**APPENDIX 1**

Table S1 Traits associated with invasion and their distribution among the 11 invasive study species in the Ukrainian Carpathians. VR = vegetative reproduction. *Reynoutria* spp. is comprised of *Reynoutria japonica* and *R. x bohemica*. The *Solidago* spp. group consists of *Solidago canadensis* and *S. gigantea*.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Species* | *Trait* | | | | | | | | |
| *Growth* | *Seed yield* | *VR* | | | *Main dispersal* | *Reaction to stress* | *Ecological niche* | *Limiting factors* |
| *Acer negundo* | Perennial, sexual maturity in five years, earlier than native *A. Campestre* in the flood plain | High | | Yes | Wind, water | | Seed survival in water for weeks, dormancy | Extremely wide, grows in wide variety of habitats, but mainly along rivers in study region | Shade, drought, extreme frost |
| *Ambrosia artemisiifolia* | Annual, early and rapid growth in spring | Very high (up to 62 000 per plant) | | No | Water, animals, humans | | Long dormancy (*c.* 30 years); accumulation of toxic trace elements | Moderate, agricultural pest, grows mainly in polluted soils | Shade, prolonged spring frost and drought; very sensitive to length of growing season (annual that flowers late in summer) |
| *Echinocystis lobata* | Annual, fast growth of leaves | Moderate (6 seeds per fruit) but high germination rate | | No | Water | | Dormancy, large, stress-resistant seeds | Relatively narrow, tied to riparian communities | Shade,  Spring and fall frost |
| *Helianthus tuberosus* | Perennial, early and rapid growth in spring | Relatively low, reproduction mainly vegetative (high rates) | | Yes | Seeds mostly local; rhizomes by water, humans | | High energy allocation to tubers, rhizomes that can become dormant | Extremely wide, grows in most types of soil, moderately frost-tolerant | Shade, long periods of drought (tolerant to short drought periods); length of growing season (flowers late in summer/early fall) |
| *Heracleum sosnowskyi* | Perennial, early and rapid growth in spring | Very high (up to 100 000 per plant) | | No | Water, humans | | Seed dormancy | Wide, affinity to riparian and roadside habitats) but can also be found on meadows and forest edges | Shade, drought, prolonged floods, tolerant to frost |
| *Impatiens glandulifera* | Annual, early and rapid growth in spring | High (average 1000 per plant) | | Yes | Water, humans | | Seed dormancy, seed germination under water | Relatively narrow, tied to riparian communities | Frost-sensitive (in particular seedlings), drought, prolonged floods |
| *Reynoutria* spp. | Perennial, early and rapid growth in spring | Low (only in *r. X bohemica*), reproduction mainly vegetative | | Yes | Rhizomes by water, humans | | Resilient rhizomes | Wide, grow in variety of habitats | Shade, length of growing season, frost |
| *Robinia pseudoacacia* | Perennial, rapid growth of seedlings (up to 2m per year in first five years) | High (0.28 kg per year per plant) | | Yes | Wind, water, humans | | Seed dormancy; root suckering | Extremely wide, nitrogen-fixing tree, found in a wide range of soils types | Shade, extreme frost, excessive flooding |
| *Solidago* spp. | Perennial, early and rapid growth in spring | High (up to 10 000 per shoot) | | Yes | Seeds by wind and water, rhizomes by water | | Seed dormancy, resilient rhizomes | Extremely wide, grow in a wide range of soils, habitats, and climates | Drought, prolonged periods of frost, length of growing season (flower late in summer) |

**Figure S1** Maxent response curves showing the functional relationships between predictor variables and species presence/study-area background points for *Helianthus tuberosus* L., as defined by the maximum entropy algorithm. The response curves are similar for the other eight invasive plant species/genera studied. Maxtwarm = 40-year average maximum temperature (°C × 10) of the warmest month; mintcold = 40-year average minimum temperature (°C × 10) of the coldest month; s\_dist\_sett\_r = proximity (m) to roads and settlements; s\_dist\_water = proximity (m) to water bodies; slope = slope (°); sat = annual sum of daily average active temperatures (°C) > 10°C. The red line represents the response curve fitted on all presence data; the blue line indicates the variation induced by fitting a curve at each step of a five-fold cross-validation.

