Enemy Release Hypothesis (ERH) is an attempt to explain the success of alien species after introduction into new areas. It assumes that in these new areas alien species "escape" from their natural enemies. As a result, the need of defence against the enemy attack is restricted, or totally eliminated. The energy "saved" this way can be allocated e.g. for a faster growth, or a more effective reproduction. This enables alien species populations to grow, expand and, in some cases, negatively affect the local environment or/and economy.

Although the ERH was formalized within last 15 years, its foundations were laid in 1958 by the British zoologist Charles Elton in his „The Ecology of Invasions by Animals and Plants". While the assumptions of the hypothesis were widely welcome by scientists, it has not been thoroughly studied yet and there are still some controversies. Results of some research are supportive but other prove that the hypothesis is equivocal, or even totally incorrect.

The aim of this thesis was to verify the three basic ERH assumptions: (1) native species are under stronger pressure from natural enemies than alien species, (2) non-invasive alien species are under stronger pressure from natural enemies than invasive alien species (3) individuals of the same species in cultivation are under stronger pressure from natural enemies than wild-growing individuals. This is the first study of this kind in Poland. The species selected for the research included native for the Polish flora (*Solidago virgaurea, Polygonum bistorta, Impatiens noli-tangere*), related invasive alien species (*Solidago gigantea, Reynoutria japonica, Impatiens parviflora, Impatiens glandulifera*) and related non-invasive alien species (*Impatiens balsamina, Impatiens walleriana*). The last group has rarely been studied so far in this context and including it in the research may help understand why only about 10% of alien species that manage to establish in new areas become invasive.

The study was carried out in a lowland (Rów Skawiński) and montane (Rów Podtatrzański with the Tarta Mts) areas, using wild-growing plants and plants in experimental plots. Throughout the season, every fortnight, 15 individuals were randomly selected out of 50 plants individually-marked at each study plot. Enemy pressure was assessed for each of the selected individuals by counting the numbers and diversity of invertebrates (including enemies), and the level and type of leaf damage. The study continued in 2010 and 2011.

Analysis of the data revealed significant differences in the numbers and diversity of plant enemies between the wild and experimental plots, as well as between lowlands and mountains. Invertebrates (including pests) were more numerous in the wild plots, whereas their diversity was higher in the experimental ones. This may suggest that while planted plants are more „attractive" for the pests, their numbers may be reduced as a result of cultivation practices in and around the plots. Comparisons between the two studied areas unexpectedly revealed higher pest numbers in

mountains. The earlier assumption was that severe montane climatic conditions would limit the abundance and diversity of invertebrates. The most numerous group that significantly affects plants were *Aphidoidea* and they probably had the greatest influence on the obtained results verifying the ERH hypothesis.

The detected leaf damage levels also had great influence on the results of the ERH tests. Nearly every second leaf was damaged and in fact this parameter was more unequivocal in supporting the ERH. This may suggest that escape from disease or pathogens may be easier for alien plants than escaping invertebrate pests. Rusts and spots were the symptom that was recorded most frequently and affected the highest numbers of leaves. The intensity of this symptom (and also other ones) significantly differed between wild and experimental plots and between the lowland and montane area. Rather than from direct enemy pressure, these differences were supposedly driven by other factors, such as soil fertility or solar radiation at a given plot, or cultivation practices in the experimental plots.

Except for comparisons between native and non-invasive alien plants, the tests did not unequivocally support the ERH assumptions. The group that was most efficient in their escape from enemies were not invasive alien plants, as it assumed, but those that are non-invasive. The hypothesis was also confirmed by tests of native vs invasive alien species, however, only in experimental plots. On the contrary, the results from the wild plots most frequently pointed to the lack of differences between the studied plant groups. Moreover, in tests concerning invasive alien species, the results were opposite to those assumed (particulalry when they were compared to non-invasive alien species). Non-invasive alien species were the only group consistently confirming that enemy pressure should be higher in the mountains than in the lowland. This is another argument for the need of more studies into non-invasive alien plants.

In conclusion, the presented results, combined with data from other authors, reveal some weaknesses of the ERH assumptions. They prove that the escape from natural enemies may not be a prerequisite of success of every alien species that becomes invasive in the new area. In addition, enemy release does not necessarily have a significant impact on the overall condition of plants. This does not mean that the ERH assumptions are totally wrong, as they were confirmed by many other studies that included other species, other habitats, or other experimental design. They were also confirmed by some of the results presented in this thesis, particularly by tests of native vs non-invasive alien plants.

It is therefore recommended that further test of the ERH hypothesis are continued in order to explain (1) the mechanism of escape from natural enemies (2) the mechanism of

„acquisition" of new enemies by alien species after introduction (3) what are the consequences of escaping the enemies for the conditions of alien species.