Changes of mineral nutriments in leaves of two tall fescue cultivars by foliar application of Iron and Zinc under heat stress

Sheng Xu[1,*] , *Xingyuan He*[1] , *Wei Chen*[1] , *Jianlong Li*[2]
Institute of Applied Ecology , Chinese Academy of Sciences , Shenyang 110016 , *P .R . China* ,*College of Life Science , Nanjing University , Nanjing* 210093 , *P .R . China*

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Introduction Heat stress is a major environmental stress that adversely affects growth and metabolism of cool-season plants . Heat stress also lead to direct inhibition of nutrient uptake or cause essential nutrient deficiency and even change the concentrations of basic nutrients (Xu et al , 2006) . There has been limited research concerning the mineral nutrient content of different turfgrass species or cultivars . The main objective of this study was to evaluate the effects of Fe and Zn by foliar application on the macronutrient and micronutrient concentrations of two tall fescue cultivars under heat stress .

Materials and methods Healthy sods of tall fescue (*Festuca arundinacea* cv . Barlexas and Crossfire Ⅱ) were collected from field plots at the Flower Cultivation Center , Nanjing University . Grass was grown in plastic pots (12 cm in diameter , 20 cm long) filled with sand and clay (2/1 , v/v) in the greenhouse . A 15 ml of exogenous FeEDTA (100 μM) , ZnEDTA (100 μM) or distilled water (control) were carried out once a week by spraying each of them onto the leaves for two weeks and then half of treated-pots was transferred into another growth chamber at a temperature of 38℃/ 30℃ (day/night) for two weeks .

Results and discussions Under heat stress , there was a tendency of increasing in K , Ca and Na concentrations in average for two tall fescue cultivars , but a tendency of decreasing in P concentration in average although there were no statistical differences between some treatments . All the concentrations of macronutrient were within the sufficiency range for both tall fescue cultivars . The K levels for two tall fescue cultivars under all treatments resulted in K concentrations within the sufficiency range of turfgrass species (20 .0 to 50 .0 g K kg^{-1}) . Ca concentrations of 2 .1 to 2 .9 g Ca kg^{-1} for two cultivars of St . Augustinegrass (McCrimmon , 2004) . In present study , the Ca concentrations were somewhat high compared to other studies of both cool and warm season turfgrasses . Under heat stress , Mg concentrations in leaves of two tall fescue cultivars by application of Fe decreased significantly , which were compared to those untreated by application of Fe . However , there were no statistical differences for both tall fescue cultivars by application of Fe and Zn under heat stress . Magnesium is important for turfgrass color and further study needs to be done on it related to the levels that different turfgrasses require under heat stress . Our result indicated that Fe levels in leaves of two tall fescue cultivars varied considerably between cultivars or among treatments , especially by application of Fe and Zn . Zn concentrations of two tall fescue cultivars are similar to the Zn concentrations that have been reported for cool season turfgrass .

References

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