

Introduction

Climate change is one of the most relevant environmental issues in the world. The climate change induced meteorological extremes have already become an important challenge. Manifestation of heavy rains, droughts and heat waves have been steadily increasing in the last decade in Lithuania and whole Europe. Moreover, intensity and frequency of weather extremes are predicted to increase even more in the future. Its effects on crops are relatively well investigated. However, the effects on forage crops, that are essential for the maintenance of an efficient livestock sector, are much less investigated.

Materials and Methods

The research was conducted in a greenhouse in Vytautas Magnus university in March – May of 2020. The plants were grown in pots with a mixture of loam, sand and perlite in a greenhouse with partly regulated environment (artificial temperature and irradiation adjustment). The first event of drought was applied 60 days after sowing. Drought was applied by retention of watering for 7 days, which was followed by 7 days of recovery period with normal irrigation. The second drought event was applied immediately after recovery period. After 7 days of the second drought, recovery was also applied. Growth of forage crops was evaluated after each different period (after 2 drought events and 2 recovery periods). The effects of subsequent droughts and abilities to recover after it were analyzed based on the changes of morphological parameters of forage crops, such as length, fresh and dry biomass (FW and DW, respectively) of shoots and roots

Results

Plants height and root elongation

Height of shoots was affected negligibly and decreased only after the second recovery in alfalfa. In contrast, drought slightly stimulated roots elongation of alfalfa and reduced in hybrid fescue; these effects on roots disappeared during the periods of recovery (data not shown).

Conclusions

Growth of dry and fresh biomass of both forage species was significantly restricted by subsequent drought events, the 2nd of which induced stronger effect with less effective recovery. Alfalfa was found to be more sensitive to drought than hybrid fescue, especially when assessing shoot growth. On the other hand, sensitivity of hybrid fescue significantly increased for the 2nd drought event, as was evidenced by sharply reduced and incomplete recovery shoot FW

The aim of the study

This research was designed to evaluate the effect of subsequent drought events on two important forage crop species: alfalfa (*Medicago sativa*) and hybrid fescue (*Festulolium loliaceum*).

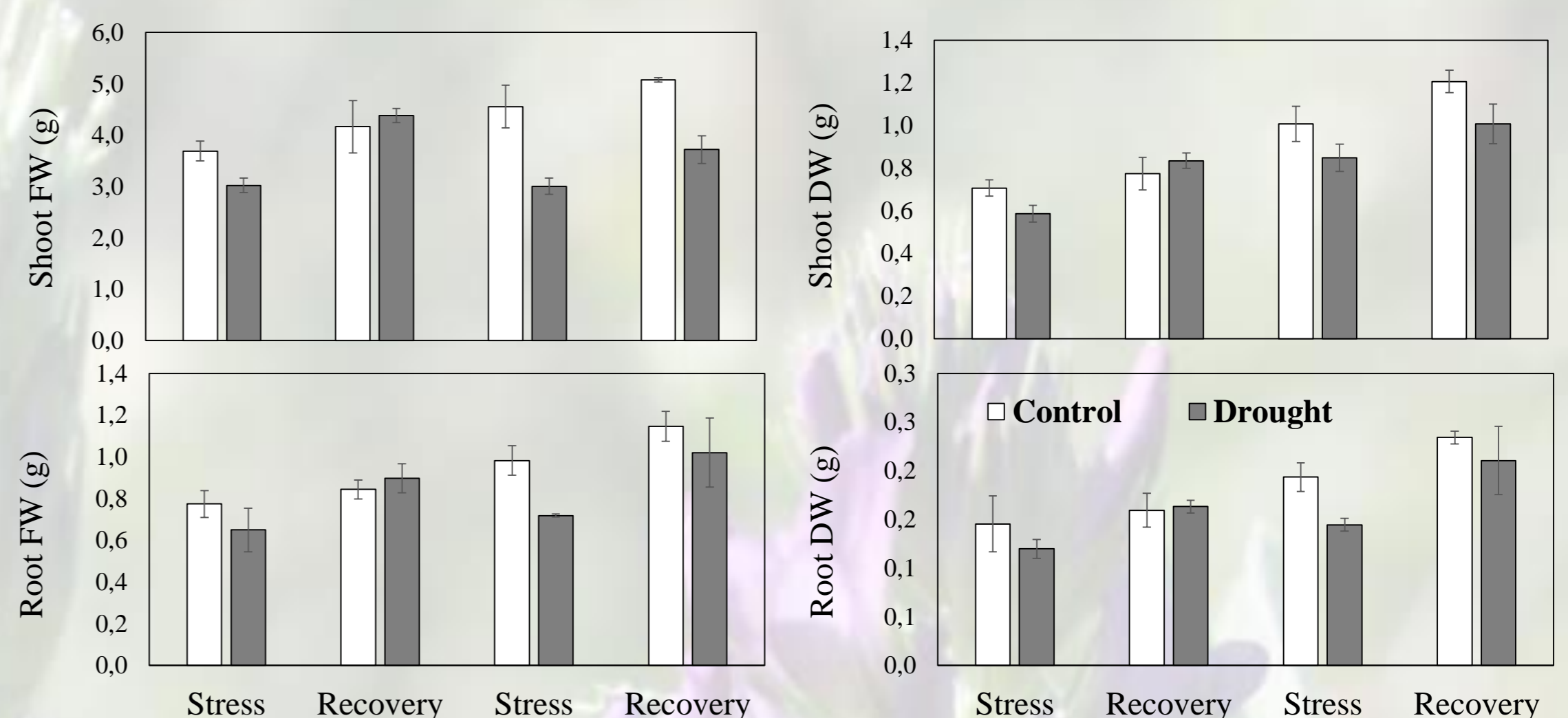


Fig. 1. Fresh and dry weight (FW and DW) of roots and shoots of hybrid fescue (*Festulolium loliaceum*) exposed to subsequent drought events and periods of recovery (means \pm SE (n=3)).

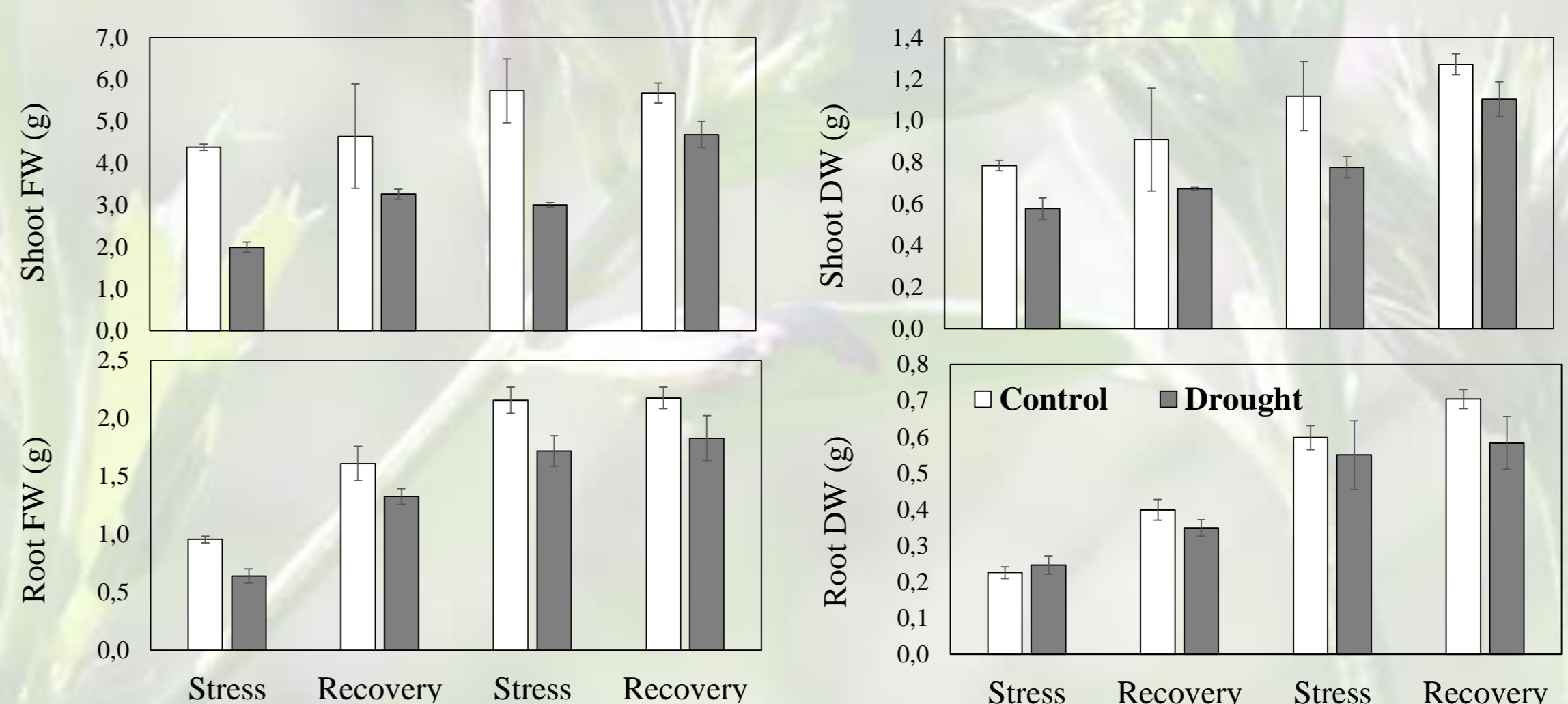


Fig. 2. Fresh and dry weight (FW and DW) of roots and shoots of alfalfa (*Medicago sativa*) exposed to subsequent drought events and periods of recovery (means \pm SE (n=3)).

Results

Dry and fresh weight

Hybrid fescue. FW and DW of roots and shoots of hybrid fescue reduced by \sim 20% after the 1st drought and recovered completely. However, the subsequent drought induced much stronger reduction of growth (especially shoot FW), that was unable to recover completely.

Alfalfa. FW of shoots of alfalfa reduced by \sim 50% after each drought and was unable to recover completely; effect on roots was less pronounced (33% and 20% reduction of FW), with a full recovery after the 1st drought and incomplete recovery after the 2nd stress event.