quantitative conversion to 5-hydroxypipecolic acid. Strong but not conclusive evidence has been adduced that both the *cis* and *trans*-5-hydroxypipecolic acids are present in *G. triacanthos*.. Determination of the imino-acids was established by co-chromatography.

EXPERIMENTAL

Seeds of *G. dioicus* (L) Koch. were collected in October 1972 in Oklahoma (USA). Voucher specimens are deposited in the Department of Organic and Biological Chemistry, Faculté des Sciences Agronomiques, Gembloux.

Isolation of cis *and* trans *5-hydroxypipecolic acid*. (For extraction, purification and separation of acidic, neutral and basic amino acids, see ref. [2]). Neutral extract from 1.7 kg of seeds was dissolved in a min. vol. of 1.5 N NCl and passed through a column (150 × 5 cm) of Lewatit S 1080 in the H^+ form. The amino acids were eluted with 1.5 N HCl (12 ml fractions). 5-Hydroxypipecolic acid is eluted in fractions 80–140 (9 g) and pipecolic acid in fractions 160–195. *Cis* and *trans*-5-hydroxypipecolic were then separated on Dowex 50 W × 8 (50 × 4 cm) in the Na^+ form, equilibrated with a buffer sol. of pH 3.2 [2]. *Cis*-5-hydroxypipecolic acid is eluted in fractions 235–250 and *cis* + *trans*-5-hydroxypipecolic acid in fractions 251–335 (10 ml fractions). From the latter fractions, *cis* and *trans*-5-hydroxypipecolic acids were separated using preparative PC (*tert* amyl alcohol–2,4-lutidine–H_2O; 89:89:57). Elution was performed during 5 days. $R_{cis/trans} = 0.84$ (Piez *et al.*: 0.83) [21]. *Cis*-5-hydroxypipecolic acid recrystallized (170 mg): C, 49.65; H, 7.64; N, 9.65 calculated for $C_6H_{11}NO_3$: C, 49.47; H, 7.61; N, 9.62%. $[\alpha]^{22°}_{589}$ nm = $-29.5°$ (*c*, 2; H_2O), $[\alpha]^{22°}_{589}$ nm = $-17.3°$ (*c*, 1; HCl 6 N). IR(KBr) ν_{max} cm^{-1}: 3400 (large), 3000 (large), 1625 (*s*), 1440(*w*), 1400(*s*), 1340(*w*), 1315(*w*), 1210(*w*), 1165(*w*). 1130(*w*), 1090(*m*), 1040(*m*), 980(*m*), 935(*w*), 850(*w*), 770(*m*).

General instrumentation. PC was performed in *n*-BuOH–HOAc–H_2O (12:3:5) and phOH at pH 4.2. HVE was carried out in buffer at pH 1.9; 60 V/cm; 90 min. The mobilities of the hydroxypipecolic acids in cm were *cis* form = 13.6; *trans* form = 12.0 PMR spectra were measured at 100 MHz and chemical shift are in ppm downfield from 2,2,3,3,-tetradeuterio-3-(tris-TMSi)propionate in D_2O.

From a personal communication, we have just heard that Hatanaka has isolated *cis*-5-hydroxypipecolic acid from *Lathyrus japonicus* (seeds) and *cis* and *trans*-5-hydroxypipecolic acid from *Morus multicaulis* (leaves).

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SOLUBLE SUGARS OF MAIZE SEEDLINGS*

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Key Word Index—*Zea mays*; Gramineae; maize seedlings; soluble sugars.

Abstract—The soluble sugars were determined in different parts of maize seedlings (seeds, roots and shoots), 0, 2, 4 and 6 days after sowing.

INTRODUCTION

Although germination, as a series of biochemical processes, has been extensively studied, information on such 'simple' biochemical events as the hydrolysis of seed polymers, is still lacking [1]. The present work approaches the chemical differences during early stages