Fatty Acid Composition of Oils Extracted from Canadian Weed Seeds[1]

J.K. DAUN and **R. TKACHUK**, Grain Research Laboratory, Canadian Grain Commission,
1404-303 Main St., Winnipeg, Manitoba, Canada, R3C 3G9

ABSTRACT

The fatty acid composition of the diethyl ether extract from nine varieties of Canadian weed seeds is reported. Fatty acid compositions for *Rumex pseudonatronatus* L. Borbus, *Setaria viridis* L. Beauv., and *Chenopodium album* L. have not been previously reported.

INTRODUCTION

Western Canadian grain may contain weed seeds up to a level of 6%. A recent study (1) reported the amino acid composition, protein, oil, and fiber contents of 10 weed seeds commonly found in Canadian grain. The results indicated that some weed seeds could be excellent sources of protein for feed or food purposes. This study reports on the fatty acid composition of nine of the species previously studied.

MATERIALS AND METHODS

Oils were extracted from the ground weed seeds on a Goldfisch extractor using diethyl ether as a solvent. Methyl esters were prepared from the oils according to AOCS Official Method Ce 1-62 (2). Gas chromatography was carried out on 8 ft x 1/8 in. columns of Sp 2330, and Sp 2340 (each 10% on Chrom w AW/DMCS) using a Beckman GC 4A gas chromatograph (3). Integration of peak areas was done by an Autolab System IV B Integrator. Some samples were also analyzed on a UC W98 column (4).

Thin layer chromatography (TLC) was carried out on silica gel G plates using the solvent systems described in Clayton et al. (5).

RESULTS AND DICUSSION

TLC showed that the oils consisted primarily of neutral lipids (mainly triglycerides but including steryl esters, mono- and diglycerides, free fatty acids, and glycolipids). Only traces of polar lipids were observed.

Fatty acid composition of the oils (Table I) is in good agreement with values reported in the literature (Table II). The fatty acid compositions of *Rumex pseudonatronatus* L. Borbus, *Setaria viridis* L. Beauv., and *Chenopodium album* L. have not been reported previously, although *Setaria viridis* might be expected to have a similar composition to *Setaria faberii* and *Setaria glauca*.

The identity of the long chain fatty acids in *Rumex pseudonatronatus* was confirmed by plotting retention time against carbon number on the three columns used. The presence of relatively large amounts of hexacosanoic and octacosanoic acids may be of taxonomic interest.

Iva zanthifolia Nutt. with an oil content of 32.8% and having 80% linoleic acid would appear to have potential as an oilseed crop, although the meal has a relatively low protein content (25%) and high fiber content (42%) (1).

TABLE I

Fatty Acid Composition of Oils from Canadian Weed Seeds

Sample	Oil content (%) (1)	Fatty acid composition (Percent of total fatty acids)														
		C14:0	C14:1	C16:0	C16:1	C18:0	C18:1	C18:2	C18:3	C20:0	C20:1	C20:2	C22:0	C22:1	C24:0	C26:0	C28:0
Polygonum convolvulus L. (Wild buckwheat)	2.9	5.6	0.6	10.9	1.0	3.7	41.5	34.4	2.5	-	-	-	-	-	-	-	-
Iva xanthifolia Nutt. (False ragweed)	32.8	-	-	4.9	0.1	1.9	11.7	80.9	0.2	-	0.2	-	-	0.4	-	-	-
Descurainia sophia L. Webb (Flaxweed)	39.3	-	-	6.7	0.1	1.8	12.2	19.9	37.4	0.7	12.5	0.9	0.3	8.7	-	-	-
Rumex pseudonatronatus L. Borbus (Field dock)	3.8	4.5	0.6	6.5	0.2	2.7	29.8	37.9	0.3	-	2.7	0	2.3	1.8	4.8	3.4	2.4
Setaria viridis L. Beauv.	7.1	0.3	-	5.0	0.1	2.1	19.5	67.0	3.9	-	1.5	-	0.3	-	-	-	-
Sinapis arvensis L. (Wild mustard)	35.2	0.3	-	5.0	0.2	1.9	33.9	24.5	15.3	-	11.9	1.0	0.2	6.5	1.1	-	-
Chenopodium album L. (Lamb's quarters)	9.1	0.3	-	8.4	0.3	0.9	20.7	56.3	6.5	0.7	2.3	0.5	0.3	3.6	0.3	-	-
Amaranthus retroflexus L (Pigweed)	7.2	0.5	0.2	9.7	0.3	2.0	23.3	61.5	1.1	0.5	0.3	0.5	-	-	-	-	-
Avena fatua L. (Wild oats)	1.4	0.6	-	23.4	-	3.3	40.9	29.5	0.9	-	0.8	-	-	-	-	-	-

[1]Contribution no. 358, Grain Research Laboratory, Canadian Grain Commission.

TABLE II

Literature Values for Fatty Acid Composition of Weed Seeds

Samples	Reference	Literature fatty acid composition (percent of total fatty acids)										
		C14:0	C16:0	C16:1	C18:0	C18:1	C18:2	C18:3	C20:0	C20:1	C20:2	C22:0	C22:1
Polygonum convolvulus L.	6		11.9	Tr	2.4	38.2	42.4	5.1					
Iva xanthifolia Nutt.	7		Saturated	8									
Descurainia sofia L. Webb	8	0.1	6	0.5	2	14	17	37	1	9	1	0.2	9
Setaria faberii L. Beauv.	6	Tr	6.8	Tr	1.2	20.0	68.8	3.2	Tr				
Setaria glauca L. Beauv.	6		6	Tr	1.5	15.9	24.4	2.2	Tr				
Sinapis arvensis L.	9		3.3	0.2	1.7	30.9	27.1	13.0	0.9	12.1	0.8	0.5	8.4
Amaranthus retroflexus L.	6		11.8	2.0	3.4	22.7	58.3	1.8					
Avena fatua L.	6		15.6		2.0	42.9	36.5	3.0					

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