

# NOBANIS – Invasive Alien Species Fact Sheet

## *Bunias orientalis*

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### Species description

**Scientific names:** *Bunias orientalis* (L., 1753), (Brassicaceae)

**Synonyms:** No significant synonyms are given.

**Common names:** Warty cabbage, Turkish wartycabbage, Turkish rocket (GB), Orientalisches Zackenschötchen, Morgenländisches Zackenschötchen (DE), Takkeklap (DK), Harilik tõlkjas, Rakvere raibe (EE), Idänukonpalko, Ukonpalko (FI), Warty cabbage (IE), Rússakál (IS), Rytinė engra (LT), Austrumu dižpērkone (LV), Grote hardvrucht (NL), Russekål (NO), Rukiewnik wschodny (PL), свербига восточная (RU), Ryssgubbe (SE).



**Fig. 1.** *Bunias orientalis*, photo by [Arne Ader](#).

### Species identification

*B. orientalis* is a perennial or biennial plant with a height of 0.5-0.9 m ([England's Plant Database](#)). The lower leaves are with large three-cornered edges or sharp-edged. Lower leaves pinnate with 1 or 2 pairs of lateral leaflets and a large, clefted (pinnatifid) terminal leaflet, sometimes entire; the upper leaves are entire to pinnatifid and are smaller. The petals are 4-8 mm long, yellow, entire or truncate. The fruit (a silicula) is less than three times as long as broad and 5 to 10 mm long, asymmetrically ovoid and covered with small, irregular protuberances (Tutin *et al.* 1964).

### Native range

The native range of *B. orientalis* is Caucasus and southern Russia (Klinge 1887; Jehlík und Slavík 1968).

### Alien distribution

#### History of introduction and geographical spread

It is now found in N. America and in most of the European countries. In the 1600s *B. orientalis* was spread across the Caucasus to Europe. Some authors claim that it is within the last three decades that *B. orientalis* populations exhibited increased expansion along with widespread establishment of dominant stands especially in lowland limestone regions in Central and parts of Western and Northern Europe (Steinlein *et al.* 1996, Dietz *et al.* 1999). It was spread mostly by the Russian army as a supplement to horse feed.

In Sweden *B. orientalis* is common in southern and central Sweden (first found in 1768), but it does not occur in massive stands ([NeoFlora](#) fact sheet). The species is also common in Latvia, where it was first found in 1803 (Grindel 1803), and is now distributed from solitary specimens to dense groups in ruderal sites or waste places, along railways, on fallow-lands and in floodplain meadows (Online encyclopaedia "[Latvijas Daba](#)"). It is not found far from railways and urban areas (Gertrude Gavrilova, pers. comm.). The first record of the species from Poland was in Silesia, where it was accidentally introduced in 1881 ([Polish Alien Species Database](#)). At present it is most common in the southern part of the country, including Silesia and the Pieniny Mts (Zajac and Zajac 2001). In the Polish countryside the species has a scattered distribution. In cities, it occurs along roads and railways (Wojciech Bąba, pers. comm.). *B. orientalis* is very common in North Estonia (first mentioned 1796), especially near the town of Rakvere ([Kull et al.](#) 2005). In Lithuania *B.orientalis* is also common, where it was first recorded in 1885 (Gudžinskas 1997). In Norway the species was first introduced together with Russian grain imports in the period 1800-10. It is now very commonly naturalised, and still spreading, in the south-eastern part of the country, and along the coast to at least 64 degrees North latitude (Lid and Lid 2005). In Thüringen, Germany, it has spread since the 1940s. Additional occurrences of *B. orientalis* are found in North Bavaria and Hessen. Since the 1980s, it is found regularly at ruderal sites, often forming dense stands in the warmer continental regions (such as Thuringia and Rheinhessen). In European part of Russia *B. orientalis* is very common in all territory (Александрова и др. 1996, Григорьевская и др. 2004) except northern regions, where it is rare and scattered (Бялт, 1999).

*B. orientalis* is now naturalized in many countries in Europe, including Britain (Clapham *et al.* 1962), Finland, Norway, Sweden, Denmark, Estonia, Latvia, Lithuania, Poland, Germany, Switzerland, Austria, the Czech Republic, Slovakia, the Netherlands and the European part of Russia.

### Pathways of introduction

*Bunias orientalis* has spread within the past 200 years and is still spreading intensively throughout Europe through the human use of the species. Until the late 1900s only a few occurrences of *B. orientalis* were found, but for the last 20 years the number of sites has increased massively. *B. orientalis* spreads mainly by seeds and roots, which easily start growing (NeoFlora fact sheet, Dietz and Steinlein 1998). Once established *B. orientalis* is a very fast growing plant. *B. orientalis* was earlier used as fodder plant and is rarely but still sold today as an ornamental plant and to harvest the eatable young leaves. But most introductions are due to transport by humans in hay material that contains soil with seeds and parts of *B. orientalis* roots (Kull *et al.* 2005).

### Alien status in region

*B. orientalis* is present in most of the North European and Baltic countries (see also table 1). *B. orientalis* is not found in Greenland, the Faroe Islands and Iceland.

It is also common in some parts of Switzerland and therefore is under observation on a national "Watch-List" as a invasive neophyte. In Austria it is present, but not considered as a problem.

Country	Not found	Not established	Rare	Local	Common	Very common	Not known
Austria						X	
Belgium							X
Czech republic							X
Denmark			X				
Estonia						X	
European part of Russia						X	
Finland				X			
Faroe Islands	X						
Germany					X		
Greenland	X						
Iceland	X						
Ireland	X						
Latvia					X		
Lithuania					X		
Netherlands			X				
Norway						X	
Poland					X		
Slovakia							X
Sweden					X		

**Table 1.** The frequency and establishment of *Bunias orientalis*, please refer also to the information provided for this species at [www.nobanis.org/search.asp](http://www.nobanis.org/search.asp). Legend for this table: **Not found** –The species is not found in the country; **Not established** - The species has not formed self-reproducing populations (but is found as a casual or incidental species); **Rare** - Few sites where it is found in the country; **Local** - Locally abundant, many individuals in some areas of the country; **Common** - Many sites in the country; **Very common** - Many sites and many individuals; **Not known** – No information was available.

## Ecology

### Habitat description

The native habitat of *B. orientalis* is woodland, sunny edges of forests, dappled shade and riverbanks (Clapham *et al.* 1962). In the new range of *B. orientalis* it has become a weed of cultivation (Tutin *et al.* 1964), occurring on grass fields, roadside verges, and ruderal sites as well as in gardens. From these sites it can invade dry grasslands, especially neglected dry meadows. Solitary specimens to dense stands of *B. orientalis* may also be found along railways, on fallow lands and in floodplain meadows.

Although *B. orientalis* is mostly indifferent to soil conditions (Huxley 1992), it prefers open, nutrient rich clay or sand soils of a neutral pH and does not grow under shaded conditions. Therefore, it can be found growing in more open landscapes such as meadows and hills. The species requires moist soils (Clapham *et al.* 1962, [NeoFlora](#) fact sheet). In the Silesian Upland (Poland) it occurs in clay and sandy soils, with a wide range of pH (Wojciech Bąba, pers. comm.).

### Reproduction and life cycle

*B. orientalis* flowers from May to August and the seeds ripen from July to September. The flowers are hermaphroditic (have both male and female organs) and are pollinated by bees and flies. The plant is self-fertile (Clapham *et al.* 1962).

Adult plants of *B. orientalis* have a low mortality and can grow old ( $\geq 12$  years), particularly at moderately disturbed sites where all stages of the plant surpass other co-occurring species in their ability to opportunistically sequester elevated resource levels (Dietz and Steinlein 1998, Dietz and Ullmann 1998).

### Dispersal and spread

Seeds are spread by humans together with hay material. Steinlein and Dietz (2002) have shown that *B. orientalis* has high capacity of regeneration from root fragments (even fragments of 1 cm length regenerated new plants). Furthermore the species has a high reproductive effort (15 up to 45 %) and seed production (up to 1000 seeds/m<sup>2</sup> soil) and substantial germination rates in the field. Combined with a low mortality of juvenile plants these characteristics ensure a rapid establishment of the species ([Kull](#) *et al.* 2005, Steinlein *et al.* 1996, Dietz *et al.* 1999).

## Impact

### Affected habitats and indigenous organisms

*B. orientalis* affects mostly grasslands as a very dominant plant. In vineyards it is considered to be a troublesome weed that is difficult to control ([NeoFlora](#) fact sheet). Dense stands of *B. orientalis* can occupy large areas of land and can be a strong competitor with other plant species. Especially in grasslands, the species may cause serious damage to plant communities ([Kull](#) *et al.* 2005). In areas with mass occurrences of *B. orientalis* the inflorescences dominate large areas, with up to 2000 inflorescences per m<sup>2</sup>. This results in another form of competition, as bees and flies pollinate *B. orientalis* and the local plants stay un-pollinated ([NeoFlora](#) fact sheet).

### Genetic effects

No known genetic effects.

### Human health effects

No known effects to human health ([NeoFlora](#) fact sheet).

### **Economic and societal effects (positive/negative)**

*B. orientalis* is a dominant, weedy plant which can easily replace other plants, also on agricultural lands. Intervention in that process may not be needed, because during succession the higher growing plants will take over and cover *B. orientalis*, preventing in this way further dispersal. (NeoFlora fact sheet). However, in some meadows, especially in flooded meadows, *B. orientalis* may itself become a strong competitor (Zigmantas Gudžinskas, pers. comm.).

All in all, *Bunias orientalis* may reduce the local biodiversity, spread massively in parks and on agricultural land (Kull et al. 2005).

It is reported that young leaves can be eaten as salad (Clapham *et al.* 1962).

## **Management approaches**

### **Prevention methods**

*B. orientalis* is mentioned in the Estonian Black Book of Invasive Species. It is in the I-category of the invasive species list, being a very invasive plant with a constantly growing distribution area. In 1939 the *Bunias orientalis* prevention ordinance was published in order to control the species in Estonia (Kull et al. 2005). Due to the World War II the eradication plan for the species was not fulfilled. The Estonian Nature Conservation Law, §49 and §57 covers the problems of invasive species and their massive distribution and describe cases where particular prevention actions should take place.

### **Eradication, control and monitoring efforts**

If there is an immediate need to eradicate *B. orientalis*, or control its dispersal, it should be done in late autumn or before the seeds mature (Kukk *et al.* 2001). Experiences with mechanical/manual control have led to the recommendation that *B. orientalis* should be cut twice during the hay-season in the summer. Cutting off only at the roots of *B. orientalis* has no effect because of its fast regeneration ability (Kull et al. 2005).

If taking into consideration the properties shown by Steinlein and Dietz (2002) *B. orientalis* may be characterised as a „super-species” whose spread can only be controlled by chemicals. However, in additional studies the same authors found *B. orientalis* to be a very weak competitor. In a controlled pot experiment in the field all other indigenous ruderal species exhibited higher competitive strength than *B. orientalis* (Dietz *et al.* 1998).

However doing nothing is the best way to stop its spread, especially when it can be combined with re-vegetation, *e.g.* seeding of a grass lawn, the planting of shading woods (Steinlein and Dietz 2002). In order to reduce *B. orientalis* dispersal, general environmental conditions should not be changed, because changing the conditions (weather or soil) may favour *B. orientalis* at the expense of the native plant species (NeoFlora fact sheet). Anthropogenic disturbance is the key factor for this alien species. The success of *Bunias orientalis* as an invasive plant species can be attributed to a (pre)adaptation of all life stages to anthropogenic disturbance regimes and the corresponding rapid exploitation of resources temporarily available in such situations. In conclusion, preventing anthropogenic disturbances is the only way to “get rid of the problem” (Steinlein and Dietz 2002).

### **Information and awareness**

In Estonia the Ministry of Environment has published two booklets dealing with invasive alien species of local importance (Kukk *et al.* 2001, Kull et al. 2005). The booklets give some simple hints how the spread of the species could be controlled. *Bunias orientalis* is furthermore listed as a particularly invasive and fast-spreading plant in the Estonian Black Book of Invasive Species.

### **Knowledge and research**

The studies on the distribution patterns and spread of *B. orientalis* had been over a long period conducted since the 19th century (e.g. Klinge 1887; Laivins *et al.* 2006). Numerous experimental studies were conducted on various aspects of the invasions success of *B. orientalis* such as establishment, regeneration success (Dietz *et al.*, 1999), growth patterns (Steinlein *et al.* 1996), role of allelopathy (Dietz *et al.* 1996) and phytotoxic constituents (Dietz, Winterhalter, 1996). A research on mechanisms of invasion success related to insect communities on *B. orientalis* is carried out in the Netherlands.

### **Recommendations or comments from experts and local communities**

In areas of massive distribution it is important to cut *Bunias orientalis* twice in the summer and when needed to use herbicides. To protect local plant communities and to prevent the invasive species from massive distribution it is very important monitor the spread and distribution of *B. orientalis*, especially in places such as harbours, railway stations and other places with suitable conditions for the species. It is definitely important to learn more about the biology and the dispersal methods of invasive species (Kukk *et al.* 2001).

## **References and other resources**

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## Links

[Virtual flora](#) in Swedish

[Nature Museum fact sheet](#)

[Neo Flora \*B. orientalis\* fact sheet – in German](#)

Online encyclopaedia "[Latvijas Daba](#)" (Nature of Latvia)

[Polish Alien Species Database](#)

England's Plant Database: [Plants for A Future](#)

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