LETTER TO THE EDITOR

Studies on Taramira (*Eruca sativa*) Seed Oil and Meal

Sir,

Taramira (*Eruca sativa* Mill), of the cruciferae family, is grown in West Asia and Northern India as an oilseed crop. Because of its drought resistance, it is becoming popular in regions of poor rainfall. When crushed for oil, glucosinolates in the seeds are hydrolyzed by myrosinase, yielding isothiocyanates which make the oil pungent. The pungency of taramira oil is different from that of mustard oil and cake containing the unhydrolyzed glucosinolates is bitter. Reports on the fatty acid composition of the oil are conflicting (1-3). The present investigation was undertaken to study the glucosinolates and the properties and compositions of taramira oil and meal.

RTM-1 and RTM-2 varieties of taramira seeds were obtained from the Department of Genetics and Plant Breeding, S.K.N. College of Agriculture, Sukhadia University, Jaipur, Rajasthan, India.

Powdered dehulled kernels were passed through a 60-mesh sieve, and oil was extracted in a Carver press. AOAC procedures (4) were used for determination of moisture, fat, protein, crude fiber, total ash and calcium. Phosphorus was determined according to Fiske and Subba Rau (5). Iron was estimated by the thiocyanogen method (6). Glucosinolates in the meal were separated and estimated as desulpho permethyl silyl ethers by gas chromatography (7). Total volatiles of the meal were determined by hydrolysis of glucosinolates to isothiocyanates, which were steam distilled and estimated volumetrically (8). The methyl esters of fatty acids were prepared according to Christie (9) and analyzed by gas chromatography using a Shimadzu Gas chromatograph model GC-9A with 15% diethylene glycol succinate on chromosorb-W. Physicochemical characteristics of the oil were determined according to AOCS (10).

TABLE 1

Fatty Acid Composition (% by wt) of Taramira and Mustard

Fatty acid	Taramira			Mustard	
	Present study	(Ref. 1)	(Ref. 2)	(Ref. 3)	(Ref. 11)
$C_{12:0}$	0.03	-	-	-	-
$C_{14:0}$	0.11	-	-	-	-
$C_{16:0}$	3.76	6.9	9.8	5.5	2.4
$C_{16:1}$	tr[a]	0.2	-	0.2	tr
$C_{18:0}$	0.93	2.3	2.1	1.2	0.7
$C_{18:1}$	19.88	11.9	12.3	15.1	7.8
$C_{18:2}$	9.28	16.3	10.6	7.6	15.6
$C_{18:3}$	11.70	36.2	22.1	12.9	10.2
$C_{20:1}$	12.61	13.0	-	11.4	5.5
$C_{22:1}$	42.40	10.3	43.1	43.15	55.4

[a]tr, Trace.

TABLE 2

Chemical Composition (% by dry wt) of Taramira (Var. RTM-1) Seeds, Kernels and Hulls[a]

	Whole seeds	Kernels	Hulls
Protein (N × 6.25)	18.99	20.18	14.50
Fat	33.74	39.32	2.97
Total ash	3.19	3.20	3.91
Crude fiber	7.05	2.05	26.90
Carbohydrate by difference	37.12	35.55	51.71
Calcium	0.94	1.39	0.70
Phosphorus	0.20	0.25	0.03
Iron	0.04	0.03	0.02

[a]Experiments were carried out in duplicate.

The average fatty acid profiles of the two varieties of taramira (Table 1) showed differences from the earlier Indian, Pakistani and Turkish varieties (1-3). Iodine values of taramira oils of Indian varieties were lower than values reported for the Turkish variety (1) and mustard oil (11). This may be attributed to the presence of lower amounts of linolenic acid in Indian varieties. The other physicochemical properties, like refractive index, saponification value, unsaponifiable matter and BTT, were nearly the same for mustard and taramira oils.

The pungent flavor of taramira oil differs from that of mustard oil. Isothiocyanates (about 1% by wt of taramira meal) are formed as products of enzymatic hydrolysis of glucosinolates and are responsible for the pungency of the oils from cruciferous seeds. An investigation of the nature of glucosinolate in taramira seeds indicated the presence of glucoerucin (4-thiomethyl 3-butenyl glucosinolate) as the principle glucosinolate (138 μmol/g of dry meal). On enzymatic hydrolysis it gives rise to 4-thio-methyl 3-butenyl isothiocyanate. This molecule contains two sulphur atoms, whereas allyl isothiocyanate and 3-butenylisothiocyanate, which are the pungent principles in mustard oil, contain only one sulphur atom. This probably explains the more penetrating pungency of taramira seed oil.

The chemical compositions of the whole seeds, kernels and hulls of the RTM-1 variety are given in Table 2. It is interesting to note that the hull fraction contained nearly 14% protein. Taramira meal was rich in calcium. The meal was rich in protein but its use as animal and poultry feed is limited because of the presence of bitter tasting glucoerucin. Proper utilization of meal depends on development of suitable technology for removal of the glucosinolate.

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