

**Rapid Communication****The distribution of *Sinacalia tangutica* (Maxim.) B. Nord. in Austria**

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**OPEN ACCESS****Abstract**

I report on the distribution of Chinese ragwort (*Sinacalia tangutica*) (Asteraceae, Magnoliopsida) in Austria. The first occurrence of this species was recorded 50 years ago in the Ybbs-valley in the pre-Alps of western Lower Austria. Here, I summarize the current distribution of the study species at this locality, and I present two new records. The composition of the invaded vegetation was documented by four relevés. *Sinacalia tangutica* forms dense populations in wet tall herb vegetation and open riverine forests in humid submontane climate. Thus, given the substantial expansion in the last decades in the Ybbs-valley, I suggest that the future spread of *Sinacalia tangutica* should be monitored, and if necessary, management actions should be taken.

**Key words:** alien flora, biological invasions, horticulture, spread, vascular plants

**Introduction**

Worldwide, numbers of alien species are increasing rapidly (Seebens et al. 2017), and horticulture is known to be the most important pathway for plant invasions (Hulme et al. 2018; van Kleunen et al. 2018). In Central Europe, most alien plants species are most wide-spread in the lowlands because human population density (and thus propagule pressure and disturbances) are most intense there. Further, most species naturalized in Central Europe are native to regions with warmer climates (Chytrý et al. 2008; Lambdon et al. 2008; Pyšek et al. 2012).

Accordingly, there are only few alien species that are restricted to mountain regions of the Central European Alps, as most species that colonize mountain regions occur in surrounding lowland regions and have spread from there to the mountains (Alexander et al. 2018). This is particularly the case for near-natural vegetation types such as forests, rock vegetation, mires or tall-herb vegetation which are rarely invaded in European mountains (Chytrý et al. 2008).

Here, I summarize and extend the known current distribution, population size and habitat affiliation of *Sinacalia tangutica* in Austria; this alien vascular plant species so far has only been known from one site in the Austrian Alps that was found in 1970 (Forstner 1972).

## Materials and methods

Currently, an update of the Alien Flora of Austria (Essl and Rabitsch 2002) is underway (Essl et al. *in prep.*). During botanical field work in the pre-Alps of Lower Austria, two new occurrences of *Sinacalia tangutica*—an alien species that had previously been known from only one site in Austria (Forstner 1972; Stöhr et al. 2007)—have been found by the author of this publication in recent years. Thus, in 2017 and 2019, all three occurrences of this species were re-visited and data on population size, accompanying vegetation and invaded vegetation types were collected. Species nomenclature and taxonomy follow Fischer et al. (2008).

## Results

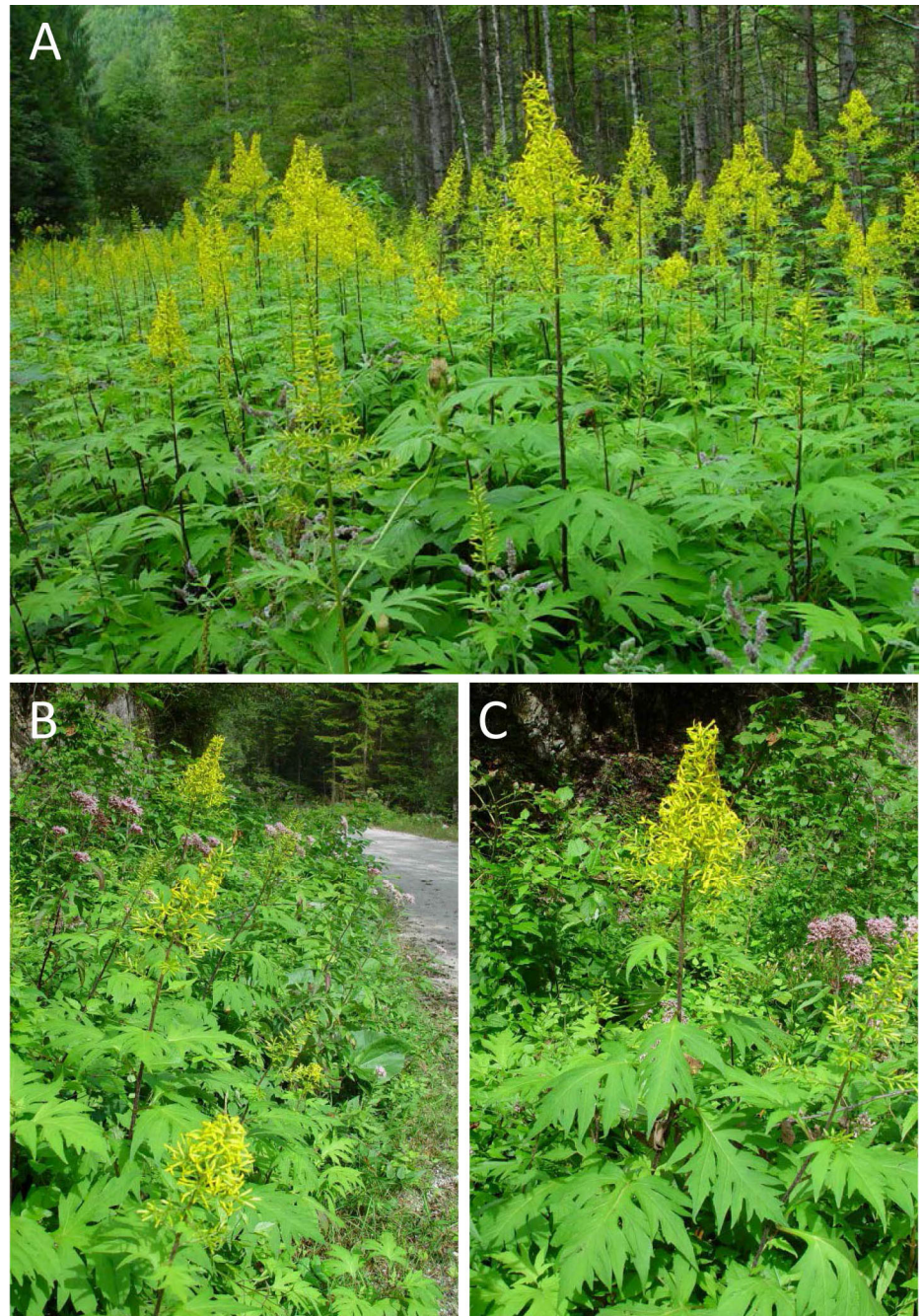
### *Species description*

*Sinacalia tangutica* (Maxim.) B.Nord., Chinese Ragwort, (Asteraceae) is a tall herb that spreads mostly vegetatively by rhizomes. Stems are robust and upright, and grow up to 1.5 m tall (Jäger et al. 2008). Lower stem leaves are fallen by anthesis. Petiole of median stem leaves is 3–6 cm long and subamplexicaul at the base; the blade of median stem leaves is ovate or ovate-cordate, 10–16 × 10–15 cm with deeply pinnatisect margin with 3 or 4 lateral lobes on each side. Upper stem leaves are smaller and shortly petiolate (Figure 1). The capitula consisting of yellow ray and disk florets are small, numerous, and arranged in terminal compound paniculoid thyrses; flowering in Austria is from mid-August to end of September. *Sinacalia tangutica* is native to tall herb vegetation of mountains (1250–3500 m asl) in Western and Central China (provinces of Gansu, Hebei, Henan, Hubei, Hunan, Ningxia) (Wu et al. 2011).

### *Distribution in Austria*

The first occurrence of *Sinacalia tangutica* in Austria was found in 1970 in the Steinbach-valley, a tributary to the Ybbs-river 3 km southwest of the village of Göstling in western Lower Austria (Forstner 1972) (Figure 2). A survey in 2019 showed that this population has spread considerably in the last decades. Currently, it occurs over a distance of *c.* 2.5 km in open floodplain forests and in wet tall herb communities near the Steinbach-stream and smaller tributaries such as the Windischbach and Hundsaubach-streams.

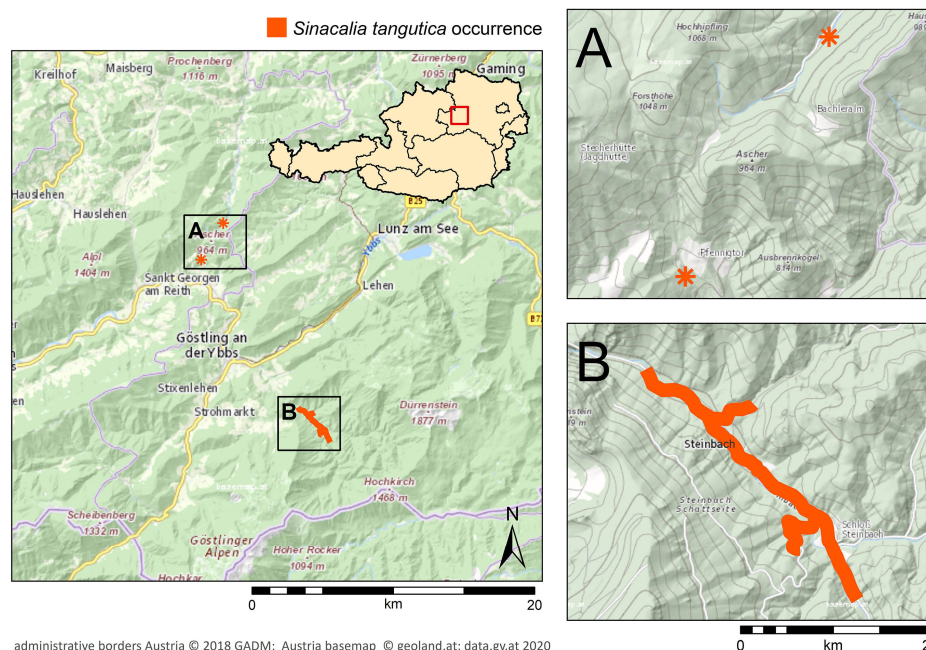
In August 2013, another population covering an area of *c.* 10 m<sup>2</sup> size was found adjacent to a small stream 200 m south of the farm “Pfenningtor” near the settlement of Kogelsbach (47°51′03″N; 14°54′55″E); this site is located 5 km northwest of the Steinbach-valley. In the same year, another population covering an area of *c.* 30 m<sup>2</sup> size was recorded at the embankment of a forest road in the “Feierabendgraben” *c.* 1.2 km northnortheast of the previous location (47°51′59″N; 14°55′45″E).



**Figure 1.** *Sinacalia tangutica* at the site Steinbach-valley: dense population in tall-herb vegetation (A), population of medium density on a roadway embankment (B), flowering plant (C); 28<sup>th</sup> August 2006.

### *Invaded vegetation types*

*Sinacalia tangutica* colonizes tall herb vegetation and open riverine forests in the submontane pre-Alps of western Lower Austria (Supplementary material Table S1). The vegetation types as documented by four relevés (Braun-Blanquet 1964) belong to different vegetation units: three of the plots with a well-developed tree- and shrub-layer (plots no. 1–3) can be placed into riparian gallery forests of the order Alno-Fraxinetalia excelsioris, although plot no 1 has affinities to zonal forests of the Querceto-Fagetea; plot no 4 does not contain tree- and shrub layers and is best placed



**Figure 2.** Location of the occurrences of *Sinacalia tangutica* in western Lower Austria, and detailed maps of its distribution (A, B).

into tall-herb fringe wet meadow vegetation of the class *Epilobietea angustifolii* (Mucina et al. 2016). Due to its clonal growth, *Sinacalia tangutica* forms dense stands and is the (co-)dominant herb species in all relevés. The tree and shrub layers are dominated by wide-spread tree species such as *Picea abies*, *Acer pseudoplatanus* and *Fagus sylvatica*, and by trees that are most abundant in riverine (*Alnus incana*, *Fraxinus excelsior*) and ravine forests (*Ulmus glabra*). In the herb layer, the abundant occurrence of tall herbs such as *Cirsium oleraceum*, *Petasites hybridus*, *Salvia glutinosa*, and *Mentha longifolia* characterizes the relevés. Overall, there were rather few other alien species present in the relevés.

## Discussion

The population of *Sinacalia tangutica* in the Steinbach-valley—which is known since 1970 (Forstner 1972)—has spread considerably in the meantime. Most likely, the species has been locally introduced as an ornamental plant by the owners of the Steinbach-castle, which is located within the current escaped population.

The two other populations reported here are much smaller, but are also locally established. These populations are located *c.* 5 km away from the Steinbach-valley, and it is unknown how the species was transported to these sites, which are away from any human settlements.

To my knowledge, the Austrian populations reported here represent one of the first escaped occurrences of the Chinese Ragwort in Central Europe. Currently, the species is missing from the alien vascular plant checklists of the Czech Republic (Pyšek et al. 2012), Slovakia (Medvecká et al. 2012), Poland (Mirek et al. 2002; Tokarska-Gudzik et al. 2012), and Switzerland

(Infoflora 2019). Only in Germany, *Sinacalia tangutica* has been reported as locally spreading in parks and large gardens (Jäger et al. 2008). In Western and Northern Europe, records of *Sinacalia tangutica* are known from several countries. In the British Isles, it is locally established for several decades (Clement and Foster 1994; Beesley and Nunn 2006), and for Norway, it has recently been reported as a rare alien species (Gederaas et al. 2012). In Belgium, *Sinacalia tangutica* has been first recorded in the wild in 2000 as a rare alien (Verloove 2006). So far, there is no report of impacts on native species in Europe.

In Austria, *Sinacalia tangutica* invades wet tall-herb vegetation and open riverine forests in the pre-Alps of western Lower Austria. This region is characterized by sub-oceanic climate with high annual precipitation of c. 1400–1600 mm in the valleys (Seger 2019). Forstner (1972) reports that plants of *Sinacalia tangutica* that were cultivated in Vienna were growing poorly, and he attributes this to the substantially warmer (c. 10 °C annual mean temperature) and drier (c. 600–700 mm mean annual precipitation) Viennese climate. Thus, it seems that while *Sinacalia tangutica* is clearly competitive in humid sub-montane climate (as also evidenced by the alien occurrences of the species in northwestern Europe), it will most likely not spread in warm and dry Central European lowland climates. I conclude that given the substantial—but still localized—recent spread of *Sinacalia tangutica* in Austria and other (northwest) European countries, the future spread of this species should be monitored, and if necessary, management actions should be taken.

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### Supplementary material

The following supplementary material is available for this article:

**Table S1.** Phytosociological relevés of the three sites in the Ybbs-valley invaded by *Sinacalia tangutica*.

This material is available as part of online article from:

[http://www.reabic.net/journals/bir/2020/Supplements/BIR\\_2020\\_Essl\\_Table\\_S1.xlsx](http://www.reabic.net/journals/bir/2020/Supplements/BIR_2020_Essl_Table_S1.xlsx)