroma, Moscow, Yaroslavl, Krasnodar, Astrakhan and Volgograd. Starodubtseva *et al.* (2017) published a record of the species also in the Voronezh oblast region in a protected area (State federal level nature sanctuary Voronezhsky). *Z. latifolia* occurs e.g., in water reservoirs along

the Volga River (Maltseva & Bobrov, 2017) and in lakes, such as Velikoe, Parovoe and Vashutinskoye (Belyakov *et al.*, 2020; Belyakov & Garin, 2018). *Z. latifolia* is recorded in the Astrakhan State Biosphere Reserve (Afanasiev & Laktionov, 2008).

Zizania latifolia locally established in Belgium where it has been planted as a marsh plant along ponds and lakes (Verloove, 2011). It was first observed in 2009 on the margins of a pond near La Hulpe (https://waarnemingen.be/observation/44769819/), probably as a relic of former cultivation (ornamental use). There are few other observations thereafter (Verloove, 2011). Recently, there have been numerous reports of the species throughout Belgium, probably as a result of the species being included in the alert list of the LIFE RIPARIAS project (https://alert.riparias.be/) and an extensive population was recorded in 2023 along the River Leie near Ghent (pers. comm. I. Jacobs, 2024).

In France, *Z. latifolia* was introduced in the botanical garden of Paris (Jardin des Plantes). In 1914 it was grown in the Allier Department (Thiollets, Gorbier-Peublanc, near Jaligny) close to the bank of a lake. In 1919, it invaded all the surroundings of the lake, covering an area of 300?m in length and 3–4?m wide. *Z. latifolia* has been first recorded in the wild in October 2016 in the Pyrenees. *Zizania latifolia* was detected for the first time in Germany in Freiburg in Breisgau in 2018 on the shore of the lake Opfinger (Amarell, 2020). It is not known how this population was first introduced into the area. In 2023, the species covered at least 200?m of shoreline of this lake (pers. obs. S. Follak, 2023).

The history of introduction into other EPPO countries is less well detailed.



EPPO Region: Armenia, Azerbaijan, Belarus, Belgium, Estonia, France (mainland), Georgia, Germany, Ireland, Italy (mainland), Kazakhstan, Lithuania, Russian Federation (Central Russia, Far East, Southern Russia), Switzerland, Ukraine, United Kingdom
Asia: China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shandong, Sichuan, Yunnan, Zhejiang), India (Assam, Manipur), Indonesia (Java), Japan, Kazakhstan, Korea, Democratic People's Republic of, Korea, Republic of, Malaysia (Sabah), Mongolia, Myanmar, Singapore, Taiwan, Vietnam
North America: Canada (British Columbia), United States of America (Hawaii)
Oceania: New Zealand

MORPHOLOGY

Plant type

Perennial rhizomatous helophyte.

Description

Wild populations of *Z. latifolia* produce underground as well as surface stems (rhizomes) that form multiple tillers and enable vegetative propagation. Culms erect, 1–2.5 (4) m tall, rooting at lower nodes. Leaf sheaths thickened, leaf blades broadly linear, 50–90?cm long and 1.5–3.5?cm wide. Ligule triangular, 10–15?mm long. Inflorescences are panicles branching out multiple times either upwards or sideways, 30–50?cm long and 10–15?cm wide, lower branches with male spikelets, upper branches with female spikelets. Male spikelet 8–15?mm long; lemma elliptic-oblong, margin ciliate, awn 2–8?mm. Female spikelet 15–25?mm, lemma linear, awn 15–30?mm. Fruits are caryopses, approximately 10?mm (Flora of China, 2006). The seeds of *Z. latifolia* are sparsely arranged on the ear and mature at different times, after which they fall off easily. There is the potential for misidentification of between the *Zizania* species.

Images of *Z. latifolia* can be retrieved from the EPPO Global Database (EPPO, 2024a).

BIOLOGY AND ECOLOGY

General

Zizania latifolia has phenotypic plasticity in morphology and shifts in reproductive strategy and biomass allocation enables it to survive flooding events (Wang *et al.*, 2014). It shows high growth rates and shoot height (up to 4?m in height) with increasing flooding depth, as the species can develop faster stem elongation as a response to increasing water depth (Li et al., 2018). Its capacity to form uprooted floating mats in wetlands also improves its resilience to inundated conditions (Hong *et al.*, 2018; Wen *et al*., 2023). The species can respond to water level fluctuation up to 5?m (Yang *et al*., 2020). The optimal water depth is 5–40?cm (Kwon *et al*., 2006; Li *et al*., 2018).

In the native range, *Z. latifolia* was reported to produce recalcitrant (desiccation-sensitive) seeds (Jin *et al.*, 2005). In the introduced range, seed does not seem to play an important role in the life cycle of the species. In New Zealand, seedlings are not reported in the natural environment (pers. comm. P. Champion, 2024). Seed production may be very limited or absent in the introduced range as observed in Lithuania (Liatukas & Stukonis, 2009) or in Belgium (Verloove, 2011).

Habitats

Zizania latifolia grows in aquatic and riparian habitats, in particular wetland habitats (Notov, 2009; Ohwi, 1964; Seok *et al.*, 2023). In the introcued range, it can also be found in roadside drainage ditches (Shaw & Allen, 2003) and can also infest damp paddocks and pastures (Arnold, 1959; Northland Regional Council, 2023). In New Zealand, *Z. latifolia* can invade lowland cropping habitats, especially sweet potato (pers. comm. P. Champion, 2024). In Hawaii, taro fields are also habitat for *Z. latifolia* (pers. comm. D. Frohlich, 2024). It can grow along waterlogged banks of large (e.g. Dnipro, Dniester, Ukraine; Volga, Russia) and small rivers (Dotnuv?l?, Lithuania) and coastal zones (estuaries) (Belyakov *et al.*, 2020; Dvoretskiy, 2021; Liatukas & Stukonis, 2009; Maltseva & Bobrov, 2017; Zub & Prokopuk, 2020).

Environmental requirements

Zizania latifolia requires waterlogged soil conditions for germination and growth.

Data from China indicate that growth of *Z. latifolia* starts when average air temperatures are greater 5°C and that the strongest growth is at temperatures from 18 to 28°C (Yan *et al*., 2013; Ye *et al*., 2017). *Zizania latifolia* can withstand cold winter temperatures. In the EPPO region, the species occurs in countries with hard frost, such as

Lithuania (e.g., K?dainiai district), Estonia (Lake Endla), and Russia (Rybinsk). The area of the Rybinski reservoir appears to mark the northern limit of occurrence of the plant in the EPPO region.

Zizania latifolia is tolerant to brackish water (Tang *et al.*, 2022) as it can grow in low salinity wetlands (salinity less than 15?mmol/L) (Tang *et al.*, 2022). It is intolerant of high salinity, determining the downstream extent on the Northern Wairoa River (New Zealand) (Champion *et al*., 2001).

Natural enemies

There are no known natural enemies for *Z. latifolia* in the EPPO region. In Japan, there is evidence that water birds selectively forage on the rhizomes of the species leading to the spread of *Z. latifloa* due to dispersal of rhizome fragments (Ohkawara & Tajiri, 2023; Watanabe *et al*., 2008).

Uses and benefits

The species is utilized as an aquatic vegetable and medicinal plant with a long history of use in China and other countries in the East Asian region (Wu *et al*., 2023). The vegetable is imported into the EPPO region from China (pers. comm. J. van Valkenburg, 2024). No evidence has been found that *Z. latifolia* is cultivated as a vegetable in the EPPO region. It has ecological and economic value in nature (provides forage and shelter, purifies water etc.) (Wu *et al*., 2023).

PATHWAYS FOR MOVEMENT

Plants for planting is the main pathway for movement into and within the EPPO region. *Z. latifolia* can be utilized as an ornamental, for planting in the natural environment for 'improving wildlife habitats' (Maltseva & Bobrov, 2017; Dubyna *et al.*, 2017; Liatukas & Stukonis, 2009; citing Fern, 1997). It has been planted for phytomeliorative/phytoremediation purposes (Chen *et al*., 2017; Tanner, 1996; Zhang *et al.*, 2023; Zub & Prokopuk, 2020) and for erosion control (Chen *et al*., 2017; William & Champion, 2008; Wu *et al.*, 2023) though not in the EPPO region.

There are historic references that *Z. latifolia* was used as an animal feed in France (Boite, 1887), though this is a historic pathway and nowadays it is very unlikely to be used for this purpose.

IMPACTS

Effects on plants

In China, in its native range, Zhang *et al.* (2016) reported that due to the overgrowth of *Z. latifolia*, the submerged and emergent macrophytes (*Vallisneria natans*, *Hydrilla verticillata*, *Phragmites australis*, *Typha angustifolia*) previously present had nearly disappeared in Wuchang Lake. Wen *et al*. (2023) showed that the emergent community in the Lake Erhai (Yunnan Province) had changed from a *P. australis*, *Typha orientalis* and *Acorus calamus* dominant community to a *Z. latifolia* monodominant community over the past decades. In the Republic of Korea, *Z. latifolia* is reported as a weed in no-tillage rice production (Im *et al.*, 2015).

In New Zealand, Champion *et al*. (2001) concluded that *Z. latifolia* displaces short-stature vegetation (essentially all non-woody species) and envelops taller individual indigenous plants (e.g., within *Dacrycarpus dacrydioides* swamp forest). These plants would be unable to produce progeny within the dense stand of *Z. latifolia*. It has been observed that *Z. latifolia* negatively impacts agricultural land in New Zealand (Arnold, 1959; Champion & Hofstra, 2010). The persistence of the species has changed farming practices. Some areas of sweet potato farming have been overtaken by *Z. latifolia*.

In the USA, *Z. latifolia* is considered a reservoir for pests such as the fungus *Ustilago esculenta*, which can potentially be transmitted to and threaten native *Zizania* species (e.g. Terrell & Batra, 1982; Watson *et al.*, 1991).

In Russia, *Z. latifolia* has spread in the Volga Delta displacing other aquatic species (Afanasiev & Laktionov, 2008). It can dominate aquatic plant communities in southern regions (for example, Krasnodar territory, Samara oblast, etc.) and strongly compete with other species (*Butomus umbellatus*, *Phragmites australis*, *Sparganium erectum*, *Typha angustifolia*, *T. latifolia*) (Matveev & Zotov, 1973; Matveev & Soloviyova, 1997; Maltseva & Bobrov, 2017).

In Lithuania, the area covered by *Z. latifolia* has increased and it forms mono-dominant stands. Liatukas and Stukonis (2009) stated that "… [t]his new species was aggressive in out-competing other species, as the largest patches of *Z. latifolia* had only very few small spots [patches] of other species".

In Ukraine, scientific investigation showed that *Z. latifolia* forms dense stands. The proportion of cover of *Z. latifolia* varies from 85% to 100 % (plants height ranges from 150 to 250?cm) (Dvoretskiy, 2021). In the Dniester Delta area, *Z. latifolia* can cause the disappearance of many other species, including those of wide ecological amplitude, particularly *Phragmites australis* (Dvoretskiy, 2021). *Z. latifolia* has significantly spread in the coastal part of the islands of the Dnieper Delta in recent years. *Z. latifolia* can change the structure of natural plant communities (Dubyna *et al.*, 2017).

In Western Europe, observations show that *Z. latifolia* can form persistent monospecific stands along water bodies (Hollings & Hollings, 2006). Thus, it is likely that similar effects on biodiversity described outside of the EPPO region will occur within the EPPO region.

Environmental and social impact

Zizania latifolia builds persistent monospecific stands in invaded natural habitats and changes the composition of the flora and is considered an ecosystem engineer.

The species can impede water flow and increase the chance of flooding by blocking drains and water channels (William & Champion, 2008) leading to the degeneration of pastureland (Arnold, 1959; William & Champion, 2008).

The plant can colonize large areas of lakes and severely interfere with fishing due to blocking access to the open water (Jia *et al*., 2017; Li, 1996). Jia *et al.* (2017) also showed a gradual loss of open water in Lower Wuchang Lake due to the encroachment from *Z. latifolia* (varying cover from 9.68?km^2 [1992] to a maximum of 49.17?km^2 [2001]). This consequently led to financial losses from major reductions in fishing income (exact data is not available).

CONTROL

Control of the species is difficult, because of the large annual accumulation of biomass, its extensive underground root/rhizome system, and its ability to grow from small rhizome fragments and the inaccessibility of most populations.

In New Zealand, successful eradication of small to medium (~100?ha in area) populations has been achieved using the grass-specific herbicides (pers. comm. P. Champion, 2024).

Raising water levels in spring (March–May) during the species' germination period could be successful in reducing the area colonized within lakes (Jia *et al*., 2017; Zhang *et al*., 2016).

Physical control can be effective at specific times (1) during the period when substantial self-thinning of shoots occurs (June–July) and (2) when the plant is mature but before senescence (September–October) Chandra and Tanaka (2006). However, this is a labour intensive and costly (Jia *et al*., 2017).

Mechanical diggers can be used to remove the plant from ditches, drainage channels and waterlogged riverbanks, but there is a high risk of transferring rhizome fragments to new sites (https://www.weedbusters.org.nz/what-are-weeds/weed-list/manchurian-rice-grass).

REGULATORY STATUS

In the EPPO region, *Z. latifolia* is included on the EPPO A2 list of pests recommended for regulation as a quarantine pest.

In New Zealand, *Z. latifolia* is a 'Pest of concern to New Zealand' (Quarantine pest) (Ministry for Primary Industries, 2023). The species is an unwanted organism and notifiable organism under the Biosecurity Act 1993: propagation, spread, display and sale are prohibited. *Z. latifolia* is one of nine weed species managed by central government for national eradication under the National Interest Pest Response programme (https://www.mpi.govt.nz/biosecurity/exotic-pests-and-diseases-in-new-zealand/long-term-biosecurity-management-programmes/national-interest-pest-responses-programme/).

In Australia, *Z. latifolia* is on the National Priority List of Exotic Environmental Pests, Weeds and Diseases. Thus, it is considered as a species of 'significant environmental and social amenity risk to Australia' (https://www.agriculture.gov.au/biosecurity-trade/policy/environmental/priority-list). In Western Australia, *Z. latifolia* is a 'Declared Pest, Prohibited - s12'. Prohibited organisms are declared pests by virtue of section 22(1) and may only be imported and kept subject to permits (https://www.agric.wa.gov.au/organisms/128909).

PHYTOSANITARY MEASURES

EPPO (2024b) recommends that *Z. latifolia* should be recommended for regulation as a quarantine pest and *Z. latifolia* should be banned for sale in the EPPO region. Plants for planting (horticulture) should be prohibited for import into the EPPO region.

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