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Phytosociological description of a hilly country stand of Impatiens parviflora DC.

By
P. CSONTOS

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Abstract: A stand of Impatiens parviflora, an adventive plant in Europe, was studied at Vadálló-rocks, Pilis Mts., Hungary. The stand is situated mostly at the ecotone of a Querco petraeae-Carpinetum pannonicum and a Mercuriali-Tilietum forest. With the shrinking of the well-developed geophyte aspect (mainly Corydalis cava and solida) Impatiens becomes dominant and remains so during the whole summer until fall. The main reason for its success in colonization is that the natural vegetation leaves a suitable habitat open and accessible for I. parviflora in time and space.

INTRODUCTION

Impatiens parviflora DC. is well-known as a continuously spreading alien species in Europe (MEUSEL et al. 1978). Its first occurrence was noted in 1891 by BORBÁS. Later PRISZTER (1965) investigated it in more details and presented a map of its in distribution in Hungary, together with two other alien species (I. glandulifera Royle and I. balfourii Hook.f.).

The communities where I. parviflora may be found in Hungary have been published by SOÓ (1964-1980). These are; in floodplain forests: Salicetum albae-fragilis, Fraxino pannonicae-Ulmetum, Carici remotae-Fraxinetum, in oak forests: Quercetum petraeae-cerris pannonicum, Convallario-Quercetum roboris, woody and floodplain weed-communities: Cuscuto-Calystegietum sepium. Considering the speedy expansion of the range of Impatiens parviflora, the list of associations will probably increase.

This work was carried out in the Biosphere Reserve of the Pilis Mts. The aim of the study was to describe the communities where I. parviflora exists and find the reasons of its accommodation.

MATERIALS AND METHODS

The object of study was an I. parviflora stand at Vadálló-rocks in the Pilis mountains, Hungary. It is a large, young (not older than 10 years) stand originated by indirect human activity, probably introduced by hikers.

Sampling was carried out according to BRAUN-BLANQUET (1964) using 10 permanent quadrats each 100 sq.m. in size and the field work was carried out in 1984 and 1985 (the estimated cover values are: + = -1%, 1 = 1-5%, 2 = 5-25%, 3 = 25-50%, 4 = 50-75%, 5 = 75-100%). We compiled the data of the samples in a comprehensive table where the A-D values mean the minimal and maximal cover values of each species and Fr stands for the frequency of the given species in the quadrats (I=-20%, II=20-40%, ... V=80-100% of the quadrats).

RESULTS

The habitat is on a steep (30^{o}-60^{o}) slope with N-NE expositions. The parent rock is neutral Miocene andesitic tuff. Dark-coloured forest soil (between Erubaz and Ranker) is characteristic there. The soil is rich in nutrients, it is well aerated and has a quite uniform water supply except for a narrow zone of about 20 m wide along the ridge which becomes a bit drier in summer.

This upper zone (zone 1) is covered by the mixed canopy of Quercus petraea, Sorbus torminalis, Carpinus betulus, Acer campestre, Cornus mas, and Fraxinus ornus. There is a well-developed shrub layer consisting mainly of Cornus mas. Corydalis solida and cava, Primula veris, and Veronica hederifolia are dominant in its spring aspect.

Below this strip (zone 2) there is a Mercuriali-Tilietum covering the rocky sites and Querco petraeae-Carpinetum pannonicum growing on the other sites without rocks. These patches are too small for these different forest types to reach typical forms, so the greatest part of this area is the ecotone of the two abovementioned associations. The shrub layer is weak or absent in this area. Corydalis cava and solida are dominant in its spring aspect.

Impatiens parviflora is abundant in both zones (with 70-100% cover value), however in zone 2 probably because of the more humid soil it shows greater vitality and productivity. Seedlings of Impatiens appear in the first week of April during the flowering of geophytes. By the time Corydalis species disappear - the first week of May - Impatiens colonizes the habitat producing already the same cover value as it has in summer. It is possible, because though individuals are small with some leaves only, they are numeruos (700-1400 individual/sq.m.). Peterson mentions a same aspectual changing in the case of geophytes and Impatiens pallida (PETERSON GRAY 1982). After colonization the I. parviflora retains its dominance until fall (first weeks of September).

The summer aspect of this area in the natural case (without Impatiens) is subnudum. It consists of some scattered perennials, mainly dicotyledonous species, and the seedlings of Fraxinus excelsior, but their cover value all together does not reach 10%.

So the reason for the success of I. parviflora in colonization is that the natural species of the herb-layer leave a suitable and large enough habitat unoccupied and Impatiens is just able to fill it in time and space.

Table. Pooled table of the Impatiens parviflora stand at the ecotone of Mercuriali-Tilietum and Querco petraeae-Carpinetum pannonicum.

Number of samples: 10; size: 100 sq.m. each; altitude above see level: 410-510 m, average 460 m; exposition: N-NE; angle of slope: 30^{o}-60^{o}, average 40^{o}; height of trees: 8-25 m, average 17 m; canopy cover: 35-80%, average 60%; height of shrub layer: 1.5-7 m, average 3 m; cover of shrub layer: 0-5(-45)%; height of herb layer: 0.2-0.7(-1.2) m, average 0.4-0.5 m; cover of herb layer: 15-98%, average 65-70%.

Species are arranged in groups according their phytosociological role following SOÓ (1968). The letters in brackets after the names mark the layer of vegetation where the given species were found; a = canopy, b = shrub layer, c = herb layer. Species without any indication were found in the herb layer only.

Fagetalia species characteristic for Acerion pseudoplatani	A-D	Fr.		A-D	Fr.
Fraxinus excelsior (a, b, c)	+-3	IV.	Stellaria holostea	+	II
Tilia platyphyllos (a, c)	1-2	II	Tilia cordata	+	I
Acer pesudoplatanus (a, c)	+-1	II	Fagetalia species		
Cystopteris fragilis	+-1	II			
Melandrium sylvestre	+	I	Moehringia trinervia	+-1	V
Parietaria erecta	+-1	I	Corydalis cava	+-3	IV
Ulmus scabra (a, c)	+-1	I	Galanthus nivalis	+-1	IV
			Corydalis solida	+-1	III
Fagetalia species characteristic for Carpinion			Gagea lutea	+	III
			Mercurialis perennis	+-2	III
Carpinus betulus (a, b, c)	+-4	V	Fagus sylvatica (a, b, c)	2-4	II
Cerasus avium (a, c)	+-2	II	Stachys sylvatica	+-1	II

	A-D	Fr.
Asarum europaeum	+	I
Epilobium montanum	+-1	I
Scrophularia vernalis	+-1	I
Quercetea species and Querco-Fagea species characteristic for Quercetea (x)		
xAcer campestre (a,c)	+-2	IV
Cardaminopsis arenosa	+	III
Cornus mas (a,b,c)	1-4	III
Quercus petraea (a,c)	1-3	III
xDigitalis grandiflora	+	II
Fraxinus ornus (a)	+-3	II
xViola cyanea	+-1	II
xCalamintha clinopodium	+	I
xEuonymus europaeus (b,c)	+-1	I
Spiraea media	+	I
xCrataegus monogyna (b)	+	I
Querco-Fagea species		
Polygonum dumetorum	+	V
Acer platanoides (a,c)	+-1	IV
Clematis vitalba (mainly seedlings)	+-1	IV
Geranium robertianum	+-2	IV
Geum urbanum	+	IV
Melica uniflora	+-2	IV
Poa nemoralis	+-3	IV
Primula veris	+-1	IV
Dactylis polygama	+-1	III
Veronica hederifolia	+-2	III
Viola odorata	+-1	III
Campanula persicifolia	+	II
Campanula rapunculoides	+-1	II
Galium schultesii	+-1	II
Sorbus torminalis (a)	1	II
Carex divulsa	+	I
Crataegus oxyacantha (b)	1	I
Ficaria verna	+	I
Lapsana communis	+	I
Mycelis muralis	+-1	I
Staphylea pinnata (b)	+	I
Scrophularia nodosa	+	I
Veronica chamaedrys	+	I
Viola mirabilis	+-1	I
Other species		
Impatiens parviflora	(1-) 3-5	V
Anthriscus silvestris	+-1	I
Lamium album	+-1	I
Rubus sp.	+	I
Indifferent species		
Alliaria petiolata	+-1	V
Galium aparine	+-1	IV
Urtica dioica	+-3	IV
Chelidonium majus	+	II
Glechoma hederacum	+	II
Stellaria media	+	I

Accidental species (found in the herb layer, in one quadrat and with a value of "+" only). Acerion pseudoplatani: Arabis turrita, Fagetalia: Anemone ranunculoides, Dryopteris filix-mas, Euphorbia amygdaloides, Polypodium vulgare, Quercetea: Achillea distans, Euphorbia polychroma, xHypericum hirsutum, Querco-Fagea: Arum maculatum, Chrysanthemum corymbosum, Hieracium sabaudum, H. sylvaticum, Sambucus nigra observed out of samples, Other species: Lactuca serriola, Lamium purpureum, Linaria genistifolia, Rosa sp.

SUMMARY

Immigration of Impatiens parviflora DC. was investigated in the Biosphere Reserve of the Pilis Mts. Its stand is situated in the greater part at the ecotone of a Querco petraeae - Carpinetum pannonicum and a Mercuriali-Tilietum forest. Under usual circumstances only the spring geophyte aspect is well-developed giving considerable cover in these forests while the summer aspect is of less importance with cover value below 10% in general.

It seems that the Hungarian flora did not have any species of the herb layer which could have filled this place with large abundance. I. parviflora proved to be a suitable species in time and space, so after introduction, being without any competitor it could colonize the vacant habitats within a short time.

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Author's address: P. CSONTOS
Botanical Department of the
Hungarian Natural History Museum
Budapest, Pf: 222
H-1473
HUNGARY