

[P3] Abiotic Stress for Crop Production

Thu. Sep 9, 2021 12:15 PM - 2:00 PM Room 3 (Poster) (Abiotic Stress for Crop Production)

1:15 PM - 2:00 PM

[P3-36] Hypoxic Tolerance of Four Millets is Attributable to Constitutive Aerenchyma Formation and Root Hair Development of Adventitious Root

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The purpose of this study is to elucidate the hypoxic tolerance mechanism of four millet species by focusing on the oxygen acquisition mechanism of adventitious roots. Four species of millets were hydroponically cultivated for 27 days in the control where aeration was continued and a hypoxic treatment where nitrogen gas was aerated to reduce the oxygen concentration. From the stress susceptibility index based on the individual plant growth rate, it was clarified that *E. tef* and *E. utilis* had stronger hypoxic tolerance than *B. ramosa* and *S. italica*. Since the net assimilation rate and mean leaf area of millets with susceptible to hypoxic stress were reduced by hypoxic treatment, both were the determinants of the interspecific difference in plant growth rate. Root growth, nitrogen content of leaf and stem, and sodium content per plant of higher hypoxic-tolerant millet species did not change with hypoxic treatment. Whereas in hypoxic-susceptible millet species, root growth, nitrogen content of leaf and stem decreased, and the sodium content of whole plant increased. The proportion of the stele area of the adventitious root of the hypoxic-tolerant millet species was smaller than that of the hypoxic-susceptible millet species, and the constitutive aerenchyma was developed. Furthermore, root hair development was observed up to the vicinity of the root tip in hypoxic -tolerant millet species. From the above, the hypoxic tolerance of the millet species is that the constitutive aerenchyma of adventitious roots develops, the proportion of the stele is small, so oxygen consumption is low, and oxygen is efficiently supplied to the root tips. Development of root hair also contributed to nutrient absorption.