Biological invasions threaten crops: Alien Himalayan balsam lures and co-opts floral visitors away from cultivated cherry tomatoes

Autorzy

Kamil Najberek

Katarzyna Patejuk

Izabela Czeluśniak

Wojciech Solarz

Marek Hojniak

Agata Kaczmarek-Pieńczewska

Anna Jakubska-Busse

Rok wydania

2024

Czasopismo

NeoBiota

Numer woluminu

95

Strony

241-266

DOI

10.3897/neobiota.95.134168

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

While it has been demonstrated that invasive alien plants pose a threat to co-occurring wild-growing native plants by attracting their pollinators, we know almost nothing about their impact on crop pollination. Alien plants with attractive flowers sometimes occur close to crops and may influence yields when they share the same pollinators and have overlapping flowering periods. We present the results of an experiment on the impact of alien balsam (*Impatiens glandulifera*) on the pollination of cherry tomato (*Solanum lycopersicum* var. *cerasiforme*). We verified whether balsam decreases the number of insect visits to the tomato flowers or, conversely, whether balsam may have a positive influence on the pollination rate of the crop. We also assessed crop production with and without the insect visitors. The study was conducted in southern Poland under garden and greenhouse experimental conditions simulating small-scale cultivation of the crop with a neighbouring patch of the alien plant. The studied plants were exposed to insects visiting flowers of the following variants: only one of the two species was exposed or both species were exposed together. Moreover, two factors that may influence insect visits in flowers were assessed: the chemical composition of the floral scent that attracts insects and floral pathogens infesting pollinators that may deter them. The number of insect visits (mainly *Bombus pascuorum*) on the tomato flowers decreased significantly when the plants were exposed to the alien balsam. Moreover, alien balsam secreted more flower attractants (mainly fatty acids and their esters) than tomatoes, which could explain more frequent insect visits in balsam flowers. However, the floral pathogens probably had a negligible impact on the number of insect visits to the flowers of the two plants. The level of infestation on both studied species was relatively low (*I. glandulifera*: 5.1% of all pathogen colonies grown in a laboratory, *S. lycopersicum* var. *cerasiforme*: 4.2% and 2.6% of all colonies in the garden and greenhouse, respectively) and we found no pathogens known to infect pollinators. It should be noted, however, that some of these pathogens (e.g. *Botrytis cinerea*, *Fusarium oxysporum* and *Sclerotinia sclerotiorum*) are known to cause severe diseases in many crops. Our results revealed that the presence of attractive invasive alien species near small-scale cultivations may negatively affect crop pollination, resulting in smaller fruit size and irregular shape. The impact of such alien species on crop production and the agricultural economy on a large scale requires further study.

Słowa kluczowe

Agriculture, beta-caryophyllene, biofilm organisms, cerise tomato, economy, eradication near cultivations, floral odours, greenhouse

Adres publiczny

http://dx.doi.org/10.3897/neobiota.95.134168