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ALIEN SPECIES *IMPATIENS PARVIFLORA* INVASION INTO FOREST COMMUNITIES OF LITHUANIA

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Abstract

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Alien plants threaten native communities by altering their species composition and reducing native biodiversity. Forests are considered to be relatively stable ecosystems and resistant to plant invasions. *Impatiens parviflora* DC. is one of the most intensively spreading alien plant species in the forests of Lithuania. Phenotypic variations among *I. parviflora* populations in three different habitat types (with different species of dominant tree and the coverage of the first tree layer) in the environs of Vilnius (South East Lithuania) were analysed. The results of the investigation enabled to evaluate alien plant species *I. parviflora* invasion into different forest communities and estimate relationships between plants of forest communities and *I. parviflora*.
The study has shown that this invasive species is spreading not only in disturbed areas, but also in places where other species do not grow due to the lack of the light. However, the number of individuals is increasing in proportion while the coverage of trees and shrubs is decreasing. The rise of the level of illumination increases not only the number of individuals in the populations, but also the above-ground biomass of *I. parviflora*: plants are larger, produce more side shoots. The correlation between the coverage of *I. parviflora* and native species statistically is significantly negative (r = -0.78) in the disturbed places.

Keywords: non-native plants, invasive species, synanthropic flora, phenotypic plasticity, forest habitats.

INTRODUCTION

Research on invasions of communities has become a global phenomenon (Gurevitch & Padilla, 2004; Pyšek et al., 2008; Vitousek & Walker, 1989). Most attention is paid to properties of species that make them successful invaders (Burton et al., 2009), and properties of communities that make them invasible (Battipaglia et al., 2009; Herben, 2008). According to Abbitt et al. (2000), Gurevitch & Padilla (2004) and Wilcove et al. (1998) invasions by non-native species is a leading cause of recent species extinctions.

Forests are considered to be relatively stable ecosystems (Muller-Scharer et al., 2004). They are rich in native species and are less likely to be colonized by alien invasive plants (Didham et al., 2005). Comparative data in invasion ecology show that disturbance enhances community inviability (Lake & Leishman, 2004; Thomson & Leishman, 2005), because such communities are not fully consistent. These disturbances may be induced by natural phenomena or by human activities (Dale & Adams, 2003).

In Europe, *Impatiens parviflora* DC. is an alien species native of Central Asia (Coombe, 1956). The first sample of this species in Europe was collected at the Botanical Garden of Dresden, Germany in 1837. Since then *I. parviflora* has spread in many European countries (FOEN, 2006). It has naturalized in a large part of Europe except the Mediterranean region. This species often occurs in disturbed forests (Graae et al., 2003; Graae et al., 2004) and

riparian communities; however, the invasion of *I. parviflora* in natural habitats (Graae et al., 2003) with higher richness of native species (Chmura & Sierka, 2006) is noted.

In Lithuania, *I. parviflora* first was recorded in 1934. This invasive species is diffusely distributed throughout the whole territory of the country and has invaded both natural and anthropogenic habitats: forests, forest cutting areas, waste lands, river banks, gardens, railways (Gudžinskas, 1998). *I. parviflora* is included in the list of invasive species in Lithuania, because it poses a threat to biodiversity and the ecosystems (Aplinkos ministerija, 2004).

The aim of the study was to test the morphological parameters of *I. parviflora* for the ability of this species to form the inflorescence and seed bank under different environmental and intraspecific competition conditions, to evaluate the intraspecific competition properties and the impact of this alien plant on the native plant species and forest communities.

MATERIALS AND METHODS

The investigations on the impact of *Impatiens parviflora* on forest communities were performed in July 2008. Three different populations of this species were analysed. In each population *I. parviflora* was studied in two transects (25 × 1 m each), which were divided into 50 sampling plots of 1 × 1 m in size. Direction of transect depended on the character of distribution of individuals, density and size of the population.

Morphometric parameters (plant height, distance from the ground level to the base of first lateral branch, length of inflorescence, and number of lateral branches) and the group of maturity were registered.

Forests were classified visually into three classes according to the coverage of tree layer: (1) open – if the first and second tree layers were sparse (canopy coverage 15–45 %); (2) intermediate – if canopy covers 50–70 %; and (3) closed – if there were lots of trees (canopy coverage 75–95 %) (Hamberg et al., 2009).

During field investigations, the structure of plant community, species diversity and their coverage were estimated. Species abundance and coverage were estimated according to the six-grade J. Braun-Blanquet scale (Natkevičaitė-Ivanauskienė, 1983).

Nomenclature of vascular plant species and species status in Lithuania follows the checklist "Vascular Plants of Lithuania" (Gudžinskas, 1999), moss species – "Mosses of Lithuania" (Jukonienė, 2003).

Similarity of plant species diversity between the study areas was evaluated using the Jaccard similarity coefficient (C_J) (Jongman et al., 1995):

$$C_J = c / a + b - c,$$

where a – the number of species in one sample plot; b – the number of species in the other sample plot; c – the number of species in both sample plots.

For each species recorded in this study, separately for each habitat type, we calculated its relative frequencies of occurrence (Brower & Zar, 1984):

$$F_i = (j_i / k) \times 100\ \%,$$

where j – the number of plots, in which species 'i' was recorded, and k – the total number of plots.

For a statistical analysis of the data *Statistica 6.0* software was employed. Descriptive statistics were used to compute summary data such as means, medians, standard deviations, etc. The correlations between the coverage of *Impatiens parviflora* and herb layer, also between the coverage of *I. parviflora* and mosses were calculated using the Pearson correlation coefficient.

CHARACTERISTICS OF THE STUDY AREAS

The sites selected for the investigation of *Impatiens parviflora* populations were situated in three different forest habitats in the environs of the northern part of Vilnius. The anthropogenic influence, trophic and hydrological conditions of the habitats as well as illumination were different in the selected study areas. The populations of *I. parviflora* were named according to the dominant first tree layer.

Pine forest. The first population of *I. parviflora* was selected in *Pinus sylvestris* L. forest with abundant herb layer. The coverage of the first tree layer was about 60 %; herb layer – 70 % (Table 1). In this plant community grew species such as *Mycelis muralis* (L.) Dumort., *Mercurialis perennis* L., *He-*

patica nobilis Mill., *Galium aparine* L., *Chelidonium majus* L., *Trientalis europaea* L., *Dactylis glomerata* L., *Galium mollugo* L., *Maianthemum bifolium* F. G. Wigg. The coverage of mosses in this population was low (about 20 %), only *Pleurozium schreberi* (Brid.) Mitt. dominated.

The sampling area was selected in the forest of Augustai in the territory of Vanagynė Geomorphological Reserve. The study area was away from the city, roads and tracks, so the plant community was less influenced by human activities; also the habitat was dry and sufficiently well illuminated.

Spruce forest. The second population of *Impatiens parviflora* was selected in the forest, where dominant tree was *Picea abies* (L.) H. Karst, but the coverage of herb layer in this plant community was sparse (20 %). Human activities in the location were not observed. The coverage of the first tree layer was about 80 % (Table 1). Together with *Impatiens parviflora* grew *Oxalis acetosella* L., *Hepatica nobilis, Urtica dioica* L. The coverage of mosses in the habitat was large (about 80 %).

The study area was located in Vanagynė forest. The conditions of the habitat were influenced by dense spruce tree of the same age: it was cold, wet and dark.

Pine forest edge. The last population of *Impatiens parviflora* was studied on the pine forest edge. The first tree layer was dominated by *Pinus sylvestris* and the coverage of the layer was about 30 %. The coverage of *Impatiens parviflora* in this population was about 90 % (Table 1). In this place, other non-native plants such as *Sambucus nigra* L., *Ribes rubrum* L., *Solidago canadensis* L., *Vinca minor* L., *Tropaoelum majus* L., *Galinsoga parviflora* Cav., *Dianthus barbatus* L., *Impatiens glandulifera* Royle were also abundant. In the moss layer prevailed *Pleurozium schreberi*, *Dicranum polysetum* Sw. and *Hylocomium splendens* (Hedw.) Schimp.

The sampling plot was arranged in Avižieniai forest, near Avižieniai communal gardens, in a dry, well-illuminated forest habitat near the road and situated at the narrow zone where fallen leaves and other plant remnants were dumped. Thus, the area was disturbed by human activity.

Table 1. Comparison of the coverage of plants in the investigated plant communities

Coverage of	Population		
	Pine forest	Spruce forest	Pine forest edge
First tree layer	60 %	80 %	30 %
Second tree layer	20 %	10 %	10 %
Shrub layer	10 %	20 %	40 %
Herb layer*	70 %	30 %	95 %
Moss layer	40 %	80 %	60 %
Impatiens parviflora	60 %	20 %	90 %

* – *Impatiens parviflora* coverage is included

Table 2. Coverage of *Impatiens parviflora* and neighbouring species in the sample plots

Population	N	Average	Minimum	Maximum	Standard deviation	Standard error
Coverage (%) of *I. parviflora* per 1 m²						
Pine forest	50	46.60	20.00	70.00	14.47	0.33
Spruce forest	50	12.14	0.00	20.00	5.75	0.36
Pine forest edge	50	84.22	0.00	100.00	9.76	0.35
Coverage of accompanying species (%) per 1 m²						
Pine forest	50	47.90	10.00	80.00	18.95	0.33
Spruce forest	50	15.47	5.00	40.00	8.32	0.36
Pine forest edge	50	23.88	10.00	50.00	6.44	11.81
Number of *I. parviflora* individuals per 1 m²						
Pine forest	50	36.06	11.00	62.00	12.62	0.33
Spruce forest	50	5.25	0.00	12.00	6.44	0.95
Pine forest edge	50	26.20	0.00	47.00	12.61	1.78
Number of neighbouring species per 1 m²						
Pine forest	50	14.03	7.00	20	8.45	0.19
Spruce forest	50	4.05	3.00	6.00	2.89	0.14
Pine forest edge	50	8.88	5.00	16.00	3.33	0.08

N – number of investigated plots

RESULTS

The number and density of *Impatiens parviflora* individuals in the studied populations were very different. The *I. parviflora* population in the pine forest was exceptionally abundant – 1803 individuals were found in the sample plots. In the spruce forest – 263 and on the pine forest edge – 1310 individuals were found. Respectively, the greatest density of *I. parviflora* individuals was in the pine forest – 36.06 ± 12.62 individuals/m² (Table 2).

Comparison of the populations according to the coverage and number of *I. parviflora* individuals in the sample plots showed that the greatest number of individuals was not in the population, which had the highest coverage of the invasive species. The highest coverage of *I. parviflora* was found in the pine forest edge population (it varied from 60 to 100 %); however, the greatest number of *I. parviflora* individuals per 1 m² was in the pine forest population (it varied from 11 to 62 individuals/m²). The coverage of *I. parviflora* in the pine forest population varied from 20 to 70 %, in the spruce forest population from 5 to 20 % (Table 2).

The investigation revealed that the height of *I. parviflora* individuals, the height of plants up to the first lateral branch and the height up to the inflorescence in the studied population were significantly different (Table 3).

The greatest variation of height of *I. parviflora* was revealed in the pine forest edge population (it varied from 27.00 cm to 111.00 cm) (Fig. 1). In the pine forest population, which was characterized by extremely large number of *I. parviflora* individuals, the investigated plants were lower: their height varied from 3.00 cm to 54.50 cm; the height of vegetative plants was up to 24.00 cm. The lowest height of individuals was in the population of spruce forest. Correlation between the maximum height of vegetative and generative *I. parviflora* individuals in this population was not significant (Table 3).

Table 3. Statistics of the investigated parameters of *Impatiens parviflora*

Population	Maturity groups	N	Average	Median	Minimum	Maximum	Standard deviation	Standard error
Plant height (cm)								
Pine forest	V	107	15.21	14.00	3.00	24.00	3.68	0.36
	G	1696	26.88	27.00	15.00	54.50	7.84	0.19
Spruce forest	V	83	12.85	13.00	5.00	18.00	2.88	0.32
	G	180	20.63	21.00	13.00	25.00	3.49	0.26
Pine forest edge	V	0	0	0	0	0	0	0
	G	1310	83.48	87.00	27.00	111.00	19.22	0.53
Plant height up to the inflorescence (cm)								
Pine forest	G	1696	23.77	23.50	11.00	43.00	6.37	0.15
Spruce forest	G	180	19.23	19.50	12.00	23.00	3.35	0.25
Pine forest edge	G	1310	62.69	64.00	24.00	94.00	13.41	0.37
Number of lateral branches								
Pine forest	V	107	0.13	0.00	0.00	2.00	0.39	0.04
	G	1696	0.92	0.00	0.00	6.00	1.14	0.03
Spruce forest	-	-	-	-	-	-	-	-
Pine forest edge	V	0	0	0	0	0	0	0
	G	1310	1.83	2.00	0.00	5.00	1.12	0.03
Plant height up to the first lateral branch (cm)								
Pine forest	V	107	1.59	0.00	0.00	10.00	4.37	0.42
	G	1696	7.22	0.00	0.00	27.00	7.89	0.19
Spruce forest	-	-	-	-	-	-	-	-
Pine forest edge	V	0	0	0	0	0	0	0
	G	1310	62.69	64.00	24.00	94.00	13.41	0.37

N – number of investigated plants
V – vegetative plants
G – generative plants

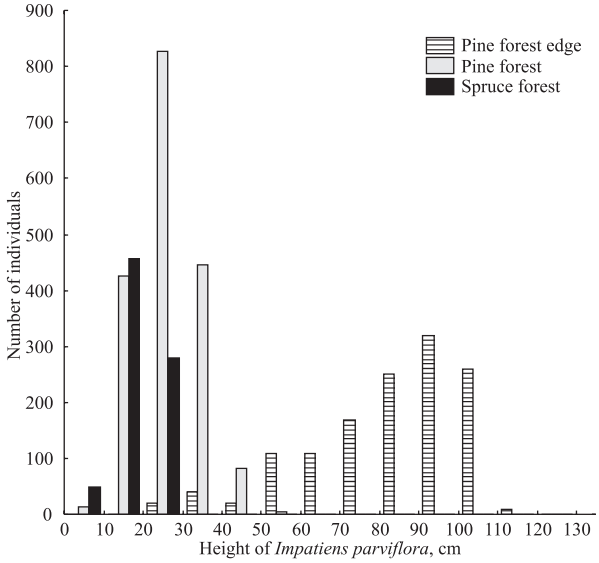

Fig. 1. Height of *Impatiens parviflora* individuals

In the process of the analysis, the height of *I. parviflora* individuals up to the inflorescence was measured. In the pine forest edge population the average height up to the inflorescence was the highest compared to other studied populations – 62.69 ± 0.37 cm. In the pine forest and in the spruce forest populations the average was similar: 23.77 ± 0.15 cm and 19.23 ± 0.25 cm, respectively (Table 3).

The largest number of *I. parviflora* lateral branches in the pine forest and in the pine forest edge populations was similar (5 and 6 lateral branches, respectively). However, the greatest average of lateral branches was in the pine forest edge populations. Also in this population the heights of *I. parviflora* individuals up to the first lateral branch were the greatest (Table 3). In the spruce forest population all plants were without lateral branches.

The analysis of *I. parviflora* populations revealed that the height of plants up to the first lateral branch, the number of lateral branches and the height up to the inflorescence depend on the height of *I. parviflora* individuals, because correlation among these characters in all studied populations was statistically significant (Table 4).

The investigation on maturity groups revealed that generative *I. parviflora* plants in all studied populations dominated and populations according to this character did not differ significantly. In the pine forest edge population all individuals were at generative stage. In the pine forest population generative plants comprised 94.70 % and in the spruce forest population – 93.08 % of the total number of plants.

The total number of species recorded in the sampling plots of the pine forest edge population was 34, in the pine forest population 28 species were recorded. In the sampling plots of spruce forest population 16 species were registered (Table 2). In all cases *I. parviflora* was excluded from the calculation of species number. The coverage of mosses in these habitats was very different (varied from 20 to 80 %), but the composition was very poor (the composition of mosses was discussed above).

The analysis of frequency of the plant species registered in all studied areas revealed a group of species that occur in most of the investigated areas. Only two herbaceous plant species were registered in all study areas: *Urtica dioica* and *Oxalis acetosella* (100 % frequency); three species were recorded in two study areas: *Rubus idaeus*, *Maianthemum bifolium* and *Dryopteris carthusiana* (66.67 %).

Similarity of plant species diversity coefficient

Table 4. Correlations of *Impatiens parviflora* parameters (in all cases $p < 0.0001$)

Population	Pine forest			Spruce forest			Pine forest edge		
Character	2.	3.	4.	2.	3.	4.	2.	3.	4.
1.	0.77	0.66	0.16	–	0.87	–	0.81	0.69	0.46
2.	–	0.50	0.34		–	–	–	0.56	0.51
3.		–	0.85			–		–	0.24

Character: 1. Plant height (cm); 2. Height to the first lateral branch (cm); 3. Height to the inflorescence (cm); 4. Lateral branches number.

Table 5. The analysis of correlation between the coverage of *Impatiens parviflora* and other parameters

Populations	Pine forest edge		Pine forest		Spruce forest	
Coverage of (%)	Herb	Moss	Herb	Moss	Herb	Moss
Impatiens parviflora	-0.78 p = 0.0000	-0.82 p = 0.0000	-0.65 p = 0.0000	-0.50 p = 0.0001	-0.12 p = 0.3986	-0.24 p = 0.0918

values established in the study areas was rather low. The highest coefficient values were revealed between the pine forest and the pine forest edge study areas (C_J = 0.51; 21 common species). The lowest similarity was between the spruce forest and the pine forest (C_J = 0.22; 8 common species) as well as between the pine forest edge study areas (C_J = 0.25; 10 common species).

Correlation between the coverage of *I. parviflora* and the coverage of mosses, also between the coverage of *I. parviflora* and other plant species in all studied populations was negative and statistically significant. The strongest correlations among these characters were in the pine forest edge population (r = -0.82 and r = -0.78 (Fig. 2), respectively), whereas correlations of these parameters in the spruce forest population were not very strong compared to other studied populations (Table 5).

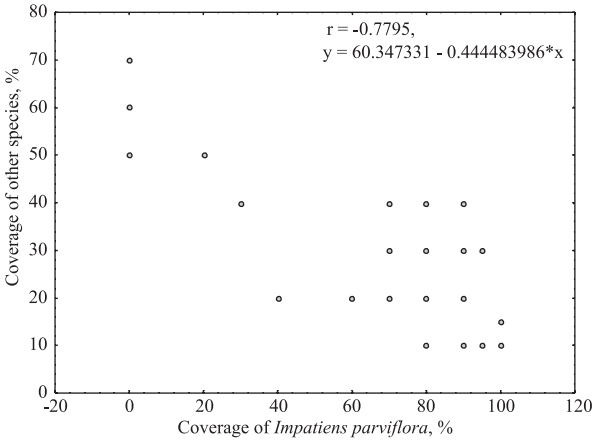

Fig. 2. The relationship between the coverage of *Impatiens parviflora* and other species in the pine forest edge population ($p < 0.05$)

DISCUSSION

Impatiens parviflora is a species with wide ecological amplitude, what probably contributes to its invasiveness and enables success in colonizing and persisting in forest ground vegetation (Chmura et al., 2007). This invasive species can occur on moderately shade (plants occurring chiefly in shade places) or moderately light (plants occurring chiefly in full light) (Zarzycki et al., 2002). Therefore, our analysis of the phenotypic variations of *I. parviflora* in different habitat types showed a significant difference in morphometric parameters and density of this species between these populations. Elemans (2004) points out that for annual species, which do not have the opportunity to draw from the resource stock in their storage organ in adverse growing conditions, plasticity might be an essential trait to survive in variable environments.

The investigation revealed that lower number of *I. parviflora* individuals was in the populations occurring in the plant community dominated by *Picea abies* (spruce forest population), which is characterized by large (80 %) coverage of the first tree layer. Dense tree canopy influenced negatively herb layer and the coverage both of native herbs and *Impatiens parviflora* was also low. According to Alston & Richardson (2006) and Rose & Hermanutz (2004) low levels of light availability limited alien plant invasion in forest habitats. However, *I. parviflora* as a shade-tolerant species is capable to exist on such conditions (Chmura & Sierka, 2006), so even poor illumination is sufficient for survival of *I. parviflora* individuals. But in the spruce forest population, the average height of the *I. parviflora* individuals was the lowest compared to other studied populations. In this population, the inflorescence bases of some generative plants were in the height of 13 cm, although the stem height was only 17 cm. So, the inflorescences were formed by lower plants due to the deficiency of light and nutrients. Ability to form generative organs in any conditions is an important factor influencing the spread of alien species into natural areas (Alston & Richardson, 2006). However, the plants did not develop lateral branches; nonetheless the density of *I. parviflora* individuals in this population was lower.

In other investigated populations of *I. parviflora*, the aboveground mass of the individuals was increasing by increasing the amount of illumination: the plants were thicker and developed larger number of lateral branches. The growing aboveground mass increases the assimilation surface of the plant (Falinska, 1998). Peace & Grubb (1982) also indicated that at high light availability *I. parviflora* had the highest biomass, and at low light levels, it was the lowest. It was observed that the aboveground biomass of *I. parviflora* decreased with the increasing number of individuals in these populations; however, this relationship was not found between the biomass and coverage of *I. parviflora*.

Peculiarities of the soil also may have contributed to these results, though Elemans (2004) indicates that the main factor affecting plasticity in biomass allocation of *I. parviflora* is light. According to Chmura et al. (2007) this invasive species reveals two optima of soils reaction: *I. parviflora* are located on very strongly and strongly acid soils and the second is associated with neutral soils where it is more frequent than on slightly acid and alkaline soils (pH range from 2.75 to 8.50). The results of our study demonstrate that the lower number of *I. parviflora* individuals (263), the lower plants (18.21 cm) and shorter height to the inflorescences (average – 13.26 cm) were established in the plant community with *Picea abies*. It is known that the forest of *Picea abies* is relatively poor in nutrients (Oberdofer, 1994). And otherwise, the greater the number (1320) of *Impatiens parviflora* individuals, the higher plants (average – 83.48 cm) were registered in the population, which was located in humus-richer soil in the pine forest edge. This habitat characterizes very clear anthropogenic activities: the fallen leaves and other plant remnants were dumped there. According to Chmura et al. (2007) in such place the amount of humus, nitrogen and organic carbon could be very high.

Strong correlation between the height of *I. parviflora* individuals and morphometric parameters of the other aboveground parts (height to the basis of the first lateral branch, the number of lateral branches and stem height up to the inflorescence base) can be interpreted as the growth of *I. parviflora* being continuous over time. The results of this study show that the generative plants in all the populations prevail, regardless of the density of individuals and the environmental conditions. So this invasive plant can mature seeds in different conditions and maintain population stability. Vegetative individuals were very low, so we think that they were overwhelmed by higher individuals and unable to develop the generative organs until the end of the growth season.

Chmura & Sierka (2007) indicated that the impact of *I. parviflora* on the species diversity of invaded communities is very little and much less dramatic than of other invasive species, in spite of the fact that negative correlation between the coverage of *I. parviflora* and the percent coverage of neighbouring species was revealed. The results of our study demonstrate that the impact of *I. parviflora* is associated with the degree of its dominance, because in the sites with high levels of *I. parviflora* invasion was maximum loss in native species richness and diversity. For example, in the pine forest edge population the correlation between the coverage of *I. parviflora* and other species was statistically significantly negative and strong (Fig. 2). According to Standish et al. (2001) and Stinson et al. (2007) native species differ in their resistance to invasion; some are excluded from invaded communities more easily than others. So our results showed that species such as *Maianthemum bifolium*, *Hepatica nobilis*, *Galium aparine* do not occur at sites where *Impatiens parviflora* is most abundant. When the coverage of *I. parviflora* is high, only strong competitors such as *Urtica dioica* and *Rubus idaeus* occur. So this invasive species develop homogenous stands. According to Hejda et al. (2009) the decrease in species evenness, and consequently diversity, is mostly driven by the coverage and height of invading species, independently of species identity. In the pine forest and the pine forest edge sampling plots, *Impatiens parviflora* have on average higher coverage (Table 2) and height (Table 2) than native species (Table 4). The highest impact on species richness indicates that the impact of such invaders is not restricted to the community level, but represents a serious hazard also at the landscape scale (Hejda et al., 2009).

Native plant species richness in the spruce forest population did not correlate with the number of *I. parviflora* individuals. In this community the coverage of *I. parviflora* and neighbouring species was lower (average 12 % and 15 %, respectively) (Table 4). A much higher density of *I. parviflora* in altered by human activity communities than a relatively natural unequivocally shows that species-rich natural forest communities are much more resistant to the invasion of *I. parviflora* than those degraded and altered by human activity.

CONCLUSIONS

The investigated communities differ significantly one from another in richness and total coverage of herbaceous species. This indicates that *I. parviflora* may establish in different habitats. The coverage and abundance of this invasive species significantly de-

pends on the anthropogenic influence, the level of illumination and nutrient availability.

These studies suggest that the effect of *I. parviflora* on species composition was different and depends on the density of the *I. parviflora* individuals as well as on morphometric parameters of individuals. The correlation between the invasive species coverage and the number of synanthropic species in all communities was statistically negative.

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SVETIMŽEMĖS RŪŠIES *IMPATIENS PARVIFLORA* PLITIMAS LIETUVOS MIŠKŲ BENDRIJOSE

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Santrauka

Viena didžiausių šiuolaikinių grėsmių biologinei įvairovei yra spartus svetimžemių rūšių skverbimasis į natūralias ekosistemas. Šių tyrimų metu buvo bandoma įvertinti plačiai Lietuvoje paplitusios invazinės rūšies – *Impatiens parviflora* plitimo tendencijas skirtingose augavietėse. Lietuvoje *I. parviflora* pirmą kartą užregistruota 1934 m., o dabar ši rūšis yra paplitusi visoje šalies teritorijoje. Dėl keliamos grėsmės biologinei įvairovei ir ekosistemoms *I. parviflora* yra įtraukta į Invazinių Lietuvoje organizmų rūšių sąrašą.

Atlikus tyrimus paaiškėjo, kad buveinės apšviestumo lygis *I. parviflora* paplitimui įtakos neturi. Šis invazinis augalas paplitęs ne tik pažeistose buveinėse, bet ir tose vietose, kur dėl šviesos trūkumo kitos rūšys neauga ir yra laisvos, žoline danga nepadengtos, nišos. Tačiau individų gausumas populiacijose proporcingai didėja mažėjant medžių ir krūmų ardų projekciniam padengimui. Didėjant apšviestumo lygiui ne tik didėja individų skaičius populiacijose, bet didėja ir išauginama *I. parviflora* individų antžeminė biomasė.

Nors literatūroje nurodoma, kad *I. parviflora* poveikis vietinių rūšių įvairovei, lyginant su kitomis invazinėmis rūšimis, yra nedidelis ir mažai reikšmingas, tačiau atlikti tyrimai parodė, kad intensyviai pažeistose augavietėse koreliacija tarp *I. parviflora* ir vietinių rūšių padengimo yra stipriai statistiškai neigiama ($r = -0.78$). Tyrimų laukeliuose, kuriuose *I. parviflora* augalų padengimas yra labai didelis (apie 90 %), kartu su šia invazine rūšimi augo tik stipriomis konkurencinėmis savybėmis pasižyminčios ruderalinės rūšys: *Urtica dioica*, *Rubus idaeus*.