



COMPETITION AND ALLOMETRY IN ANNUAL HALOPHYTES PLANTS: AN EXPERIENCE FROM CRIMEA

SERGEY KOTOV *, SVETLANA ZHALDAK **, OLGA KOTOVA

Abstract. Competitive interactions were established in populations of *Salicornia perennans*, *Suaeda acuminata*, *Halimione pedunculata*, *Petrosimonia oppositifolia*. The competition changed allometry of plants.

Key words: competition, allometry, halophytes, annuals

V.I. Vernadsky Taurida National University, V.I. Vernadsky av., 4, Simferopol, 95007, Ukraine;

*sfktv@ukr.net, **galdak@ukr.net

Competition is a significant factor in determining both the species composition of communities and the patterns in different habitats. Competition between plants is one of the most important biotic factors limiting plant growth, size and plant growth form. Almost all observed plant allocation patterns are size dependent. And allocation is allometric because it changes with size (WEINER *et al.* 2009).

Investigations were carried out in the Central Prisivashie (Crimean region), in the communities composed by annual halophytes such as (1) *Salicornia perennans* Willd., (2) *Suaeda acuminata* (C.A. Mey.) Moq., (3) *Halimione pedunculata* (L.) Aell., (4) *Petrosimonia oppositifolia* (Pall.) Litv. The populations of different density were investigated; also the density was regulated by neighbor's remove experiment. Height, diameter of the stem and dry mass of a plant were used as the morphometric parameters of the vitality. The intensity of competition was determined by means of competition index – CI (KOTOV 1998). Relations height to the diameter of stem, heights to mass of plant, diameter to mass of plant, relational growth on height, reproductive effort (RE) were used from static allometric parameters; the dynamic allometric parameter such as net-assimilation rate (NAR) took into account too.

The competition reduces the plant vitality in the annual halophytes populations: height, diameter of the stem and dry mass of the noncompeting plants is significantly ($P < 0.05$) higher than those of plants in the competition conditions. CI increases in the intense allocation period, during the vegetative growth, and stabilizes at the generative stage.

The competition changes allometry of plants – the linear dependence of allometric ratios of height, of a diameter and weight of plants in neighbor

removal experiment changed it on curve dependence in competing populations.

The reduction of relative growth on height was obtained in the populations of *S. perennans* and *H. pedunculata* (competing plants (1) – 1,6-2,8%, (3) – 6,8-8,8%; noncompeting plants (1) – 7,3-8,3%, (3) – 7,5-19,5%).

For the annual succulent eugalophyte *S. acuminata* index RE has been measured by three methods: 1) RE_I – as a proportion of the mass of generative structures (the seed mass and the mass of auxiliary structures) to the total plant biomass; 2) RE_{II} – as a proportion of the number of seeds per plant to the total plants biomass; 3) RE_{III} – as a proportion of the number of seeds per plants to the mass of generative structures. In the studied coenopopulation, RE_I is relatively stable at different levels of the density because it is characterized by a high degree of the genetic determination. Indexes RE_{II} and RE_{III} vary depending on the number of plants per m^2 . The positive significant correlation ($P < 0.05$) between RE_{II} , RE_{III} and the density of the coenopopulation was found. The negative significant correlation ($P < 0.05$) between RE_{II} , RE_{III} and the total biomass of the maternal plant was found (KOTOV & KALINUSHKINA 2007).

Competition reduces productive activity of plants (NAR) too.

The competition influences on the morphological growth form of *S. perennans* – with increasing of density of a population percent of plants “dwarf” form increased and percentage of plants “bush” form reduced.

References

KOTOV S.F. 1998. The functional structure of some communities

- of class *Thero-Salicornietea* R. Tx. Et oberd. 1958 in Crimea. *Ucr. Phytosoc. Col. Ser. C.* **1** (10): 76–83. (in Rus.).
- KOTOV S.F. & KALINUSHKINA E.A. 2007.** The reproductive effort in *Suaeda prostrata* Pall. at different levels of the coenopopulation's density. *News Biosphere reserve "Ascania Nova"* **9**: 64–69. (in Rus.).
- WEINER J., CAMBELL L.C., PINO J., ECHARTE L. 2009.** The allometry reproduction within plant populations. *J. Ecol.* **97**: 1220–1233.