Biomass Changes Registered in Two *Sedum* Species Under Ecological Stress Conditions

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Abstract

Sedum plants are considered to be appropriate for green roof landscape designs because of their resistance to draught. The purpose of these experiments were to identify the extent of drought conditions on development of plants. Observations were made to measure the amount of water loss per day on plants exposed for 8 days to high temperatures and drought. The experiment was conducted in 2014 at the Floriculture greenhouse at UASVM Cluj-Napoca, using *S. reflexum* and *S. spectabile* stalks plants. The results pointed different responses of the two analyzed species regarding the partial and the cumulative differences reported to the initial weight of the plants. Diagrams representing cumulative weight loss over time show uniformity on both charts, even that *Sedum reflexum* plants lose greater amounts of water than those of *Sedum spectabile*. Also, at *S. spectabile* plants, the water loss affected all the leaves.

Keywords: *succulents, water loss, vegetative mass, weight*

INTRODUCTION

Landscape architects consider that *Sedum* plants are attractive and useful for rock gardens, hanging gardens and garden with sandy or rocky substrate. They are appreciated for their ability to grow in harshest parts of the gardens, they are easily facing dryness of summer, while most other plants less resistant to these conditions wither and die (Tan and Sia, 2005). If the *Sedum* plants are chosen carefully, it can ensure the blossoming of flowers for a considerable period, having a great diversity of colours: white, pink, violet, blue or even green (Landry, 2010). The viability of an organ of a plant is dependent on the existence of a specific amount of water in its tissues. *Sedum* species are considered to be highly resistant to drought, surviving in conditions where other plants fail within a very short time.

AIMS AND OBJECTIVES

The aim of the observations was to measure the weight changes of vegetative mass, which is due to water loss through transpiration, respiration

and other physiological and biochemical processes specific to consumption.

MATERIALS AND METHODS

The analysed biological material was represented by two species of *Sedum* (*S. reflexum* L. and *S. spectabile* Bor). The experiments were carried out in the didactical field of UASVM Cluj-Napoca and the plants were exposed to the natural ecological conditions of the year 2014. For the experiments were used as biological material sterile stalks of two *Sedum* species, harvested from cultures in which the plants were well developed. Stalks collected were completely devoid of water and were kept for 10 to 24 hours at 30°C to 55°C of temperature. Observations targeted changes in the weight of vegetative mass.

RESULTS AND DISCUSSION

The results of observations and measurements taken are presented in Figs. 1 and 2. The results show that at the two analysed samples, in the early period of experimentation, occurs consistent

Fig. 1. Biomass weight changes in *Sedum reflexum*

weight reduction of vegetative mass, due to high water losses. The values of these losses vary from species to species and are also dependent on the initial weight of the sample. Figures 1 and 2 show the evolution of the vegetative mass weight of *S. spectabile* and *S. reflexum* stalks, exposed to high temperatures, lack of water and high solar radiation. A common aspect of the two samples studied is that in the early period experiment occurs consistent weight reductions, due to high water losses. The values of these losses vary from species to species and are also dependent on the initial weight of the sample. In *S. reflexum*, the largest weight loss occurred in the first day, 32% of the original weight, in days 3, 4 and 5, the biomass diminished by approximately 12-13% and cumulative losses reached the value 49.4 g in the 5th day. In the last three days in which observations were made, the weight of the vegetative mass decreased by 3-5% per day, from its original weight, reaching that, in the last day, cumulative losses have achieved 57.5 g and the partial differences, 0.9 g.

In the case of *S. Spectabile*, the largest decrease of the biomass weight was recorded in the first day, 27.4 g, following that, further losses to be more uniform. On days 3, 4 and 5 the weight of the biomass decreased by 6.6-7.8% (11.5, 10.5 respectively 9.7 g), up to day 5 when the plants lost 59.1 g. On days 7 and 8 weight decreased by 2.5 respective 2.3% (3.8 and 3.4 g). Finally, after eight days of exposure of plants to stressful conditions, the weight of biomass is 73.6 g, reaching cumulative losses of 73.5 g, representing 49.9% of the initial weight. At the beginning of the experiment, diagrams show some glimpses caused by variation of quantities of water lost, but after the first 3-4 days it becomes uniform and

Fig. 2. Biomass weight changes in *Sedum spectabile*

continuous downward. It should be noted that the *Sedum spectabile* (Fig. 2) diagram representing the partial loss of water is lower than the partial loss of water of *Sedum reflexum* (Fig 1).

Analyzing the aspect of the plants, can be noted that in *S. reflexum*, the most affected by water losses were the leaves on the stems, in the following order - from their base to the tip. The leaves have faded and dried remaining viable only stems, buds and leaves of apical area.

In *S. spectabile* plants, all leaves were affected by water loss, but because they are big and fleshy, water loss effect is more evident in their edges and margins, while advancing towards to the central rib and the leaf base. The effect of the loss of water on *S. spectabile* consists in the wilting of the affected area, loss of stiffness and turgidity and finally browning and drying. Similar results were obtained by other authors who concluded that *Sedum* species are able to easily adapt to dry areas because of their low level of transpiration during the day, thus reducing the amount of water lost (Tan and Sia, 2005).

CONCLUSION

Based on this finding it can conclude that under drought and high temperatures, *Sedum reflexum* plants lose greater amounts of water than those of *Sedum spectabile* if vegetative mass is the same. *S. reflexum* plants are affected faster by water stress than plants of *S. spectabile* and to avoid this, water should be administered differentially. Analyzing the diagrams representing cumulative weight loss over time, reported to the initial weight of vegetable mass, uniformity can be observed on both charts, while the two studied species differ greatly in terms of appearance of leaves, stems, buds, etc.

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