ALTERATIONS IN THE POLYAMINE CONTENT OF THE BULGARIAN WHEAT CULTIVAR FERMER INDUCED BY DROUGHT AND MELATONIN

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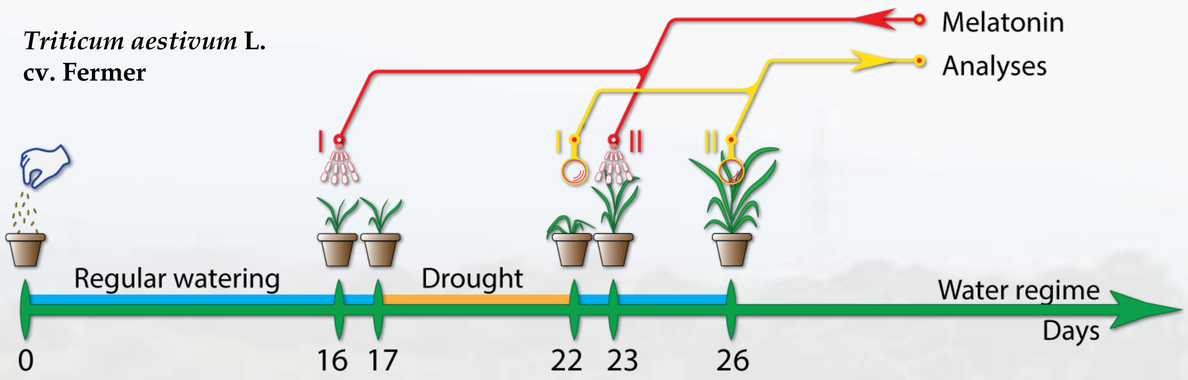
Polyamines and melatonin are among the key regulators of plant growth and development. Both of them participate in physiological response of various stress factors including drought – one of the most common and disruptive environmental variable. The study aims to examine the melatonin potential to modulate polyamine pool after drought.



MATERIAL AND METHODS

Seeds: Bulgarian winter wheat (*Triticum aestivum* L.) cv. Fermer, obtained from the Institute of Plant Genetic Resources (Sadovo).

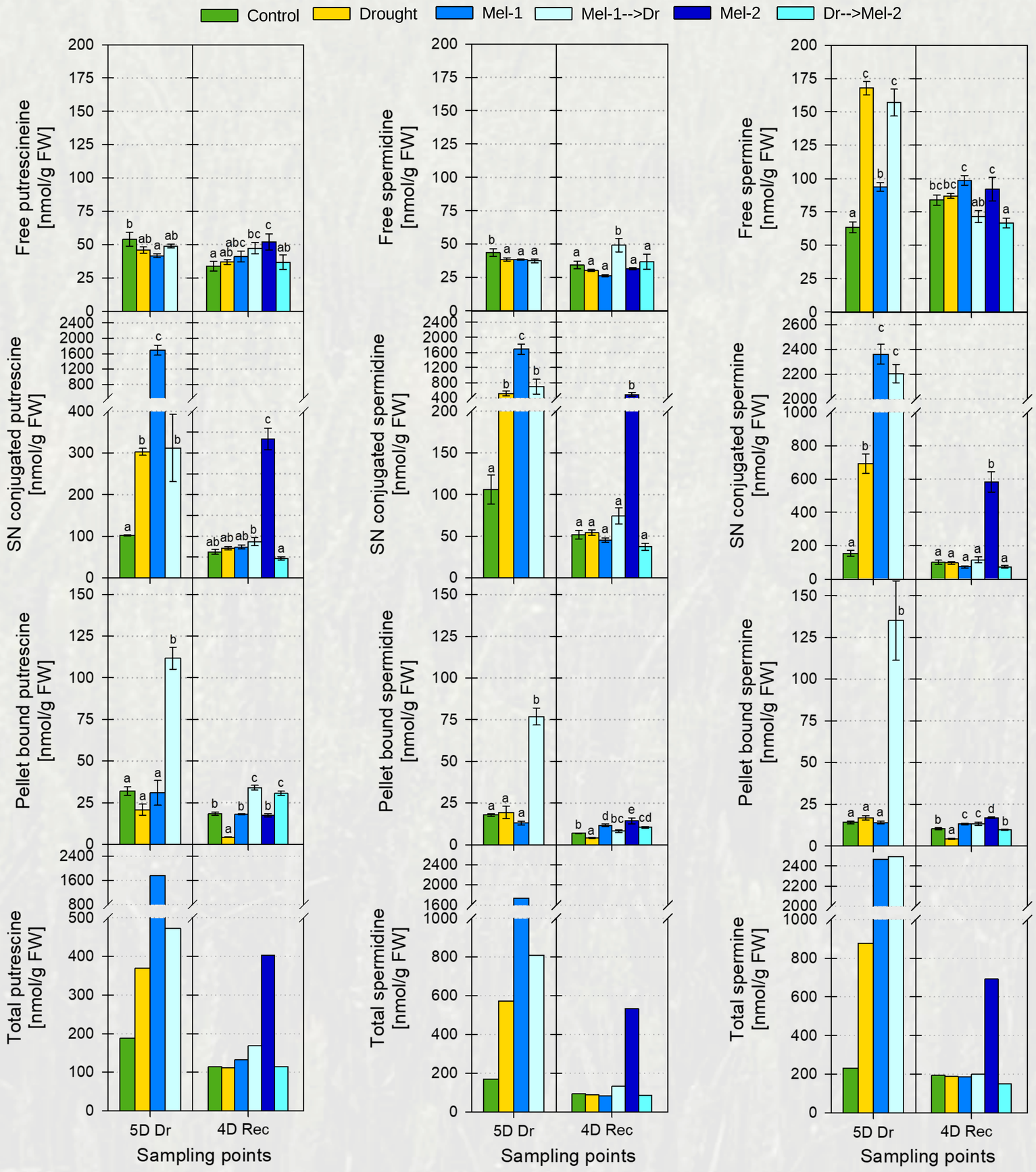
Growth conditions: Soil culture, in growth chamber (14/10 h photoperiod, 200 µmol/m^2/s, 21/19 °C day/night temperatures, 60% air humidity).

Dought: Five days period achieved by withholding water at BBCH stage 12 (17 day old plants).

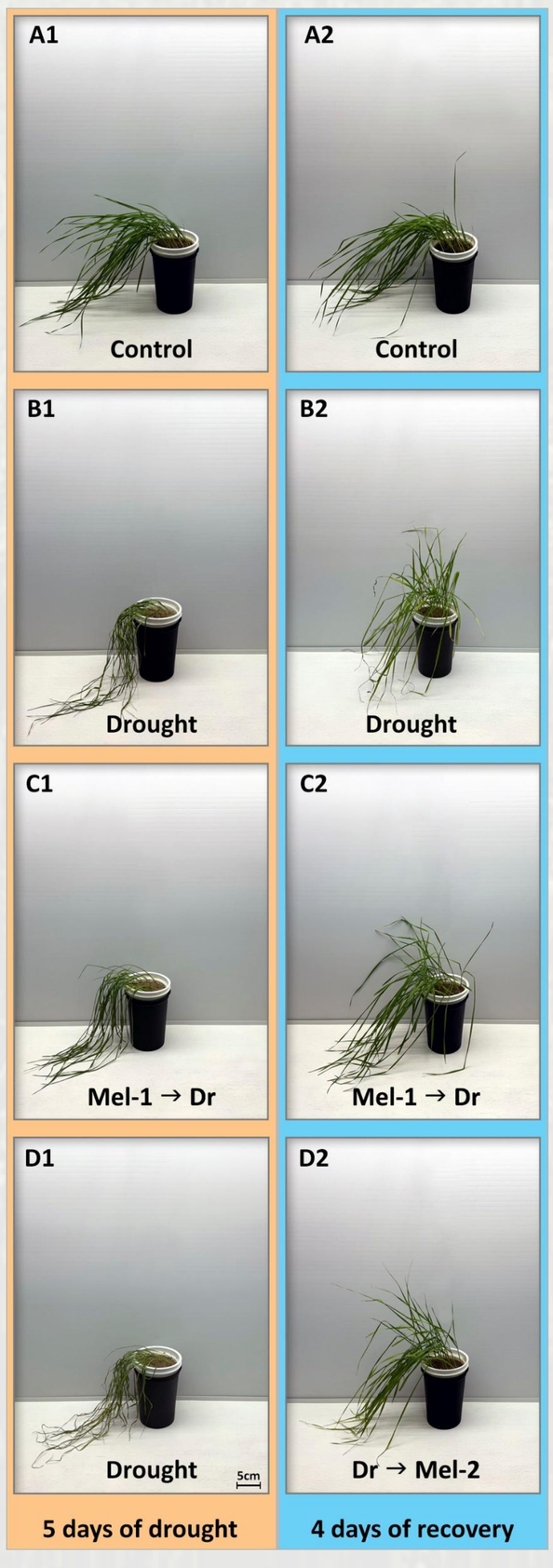
Melatonin (Mel) application: Plants received root treatment of 10ml 75µM aqueous melatonin solution 24h before (Mel-1→Dr) or after (Dr→Mel-2) the stress period.

Sampling points: At the fifth day of drought (5D Dr) and four days after resuming/renew the watering (4D Rec).

Assays: The concentration of free polyamines putrescine (Put), spermidine (Spd) and spermine (Spm) are determined *via* the direct dansylation method of Smith and Best (1977). To assess supernatant (SN) conjugated and pellet bound polyamines the method of Torrigiani et al. (1989) was used. To separate different fractions of Put, Spd and Spm a TLC (Silicagel G 60 plates) was performed (solvent system of cyclohexane:ethylacetate), the spots marked under UV light, scraped off and eluted in anhydrous acetone and fluorescence was measured (excitation 360 nm, emission 505.5 nm).



Content of putresceine, spermidine and spermine fractions in the leaves of wheat cv. Fermer.



Phenotype alterations in wheat cv. Fermer.

RESULTS

Drought increased all of the total polyamines measured (Put, Spd and Spm), due to their SN conjugated fraction (5D Dr), as well as free Spm, but during the recovery only a significant decrease in pellet bound fractions was found.

Melatonin pre-treatment alone induced total polyamine content higher than the drought stress due to the SN conjugated fraction (5D Dr), however pellet bound Put and Spm were slightly raised at recovery.

Combined melatonin application before drought increased total polyamines (Spm>Spd>Put) predominantly at the fifth day of drought, due to serious induction in SN conjugated and pellet bound fractions, which were enhanced significantly more than the drought only.

Melatonin post-treatment alone raised total polyamine concentrations, in particular SN-conjugated fractions. Probably due to the time shift with pre-treatment alone on 5D Dr, the induction is not so high.

Combined melatonin application after drought increased slightly pellet bound fractions of polyamines, which was significantly more than the drought stress only.

CONCLUSION

Melatonin treatment applied before drought had stronger effect than when it was applied after the stress. The observed regulation on endogenous polyamines by melatonin probably have beneficial effect on the physiological performance of the Bulgarian wheat cv. Fermer grown under mild drought conditions.

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