SOME IMPORTANT PARAMETERS OF *SOLIDAGO CANADENSIS* L. IN MODEL POPULATIONS IN UKRAINIAN POLESIE

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Introduction. As plant species live in populations, which are characterised by such indices as quantity, population density, individual seed productivity, stock of seeds in soil, study of these important parameters is necessary for prognoses of further distribution of invasive alien plant species. All these parameters are important to control wide spread of *Solidago canadensis* in Ukraine, as it was attributed to invasive transformer-species of plants (Protopopova et al., 2015).

Materials and methods. *S. canadensis* population parameters were studied in 2019 on 3 experimental plots (0.5 ha each), which represented 3 different population models in the Zhytomyr region, Ukrainian Polesie. Experimental plots were situated as follows: S-1 was located in the vicinity of vill. Strizhavka of the Korostyshiv distr., on 15-years fallow on relatively poor soddy-podzolic sandy loam soils, completely overgrown with *S. canadensis*; Z-2 was located in the vicinity of vill. Zarichany of the Zhytomyr distr., on 10-years fallow on relatively rich light-gray forest soils with dense thickets of *S. canadensis*; D-3 was located in the vicinity of vill. Narodichi of the Narodichi distr., in the nature reserve “Drevlyansky”, on swampy floodplain on the left bank of the river Uzh, occupied in the past by waterlogged meadows and eutrophic bogs; later a significant part of these biotops were completely overgrown with *S. canadensis*.

Each experimental plot (population model) of *S. canadensis* was devided into 3 registration areas, 25 m^2 each. The values calculated in the areas were total quantity of individuals of this species, quantity of shoots per individual, and separately, quantity of generative shoots. Seed productivity of *S. canadensis* in each population model was defined by the calculation of the following average values: quantity of seeds in 10 anthodiums, collected one by one from 10 plants (1); quantity of anthodiums on 1 generative shoot, collected one by one from 10 plants (2); quantity of generative shoots per 1 individual (calculated for all individuals on each registration area of 25 m^2) (3); population density – quantity of individuals per 1 m^2 (4). Seed productivity of an individual of *S. canadensis* was calculated by multiplication of average values: 1 x 2 x 3; and total stock of seeds on an experimental plot was calculated as 1 x 2 x 3 x 4. The calculation of seeds quantity was conducted with binocular microscope MBS-9. Average values were calculated according to (Lakin, 1973), essentiality of difference of average values of all parameter among populations was determined by ANOVA.

Results. It was found that the highest value of average shoots quantity per individual was observed in the population D-3 (29 ± 0.7). The values of the populations S-1 and Z-2 were significantly less, 19 ± 0.6 and 19 ± 0.7, respectively. The difference in mean values of this index between populations S-1 and Z-2 was inessential on 95 % confidence level, but population D-3 was significantly different from C-1 and Z-2 ($p<0.000$).

The highest value of average generative shoots quantity per individual was also observed in the population D-3 and made up 18±0.3; this index in the populations S-1 and Z-2 were equal to 15 ± 2.0 and 10 ± 0.6, respectively. These average values essentially differ ($p<0.000$).

In population S-1 average quantity of anthodiums per generative shoot was equal to 3,238 ± 185.6 (V = 31.39 %); in Z-2, 2,318 ± 57.5 (V = 13.58 %) and in D-3, 9,824 ± 11.2 (V=11.19 %). All average values mentioned above essentially differ ($p<0.000$).

It was found, that the highest value of average quantity of seeds per one anthodium was maximum in population S-1 and was equal to 22 ± 0.3, while the same minimum value of

20 ± 0.2 was peculiar for populations Z-2 and D-3. It was found, that the studied index in population
S-1 essentially differed from populations Z-2 and D-3 ($p<0.01$).

Field investigations showed that quantity of individuals of *S. canadensis* on 25 m^2 was rather different in studied populations –139 ± 13.0 for Z-2, 120 ± 4.9 for S-1 and 104 ± 5.0 for D-3. Thus, population density of *S. canadensis* calculated for the population Z-2 was 6 ± 0.4 $plant \cdot m^{-2}$; S-1, 5 ± 0.2 $plant \cdot m^{-2}$ and D-3, 4 ± 0.2 $plant \cdot m^{-2}$.

The calculations showed, that in the population S-1 average number of seeds per one individual was 1,092.2 thousand pieces, in Z-2, 470.5 thousand pieces, and in the population D-3, 3,536.6 thousand pieces. Taking into account the average density of *S. canadensis* individuals in the studied populations, potential stock of seeds was in population S-1, 5.24 million $seeds \cdot m^{-2}$; Z-2, 1.87 million $seeds \cdot m^{-2}$ and D-3 – 15.7 million $seeds \cdot m^{-2}$.

Conclusion. Huge seed productivity of *S. canadensis* and its significant allelopathic activity (Yuan et al., 2013) promote manifestation of this species as a transformer, which is able to capture quickly new territories and biotops in Ukrainian Polesie.

References

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