Stem fungi disease (*Puccinia komarowii*) on *Impatiens parviflora* in Slovakia: effects on population dynamics and its role in regulation of plant populations

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Abstract: Since 1985 population dynamics opf *Impatiens parviflora* DC., an invasive annual of Central-Asiatic origin, have been studied in several localities in western Slovakia (Malé Karpaty Mts.). A stem disease on *Impatiens* was observed first time in 1987 in the populations at Bratislava-Železná Studienka; it was determined as *Puccinia komarowii* (ELIÁŠ 1994). Since that time number of infected plants has progressively increased from a year to year and spreading of the disease was evident. In April 1994 65–99% of plants in the forest populations was infected by the stem disease. The infected plants have survived only some weeks and they were among the first plants died during next months (predominantly in May). Extremely high mortality of infected plants (close to 100%) resulted in lower population density and in reduction of fruit production in the population. The infection of *I. parviflora* by the pathogenic fungi has a strong impact on its population biology.

Introduction

Fungal parasites can attack agricultural plants and can reduced harvest. There are several reports on the occurrence of significant levels of disease in wild populations (cf. SILVERTOWN and LOVETT DOUST 1993) The fungi may influence the population dynamics of a plant population (HARPER 1977, BURDON 1987).

Puccinia komarowii TRANZSCH. 1903 was described on *Impatiens parviflora* DC. and *I. amphorata* EDGEW. in Central Asia and northern Himalayas. Since 1st world war it spread on western direction up to Switzerland and northern France. In Eastern Europe (Ukraine) it was found in 1921, in Switzerland in 1938 (MAJEWSKI 1979) on *Impatiens parviflora.*

Puccinia komarowii attacks the stem of young *I. parviflora* plants in closed decidous stands of *Carpinus betulus* and *Quercus petraea* (Querco-Carpinetum) and in beech forests (Asperulo-Fagetum). It forms eocies on stems and stalks of young plants. In Slovakia it infects hypocotyls and stalk of cotyledons of *Impatiens parviflora* in their dense stands. Up to 90% of plants/stems may be attacked per 1 m^2

The main goal of the project was to study role of a disease in regulation of population dynamics and/or effects of the disease on mortality of plants during the development of the stand/population.

Material and methods

In an oak-hornbeam forest at Bratislava Železná Studienka population dynamics and regulation mechanisms in *Impatiens parviflora* DC. population have been studied since 1985. Permanent quadrats (square plots) were selected and fixed in forest understorey and in neighbouring cutted-areas. Since seedlings emergence the plants were counted and measured in 14-days intervals. Healthy status was analysed in field populations and diseased and healthy stems were distinguished (healthy and infected plants). In 1993 and 1994 permanent plots were also situated in such stands of *I. parviflora* where the stems were attacked by fungi. Effects of the fungi on stem/plants morphology was studied in both infected and healthy populations.

Results and discussion

A stem disease on *Impatiens* was observed first time in 1987 in the populations at Bratislava-Železná Studienka; it was determined as *Puccinia komarowii* (ELIÁŠ 1994). Since that time number of infected plants has progressively increased from a year to year and spreading of the disease was evident. In April 1994 65–99% of plants in the forest populations was infected by the stem disease.

HARPER (1977) noted in crops pathogens persist in the soil (as a slow-growing or resting mycelium, and long-lived spores) it seems probable that an entirely similar disease accumulations occurs in the soil, under more natural vegetation, but there has been little serious study of this possibility. Our results show, that such disease accumulation actually has occured in *Impatiens* population.

In 1993 *Puccinia komarowii* affected directly more than 30 percent of individuals in the population and caused death of young plants during May and June.

Field observations, performed in different populations in April to May 1994, showed infection percentages of 0 to 90%. High percentages of infection were found in dense populations. In strongly infected populations the mean percentage of disease appeared to be about 70%. It is known also from other populations than dense plant stands are particularly susceptible to fungal disease (BURDON 1987).

Puccinia komarowii affects morphology of *Impatiens* plants. It stimulates the elongation of the hypocotyls and shoots, so that shoots with an infection by *Puccinia komarowii* surmount all other plants up to 5–7 cm.

Heavily infected stems died after one-two months of infection. High mortality in parasitised plots has observed in May and June. During hot and drought period only healthy plants have survived.

In the field, the majority of the infected plants die before flowering and/or seed formation and set. It means that the fungi disease affects reproduction of *Impatiens* by decreasing production of seeds in natural populations.

It is evident that *Puccinia komarowii* caused high mortality in *Impatiens* populations in spring and has important role in regulation of population density of the species.

The disease actually affected population dynamics and reproduction of *Impatiens parviflora* DC. and it must be, therefore, considered as an important regulation factor also in the invasie species (anthropophytes).

REFERENCES

BURDON, J. J. (1987): Disease and Plant Population Biology. Cambridge University Press, Cambridge.

ELIÁŠ, P. (1992): Vertical structure, biomass allocation and size inequality in an ecotonal community of an invasive annual *Impatiens parviflora* DC. on a clearing in SW Slovakia. Ekológia (CSFR), 11:299–313,

– (1994): Population dynamics and regulation mechanisms in plant populations. In: Institute of Botany Annual Report for 1993. Slovak Academy of Sciences, Bratislava, p. 19–20.

ERNST, W H. O. (1983): Population biology and mineral nutrition of *Anemone nemorosa* with emphasis on its parasitic fungi. Flora, 173:335–348.

HARPER, J. L. (1977): Population Biology of Plants. Academic Press, London, 892 p.

MAJEWSKI, T. (1979) Grzyby (Mycota). Tom XI: Podstczaki (Basidiomycetes), Rdzawnikowe (Uredinales) II. Vydaw., Warszawa, 464 p.

Zur Gattung *Pritzelago* in den Ostalpen

Von Thorsten ENGLISCH

Für die kritische „Flora von Österreich" wurde die Gattung *Pritzelago* O. KUNTZE (= *Hutchinsia* R. BR.) mit der nun einzigen Art *P. alpina* (L.) O. KUNTZE im Ostalpenraum einer kritischen Revision unterzogen. Anstoß dazu lieferte die Publikation von TRPIN (1974), die aus dem Gebiet der Julischen Alpen eine neue Sippe als *Hutchinsia alpina* subsp. *austroalpina* beschrieb und damit erneut das Augenmerk auf die schon lange bekannten und mit vielen Namen belegten „Übergangsformen" zwischen *P. alpina* subsp. *alpina* und subsp. *brevicaulis* lenkte. Diese „Übergangsformen" waren auch der Grund, daß diese beiden Sippen wiederholt ihren Status – vom Rang einer Art zur Unterart bzw. umgekehrt – wechselten.

Die Unterscheidung der subsp. *brevicaulis* von subsp. *alpina* wurde durch SPRENGEL bereits 1825 (unter dem Namen *Hutchinsia brevicaulis*) durchgeführt, bekannt wurde sie vor allem durch HOPPE, der zahlreiche Belege in seinem Umfeld verteilte. MELCHERS (1932) führte ausgehend von der Problemstellung des „Kalk-Urgesteins-Vikariismus" eingehende Studien über Merkmale und Areal der beiden Sippen durch, wobei er bemüht war, Varietäten früherer Autoren (z. B. GLAAB 1894) möglichst auszuschalten. Dennoch mußte er auch abweichende Formen anerkennen, darunter als auffallendste jene Pflanzen aus dem Bachertal in den Sextener Dolomiten, die er als „Dolomiten-Sippe" bezeichnete und die von MARKGRAF (1962) als *Hutchinsia brevicaulis* var. *drexlerae* benannt wurde.

Eigene Aufsammlungen in den Jahren 1993 und 1994 in Teilen der Südalpen und eine eingehende Merkmalsanalyse nach Herbarmaterial brachte nun aufschlußreiche Ergebnisse. Neben der früher vielbeachteten Form der Kronblät-