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PYRROLIZIDINE ALKALOIDS FROM *SENECIO BRASILIENSIS* POPULATIONS

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Senecio brasiliensis (Spreng.) Less. (Compositae) has been associated with cattle poisoning in countries bordering the Rio de La Plata (1,2). We report here the pyrrolizidine alkaloids of three *S. brasiliensis* populations growing on rangelands in Paraguay. The pyrrolizidine alkaloid content and composition based on dried material and variation in different organs and collection sites are summarized in Table 1.

EXPERIMENTAL

PLANT MATERIAL.—Collections were made on November 10, 1985, along Ruta 2 in Department Alto Paraná, Paraguay. Voucher specimens have been filed with the Smithsonian Institution (US), Washington, DC (Schmeda 742-744).

EXTRACTION AND ISOLATION.—Freshly collected samples were separated into flowering tops, leaves, stems, and roots and extracted with 95% EtOH at room temperature for 48 h. After filtration, the plant material was dried, ground, and re-extracted twice with 95% EtOH at room temperature. The combined extracts were evaporated under reduced pressure and processed by standard procedures (3-5). The free base and *N*-oxide pyrrolizidine-alkaloid content were determined for each sample by the ^{1}H-nmr method (5) using a Varian EM 390 spectrometer. Small amounts of each plant part were air-dried in the shade to determine the ratio of fresh to dry weight.

All crude alkaloid bases and *N*-oxides (ca. 4 g) were chromatographed on Si gel with $CHCl_3$/EtOH gradient with increasing amounts of EtOH, affording after tlc (Si gel; $CHCl_3$-EtOH, 85:15; Dragendorff reagent) and recrystallization, integerrimine, retrorsine, and its 20-21 *E*-isomer. Compounds were identified by ^{1}H-nmr (6), ms, mp (7), and authentic sample comparisons.

Details of the identification are available upon request to the senior author.

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TABLE 1. Pyrrolizidine Alkaloid (PA) Content and Composition in Three *Senecio brasiliensis* Populations (mg/100 g dry weight)

Location	Plant part	Free Bases					*N*-oxide					Total	Bases (%)	*N*-oxide (%)
		Integerrimine	Retrorsine	Total	Integerrimine[a]	Retrorsine[a]	Integerrimine	Retrorsine	Total	Integerrimine[a]	Retrorsine[a]			
Km 295; Ruta 2 (Schmeda 742, US)	Flowering tops	165.6	34.1	199.7	83	17	391.3	—	391.3	100	—	591.0	33.8	66.2
	Leaves	115.1	7.9	123.0	93.6	6.4	189.1	31.2	220.3	85.8	14.2	343.3	36.0	64.0
	Stems	13.5	—	13.5	100	—	30.1	—	30.1	100	—	43.6	30.9	69.1
	Roots	30.8	—	30.8	100	—	0.4	—	0.4	100	—	31.2	98.6	1.4
Km 231; Ruta 2 (Schmeda 743, US)	Flowering tops	714.0	—	714.0	100	—	135.4	52.0	187.4	72.3	27.7	901.4	79.2	20.8
	Leaves	124.2	8.4	132.6	93.7	6.3	175.2	73.1	248.3	70.6	29.4	380.9	35.1	64.9
	Stems	37.8	—	37.8	100	—	7.9	—	7.9	100	—	45.7	82.6	17.4
	Roots	13.4	—	13.4	100	—	6.4	0.4	6.8	94.3	5.7	20.2	66.3	33.7
Km 231.5 Ruta 2 (Schmeda 744, US)	Flowering Tops	273.6	—	273.6	100	—	599.3	96.8	696.1	86.1	13.9	969.7	28.2	71.8
	Leaves	79.3	40.6	119.9	66.1	33.9	88.1	—	88.1	100	—	208.0	58.0	42.0
	Stems	2.9	—	2.9	100	—	17.6	—	17.6	100	—	20.5	14.0	86.0
	Roots	16.0	5.6	21.6	74.1	25.9	10.9	3.8	14.7	74.2	25.8	36.3	59.6	40.4

[a]Individual PAs, %.