Journal of Plant Physiology **163** (2006) 80—85

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JOURNAL OF PLANT PHYSIOLOGY

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Nitrogen compounds in the apoplastic sap of sugarcane stem: Some implications in the association with endophytes

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Received 22 September 2004; accepted 7 March 2005

KEYWORDS
Amino acids;
Apoplast;
Endophyte;
Nitrogen compounds;
Sugarcane

Summary

Several nitrogen compounds were identified and quantified in the apoplastic and symplastic sap of sugarcane stems. The sap of stems was composed mainly of soluble sugars, which constituted 95% of the total organic compounds detected. Sap also contained nitrogen compounds, with amino acids (50–70% of N) and proteins (20–30% of N), being the main nitrogenous substances, as well as inorganic forms as ammonium, nitrite and nitrate, in low concentrations (<20% of N). Serine, proline, alanine and aspartic acid together represented around 60% of the amino acids of the sap of both field grown and high nitrogen fertilized plants, and non-nitrogen fertilized plants inoculated with *Gluconacetobacter diazotrophicus*. The total amino acid content of apoplastic sap was six to nine times lower in non-nitrogen fertilized plants than in fertilized ones. The possible roles of these substances to regulate endophytic associations with sugarcane are also discussed.

Introduction

Sugarcane is one of the major productive plant species in the world. Sugarcane can potentially produce approximately 45 tons of dry weight $ha^{-1}\,year^{-1}$, and 22 tons of sugar $ha^{-1}\,year^{-1}$. The stem tissues of this plant, consisting of intercellular spaces (apoplast) and vacuolar spaces (symplast), have been the subject of study over many years, since the maturation of sugarcane is characterized by the accumulation of sucrose in developing internodes (Glasziou and Gaylor, 1972; Moore, 1995). Most interest of sugarcane stem knowledge has risen from the finding of Döbereiner's group in Brazil (Baldani

Abbreviations: AA, amino acids; APS, apoplastic sap; Prot, proteins; SPS, symplastic sap

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doi:10.1016/j.jplph.2005.03.010