Rapid Communication

The distribution of *Ageratina altissima* (L.) R. M. King & H. Rob. in Austria

Franz Essl

Division of BioInvasions, Macroecology and Global Change, Department of Botany and Biodiversity Research, University of Vienna, Rennweg 14, 1030 Vienna, Austria

franz.essl@univie.ac.at

Citation: Essl F (2025) The distribution of *Ageratina altissima* (L.) R. M. King & H. Rob. in Austria. *BioInvasions Records* 14(1): 13–18, https://doi.org/10.3391/bir.2025.14.1.02

Received: 18 June 2024
Accepted: 20 January 2025
Published: 27 March 2025

Handling editor: Ioannis Bazos
Thematic editor: Giuseppe Brundu

Copyright: © Essl
This is an open access article distributed under terms of the Creative Commons Attribution License (Attribution 4.0 International - CC BY 4.0).

OPEN ACCESS

Abstract

I report on the distribution of White snakeroot (*Ageratina altissima*) (Asteraceae, Magnoliopsida) in Austria. The first established occurrence of this species in Austria was recorded in Lower Austria in 2006. Here, I summarize the current distribution of the study species at this locality. In 2006, the species had invaded several 100 m^2. In 2024, it has spread over c. 2.7 ha forming open to dense stands. The composition of the invaded vegetation was documented by four plots. *Ageratina altissima* invades mesic to temporarily wet tall herb vegetation in forest clearcuts, forest fringes, open conifer plantations, and broadleaved forests. Thus, given the substantial expansion in the last two decades, I suggest that the future spread of *Ageratina altissima* should be monitored, and if necessary, management actions should be taken.

Key words: alien flora, biological invasions, forests, 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, alien plant species are most widespread in the lowlands because human population density (and thus propagule pressure and disturbances) are highest there. Consequently, habitats that are strongly shaped by human disturbance are the most invaded, while near-natural vegetation types such as forests, rock vegetation, mires or tall-herb vegetation are rather rarely invaded (Chytrý et al. 2008; Wagner et al. 2017). However, evidence is accumulating that the number of invasions of alien plants in European temperate forests is increasing (Essl et al. 2012; Wagner et al. 2017).

Here, I summarize and extend the known current distribution, population size and habitat affiliation of *Ageratina altissima* in Austria; this vascular plant species has been recorded as an alien species in several countries of the world and has shown considerable invasive potential in a few countries, e.g. in South Korea (e.g. Kang et al. 2019; Kim et al. 2021). In Central Europe, it is still very rare, and most occurrences so far have been short-lived casual findings.

Materials and methods

Recently, an update of the Alien Flora of Austria (Essl and Rabitsch 2002) has been completed (Glaser et al. *in prep*). In 2024, the only known established population of *Ageratina altissima* in Austria was surveyed, and data on population size, accompanying species and invaded vegetation types were collected. Species cover in the plots was assessed in % separately for tree, shrub and herb layers. Species nomenclature and taxonomy follow Fischer et al. (2008), names of syntaxonomic units follow Mucina et al. (2016).

Results

Species description

Ageratina altissima (L.) R. M. King & H. Rob., White snakeroot, (Asteraceae) is a toxic perennial herb that spreads mostly vegetatively by rhizomes. Stems are robust and upright, and the plant grows up to 1.5 m tall; stems are branched in the upper part, with decussate leaves. Leaves have sharply serrated margins and are up to 15 centimetres long. The white flowers are arranged in flat-topped panicles measuring 5–15 cm in diameter. Diaspores are dispersed by wind. Flowering in Austria lasts from late July to early October. *Ageratina altissima* is native to eastern and central North America (Nesom 2006). White snakeroot contains a complex mixture of alcohols and ketones collectively called tremetol. When milk or meat containing the toxin is consumed, the poison is passed on to humans. If consumed in large enough quantities, it can cause tremetol poisoning in humans. The poisoning is also called milk sickness, as humans may ingest the toxin by drinking the milk of cows that had eaten snakeroot (Davis et al. 2015).

Distribution in Austria

The first observation of a casual occurrence of *A. altissima* in Austria was made in the 1940s in Graz (Hamburger 1948; Melzer 1954; Essl and Rabitsch 2002). More recently, the species was also recorded in Viktring near Klagenfurt in Carinthia (Fischer and Niklfeld 2003). In 2006, an established occurrence was found in Goldegg in Lower Austria which covered a few 100 m^2 at that time (Stöhr et al. 2007). A survey in 2024 (Figure 1) showed that this population has spread considerably since its first discovery. Currently, it covers an area of c. 2.7 ha. There, it occurs mostly in dense stands with cover values > 10 % in tall herb communities, in clear cuts, and along forest roads. Further, it grows to a smaller extent in open conifer forest plantations, and broadleaved forests. In Goldegg, *A. altissima* prefers temporarily wet sites on loamy soils, while it avoids temporarily dry, acidic shallow and nutrient poor soils.

Invaded vegetation types

In Goldegg, *A. altissima* colonizes tall herb vegetation in forest clearcuts and forest fringes, and—to a lesser extent—open conifer plantations and

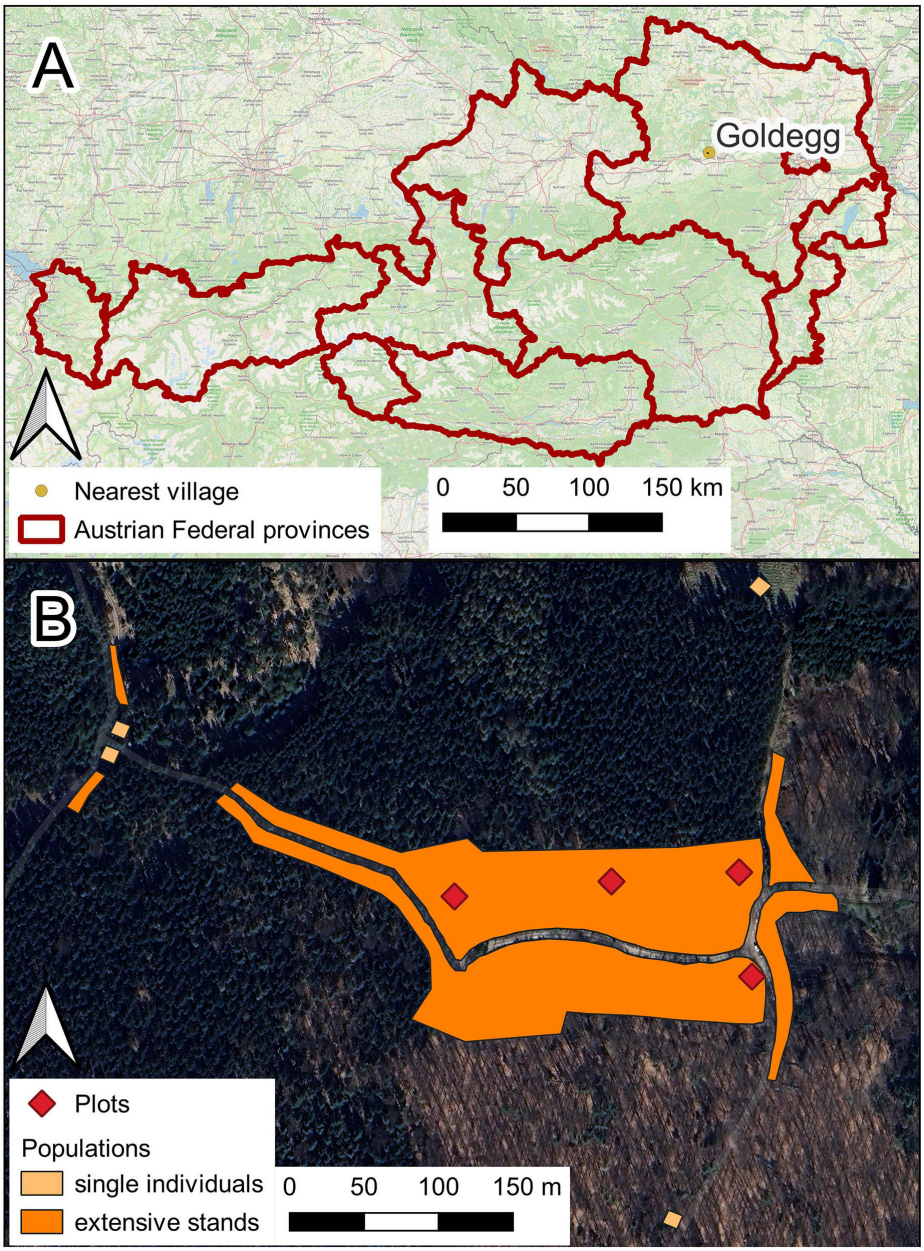


Figure 1. Location of the occurrences of *Ageratina altissima* in central Lower Austria, and detailed maps of its distribution (A, B).

broadleaved forests (Supplementary material Table S1, Figure 2). The vegetation types as documented by four plots belong to two different vegetation units: three of the plots (plots no. 1, 3, 4) are placed in tall-herb fringe vegetation of the class Epilobietea angustifolii (Mucina et al. 2016); the fourth plot (plot no. 2) has been established in an open conifer forest dominated by *Picea abies*. The herb vegetation in all four plots is characterized by the joint occurrence of tall herbs and grasses (e.g. *Urtica dioica, Calamagrostis epigejos, Phalaris arundinacea*), pioneer shrubs (e.g. *Rubus fruticosus, R. idaeus*), forest understorey species (e.g. *Carex brizoides, Oxalis acetosella*), and ruderal species (e.g. *Galium aparine*). *Ageratina altissima* is a co-dominant species in all four plots. The population of *A. altissima* at Goldegg grows between c. 400–460 m a.s.l. in a submontane



Figure 2. A detail of the growing site Goldegg in Lower Austria. Invaded are the open broadleaved forests dominated by *Fagus sylvatica*, tall herb vegetation in clear cuts, and road embankments of the forest road; 21st April 2024. Photograph by Franz Essl.

Central European climate with average annual precipitation of c. 800 mm and average temperature of c. 9.0 °C (ZAMG 2024).

Discussion

The population of *A. altissima* in Goldegg – which is known since 2006 but has been introduced substantially earlier (F. Drucker *pers. comm.*) – has spread considerably since its discovery. Most likely, the species has been locally introduced as an ornamental plant by the owners of the Goldegg-castle, which is located c. 500 m northeast of the established population. This is corroborated by the occurrence of established populations of several other alien species in the vicinity such as *Digitalis purpurea, Rubus armeniacus, Spiraea japonica*, and *Symhoricarpus albus*.

The Austrian population reported here represents one of the first established occurrences of *A. altissima* in Central Europe. Currently, the species is missing from the alien vascular plant checklists of Slovakia (Medvecká et al. 2012), and Switzerland (Infoflora 2024). In the Czech Republic, *A. altissima* has been first recorded in 1979 and still is a rare casual (Pyšek et al. 2022). In Poland it was reported as ephemerophyte (Rostański and Sowa 1987; EPPO 2024), but not confirmed in recent decades (Tokarska-Guzik et al. 2012). In Hungary, the species is a very rare alien plant (Király and Vidéki 2004). In Germany, *A. altissima* is a very rare and casual alien species (Floraweb 2024). In Western and Northern Europe, records of *A. altissima* are known from a few countries. In Belgium, *A. altissima* has been first recorded in the wild in 1953, and since then,

only one further record was made (Verloove 2024). In Italy, the species has been included as naturalized in the alien plant species checklist (Galasso et al. 2024). So far, there is no report of impacts on native species in Europe.

In Austria, *A. altissima* invades mesic to temporarily wet submontane tall-herb vegetation, forest fringes, plantations and open forests. I conclude that given the substantial—but still localized—distribution of *A. altissima* since it was recorded for the first time in 2006 in Austria, the future spread of this species should be monitored, and if necessary, management actions should be taken.

Acknowledgements

I thank Franz Drucker for providing me information on the occurrenc of *A. altissima* in Golddegg, and Michael Glaser for producing the distribution map. I am thankful for the helpful comments of two anonymous reviewers.

Funding declaration

This study was supported by the Austrian Science Foundation FWF (Project no.: I5825).

References

Chytrý M, Maskell LC, Pino J, Pyšek P, Vilá M, Font X, Smart SM (2008) Habitat invasions by alien plants: a quantitative comparison among Mediterranean, subcontinental and oceanic regions of Europe. *Journal of Applied Ecology* 45: 448–458, https://doi.org/10.1111/j.1365-2664.2007.01398.x

Davis TZ, Lee ST, Collet MG, Stegelmeier BL, Green BT, Buck SR, Pfister JA (2015) Toxicity of white snakeroot (*Ageratina altissima*) and chemical extracts of white snakeroot in goats. *Journal of Agricultural and Food Chemistry* 66: 2092–2097, https://doi.org/10.1021/jf505614z

Essl F, Rabitsch W (eds) (2002) Neobiota in Österreich. Environment Agency Austria. Vienna, Austria, 432 pp

Essl F, Mang T, Moser D (2012) Ancient and recent alien species in temperate forests: Steady state and time lags. *Biological Invasions* 14: 1331–1342, https://doi.org/10.1007/s10530-011-0156-y

Fischer MA, Niklfeld H (2003) Floristische Neufunde (57-73). *Neilreichia* 2–3: 287–288

Fischer MA, Oswald K, Adler W (2008) Exkursionsflora für Österreich, Liechtenstein, Südtirol. Biologiezentrum der oö. Landesmuseen, Linz, 1392 pp

Galasso G, Conti F, Peruzzi L, Alessandrini A, Ardenghi NMG, Bacchetta G, Banfi E, Barberis G, Bernardo L, Bouvet D, Bovio M, Castello M, Cecchi L, Del Guacchio E, Domina G, Fascetti S, Gallo L, Guarino R, Gubellini L, Guiggi A, Hofmann N, Iberite M, Jiménez-Mejías P, Longo D, Marchetti D, Martini F, Masin RR, Medagli P, Mussarella CM, Peccenini S, Podda L, Prosser F, Roma-Marzio F, Rosati F, Santangelo A, Scoppola A, Selvaggi A, Selvi F, Soldano A, Stinca A, Wagensommer RP, Wilhalm T, Bartolucci F (2024) An second update to the checklist of the vascular flora alien to Italy. *Plant Biosystems* 158: 297–340, https://doi.org/10.1080/11263504.2024.2320129

Hamburger I (1948) Zur Adventivflora von Graz. Doctoral thesis (unpublished), University of Graz, Graz

Haschek WM, Rousseaux CG, Wallig MA (2013) Rousseaux's handbook of toxicologic pathology. 3rd Ed. Academic Press, 2224 pp

Hulme PE, Brundu G, Carboni M, Dehnen-Schmutz K, Dullinger S, Early R, Essl F, González-Moreno P, Groom QJ, Kueffer C, Kühn I, Maurel N, Novoa A, Pergl J, Pyšek P, Seebens H, Tanner R, Touza JM, van Kleunen M, Verbrugge LNH (2018) Integrating invasive species policies across ornamental horticulture supply chains to prevent plant invasions. *Journal of Applied Ecology* 55: 92–98, https://doi.org/10.1111/1365-2664.12953

Kang W, Song Y, Lee D, Kim G, Chae H (2019) Identifying habitats and corridors of an invasive plant, *Ageratina altissima*, in an urban forest. *Landscape and Ecological Engineering* 15: 277–287, https://doi.org/10.1007/s11355-019-00381-y

Kim E, Choi J, SongW (2021) Introduction and spread of the invasive alien species *Ageratina altissima* in a disturbed forest ecosystem. *Sustainability* 13: 6152, https://doi.org/10.3390/su13116152

Király G, Vidéki (2004) First record of *Ageratina altissima* (L.) King et Robinson in Hungary. *Flora Pannonica* 2: 1–6

Medvecká J, Kliment J, Májeková J, Halada Ľ, Zaliberová M, Gojdičová E, Feráková V, Jarolímek I (2012) Inventory of the alien flora of Slovakia. *Preslia* 84: 257–309

Melzer H (1954) Zur Adventivflora der Steiermark I. *Mitteilungen de Naturwissenschaftlichen Vereins Steiermark* 84: 103–120

Mucina L, Bueltmann H, Theurillat J (2016) Vegetation of Europe: Hierarchical floristic classification system of vascular plant, bryophyte, lichen, and algal communities. *Applied Vegetation Science* 19: 3–264, https://doi.org/10.1111/avsc.12257

Nesom GL (2006) *Ageratina altissima* var. *altissima*. In: Flora of North America Editorial Committee (ed), Flora of North America North of Mexico (FNA). Vol. 21. Oxford University Press, New York and Oxford, pp 547–553

Pyšek P, Sádlo J, Chrtek J, Chytrý M, Kaplan Z, Pergl J, Pokorná A, Axmanová I, Čuda J, Doležal J, Dřevojan P, Hejda M, Kočár P, Kortz A, Lososová Z, Lustyk P, Skálová H, Štajerová K, Večeřa M, Vítková M, Wild J, Danihelka J (2022) Catalogue of alien plants of the Czech Republic (3rd edition): species richness, status, distributions, habitats, regional invasion levels, introduction pathways and impacts. *Preslia* 94: 447–577, https://doi.org/10.23855/preslia.2022.447

Rostański K, Sowa R (1987) Alfabetyczny wykaz efemerofitów Polski. *Fragmenta Floristica et Geobotanica* 31–32: 151–205

Seebens H, Blackburn TM, Dyer EE, Genovesi P, Hulme PE, Jeschke JM, Pagad S, Pyšek P, Winter M, Arianoutsou M, Bacher S, Blasius B, Brundu G, Capinha C, Celesti-Grapow L, Dawson W, Dullinger S, Fuentes N, Jäger H, Kartesz J, Kenis M, Kreft H, Kühn I, Lenzner B, Liebhold A, Mosena A, Moser D, Nishino M, Pearman D, Pergl J, Rabitsch W, Rojas-Sandoval J, Roques A, Rorke S, Rossinelli S, Roy HE, Scalera R, Schindler S, Štajerová K, Tokarska-Guzik B, Van Kleunen M, Walker K, Weigelt P, Yamanaka, T, Essl F (2017) No saturation in the accumulation of alien species worldwide. *Nature Communications* 8: 14435, https://doi.org/10.1038/ncomms14435

Stöhr O, Pilsl P, Essl F, Hohla M, Schröck C (2007) Beiträge zur Flora von Österreich, II. *Linzer Biologische Beiträge* 39: 155–292

Tokarska-Guzik B, Dajdok Z, Zając M, Zając A, Urbisz A, Danielewicz W, Hołdyński C (2012) Rośliny obcego pochodzenia w Polsce ze szczególnym uwzględnieniem gatunków inwazyjnych. [Alien plants in Poland with particular reference to invasive species]. Generalna Dyrekcja Ochrony Środowiska, Warszawa, 197 pp

van Kleunen M, Essl F, Pergl J, Brundu G, Carboni M, Dullinger S, Early R, González-Moreno P, Groom QJ, Hulme PE, Kueffer C, Kühn I, Máguas C, Maurel N, Novoa A, Parepa M, Pyšek P, Seebens H, Tanner R, Touza J, Verbrugge L, Weber E, Dawson W, Kreft H, Weigelt P, Winter M, Klonner G, Talluto MV, Dehnen-Schmutz K (2018) The changing role of ornamental horticulture in alien plant invasions. *Biological Reviews* 93: 1421–1437, https://doi.org/10.1111/brv.12402

Wagner V, Chytrý M, Jiménez-Alfaro B, Pergl J, Hennekens S, Biurrun I, Knollová I, Berg C, Vassilev K, Rodwell JS, Škvorc Ž, Jandt U, Ewald J, Jansen J, Tsiripidis I, Botta-Dukát Z, Casella L, Attorre F, Rašomavičius V, Ćušterevska R, Schaminée JHJ, Brunet J, Lenoir J, Svenning JC, Kącki Z, Petrášová-Šibíková M, Šilc U, García-Mijangos I, Campos JA, Fernández-González F, Wohlgemuth T, Onyshchenko V, Pyšek P (2017) Alien plant invasions in European woodlands. *Diversity and Distributions* 23: 969–981, https://doi.org/10.1111/ddi.12592

Web sites, online databases and software

EPPO (2024) EPPO Global Database. https://gd.eppo.int/ (accessed 18 June 2024).

Floraweb (2024) FloraWeb. Daten und Informationen zu Wildpflanzen Deutschlands. https://www.floraweb.de/ (accessed 18 June 2024)

Infoflora (2024) Info Flora Schweiz. https://www.infoflora.ch/de/ (accessed 10 June 2024)

Verloove F (2024) Manual of the alien plants of Belgium. https://alienplantsbelgium.myspecies.info/content/ageratina-altissima (accessed 10 June 2024)

ZAMG (2024) Geosphere Austria. https://www.zamg.ac.at/cms/de (accessed 10 June 2024)

Supplementary material

The following supplementary material is available for this article:

Table S1. Phytosociological plots of four sites in Goldegg invaded by *Ageratina altissima*. Species cover (in %) was assessed separately for tree, shrub and herb layers.

This material is available as part of online article from:
http://www.reabic.net/journals/bir/2025/Supplements/BIR_2025_Essl_SupplementaryMaterial.xlsx