

FATTY ACID COMPOSITION OF NEW HYBRID VARIETIES OF MINOR MILLETS SEED

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ABSTRACT

Minor millets are important food crops of a large group of people in rural, tribal and hilly areas in India. Nine hybrid varieties of minor millets seeds viz., Ragi (*Eleusine coracana* variety FM & HR), Kodo (*Paspalum scrobiculatum* variety 41, 48 & 439), kutki (*Panicum sumatrense* variety 8 & LMCO-2), Sanwa (*Echinochloa frumentacea* variety VL-29 & VL-172) have been studied for their fatty acid composition by gas chromatography. The Kodo-48 has highest (86.5%) total saturated fatty acid content whereas variety kutki-8 has 79.1% total unsaturated fatty acid content with better storage quality. The Sanwa BMVL-29 has highest content (46.9%) of linoleic acid (PUFA).

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KEY WORDS

Minor millets; fatty acid composition; Gas chromatography; Ragi; Kodo; Kutki; Sanwa varieties.

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[I] INTRODUCTION

Millet is a group of small-seeded species of cereal crops or grain like food that has been used by large group of people in rural, tribal and hilly areas in India. Millet is a cereal crop plant belonging to the grass family, Graminae. The term "millet" is used loosely to refer to several types of small seeded annual grasses, belonging to species under the five genera in the tribe Paniceae [1-9]. Moreover these plants are less prone to diseases and pests in the field and store. The advantage of millets lies in the fact that they can be grown in infertile soil, intense heat, and scanty rainfall. For millions of people in the semi-arid tropics of Asia and Africa, millet has been the most important staple food for centuries. They are sometimes known as the "poor man's cereal" because given choice, people go for other cereals such as wheat or rice. Millet is considered as the sixth crop in the world after wheat, rice, corn, barley and sorghum [10].

Fat is one of the major nutrients which provide energy, promote body growth, maintain and repair body tissue, promote reproduction and lactation and regulate body process. Fats are carriers of fat soluble vitamins. Dietary fat must also provide essential fatty acids (EFA) which are the functional components of membrane lipids and have other important metabolic function. Fats are made up of fatty acids which include saturated fatty acids like palmitic and stearic, monounsaturated fatty acids (MUFA) like oleic and polyunsaturated fatty acids

(PUFA) like linoleic acid and linolenic acid [11, 12]. Lipids are relatively minor constituents in cereal grains, however, they contribute significantly to diet as a source of invisible fat and essential fatty acid [13, 14]. The lipid also have an important role in storage quality and processing of cereal, among minor millets account for about 1% of good grains produced in the world and they are useful as food crops in their respective agro-eco systems [15], rural people used millets as an important staple food and also an alternative for alcoholic beverages.

[II] MATERIALS AND METHODS

2.1. Collection of samples

The healthy, authentic and new hybrid varieties of minor millets seed of Ragi variety FM and HR, Kodo variety 41, 48 and 439, Kutki variety 8 and LMCO-2, Sanwa variety VL-29 and VL-172 under investigation were collected from Agriculture Research Station of Jawaharlal Nehru krishi Vishwavidyalaya, Dindori (M.P.).

2.2. Extraction and GLC analysis

Powdered sample of experimental seeds were subjected to solvent extraction in Soxhlet Apparatus for 20h, using petroleum ether (40-600C) as solvent. Lipids were then estimated gravimetrically by the method of

Colowick and Kaplan [16]. Methyl esters of the lipids were prepared by the method of Chowdhary et al, [17] and analyzed by gas liquid chromatogram (GLC). Gas chromatograms were recorded using Flame Ionization Detector (FID) with split ratio 1:50.

[III] RESULTS

The results of saturated and unsaturated fatty acid composition of minor millets seeds are reported in [Table -1 and Table -2] respectively.

Table: 1. Saturated fatty acid composition of hybrid variety of minor millets

Seed	Saturated fatty acid %							
	Caprylic acid	Lauric acid	Myristic acid	Palmitic acid	Stearic acid	Arachidic acid	Bahenic acid	Total saturated fatty acid(%)
Ragi-FM	4.6	0.4	0.7	23.8	3.5	0.8	0.7	34.5
Ragi-HR	3.9	0.2	0.6	20.4	3.7	0.3	1.5	30.6
Kodo-41	1.7	0.2	0.3	25.7	4.2	1.0	1.1	34.2
Kodo-48	76.6	-	-	2.8	5.3	0.2	1.6	86.5
Kodo-439	1.3	0.1	0.2	16.5	2.4	1.1	0.7	22.3
Kutki-8	0.5	-	0.1	15.6	2.5	1.1	0.4	20.2
Kutki LMCO-2	0.5	0.1	0.1	17.8	1.8	1.8	0.3	22.4
Sanwa BMVL-29	2.1	-	0.1	15.8	5.0	0.9	0.3	24.2
Sanwa BMVL-172	1.1	0.1	0.1	17.1	6.1	1.1	0.4	26.0

Table: 2. Unsaturated fatty acid composition of hybrid varieties of minor millets

Seed	Unsaturated Fatty acid (%)				Total Unsaturated fatty acid
	Oleic acid (MUFA)	Linoleic acid (PUFA)	Linolenic Acid (PUFA)	Ecosenoic Acid (MUFA)	
Ragi-FM	48.8	13.3	0.8	2.6	65.5
Ragi-HR	48.4	19.3	1.1	0.5	69.3
Kodo-41	42.7	17.9	1.8	3.1	65.5
Kodo-48	6.7	5.8	0.1	0.2	12.8
Kodo-439	37.2	38.8	0.8	0.9	77.7
Kutki-8	38.8	38.8	1.0	0.5	79.1
Kutki LMCO-2	43.2	32.7	0.5	0.9	77.3
Sanwa BMVL-29	27.0	46.9	1.0	0.5	75.4
Sanwa BMVL-172	29.5	42.9	0.7	0.4	73.5

[IV] DISCUSSION

[Table-1 and Table -2] showed the variation of fatty acid content amongst different hybrid varieties of minor millets seeds viz., Ragi (FM ,HR), Kodo (41,48,439), Kutki (8,LMCO-2), Sanwa (VL-29,VL-172) .

The saturated fatty acid, Caprylic acid was found to be highest (76.6%) in variety Kodo-48 and lowest (0.5%) in variety Kutki (8, LMCO-2). The Palmitic acid content was reported higher (25.7%) in variety kodo -41, while It ranges from 2.8% (Kodo-48) to 23.8% (Ragi-FM) in the other variety of minor millets under the study.

The percentage of Stearic acid was to be found maximum (6.1%) in the variety Sanwa BMVL -172 and minimum (1.8%)

in the variety Kutki LMCO-2. The Arachidic acid ranges from 0.2% (Kodo-48) to 1.8% (Kutki LMCO-2). The variety Kodo -48 has maximum (1.6%) Bahenic acid content while varieties Kutki LMCO-2 & Sanwa BMVL-172 have minimum Bahenic acid content (0.3%).The total saturated fatty acid (TSFA) content was to be greater (86.5%) in the variety Kodo-48 than the variety Kutki-8 (20.2%).

The unsaturated fatty acid, Ragi variety (FM) contain maximum amount (48.8%) of Oleic acid. Whereas, the Linoleic acid was found to be highest (46.9%) in the variety Sanwa-29. The Linolenic acid and Ecosenoic acid content was found to be greater (1.8% and 3.1% respectively) in the variety Kodo-41 than the variety Kodo-48 (0.1 & 0.2 respectively). The variety Kodo-48 contains minimum value of mono unsaturated fatty acid (MUFA) and polyunsaturated fatty acid (PUFA). Total

unsaturated fatty acid (TUFA) content was found to be highest (79.1%) in the variety Kutki-8 and lowest (12.8%) in the variety Kodo-48.

Sanwa BMVL -29 variety found to be superior than the other hybrid varieties of minor millet seeds, under investigation and the other variety of millets, as it contains highest content of linoleic acid (46.9%). The amount of linoleic acid in millet oil is higher in comparison with most other types of vegetable oils [18]. The linoleic acid is one of the most important polyunsaturated fatty acid in human food, because of its prevention of distinct heart vascular disease [19]. This acid is most important essential fatty acid required for growth, physiological function and maintenance, which cannot be synthesized by the human body and one has to depend on dietary source for their adequate supply [20]. The body metabolizes linoleic and linolenic acid into arachidonic acid and docosahexaenoic acid (DHA) respectively which are essential to the normal development of central nervous system [21, 22]. Various developmental problems including attention-deficit/hyperactivity disorder (ADHD) in children have been linked to biological deficiencies in polyunsaturated fatty acids. Additionally, there is evidence that symptoms may be reduced with PUFA supplementation [23].

[VI] CONCLUSION

Millets are a major food source in arid and semi-arid parts of the world. Millets are good sources of nutrients. Minor millet lipid contains high quantity of essential fatty acids especially the grains are rich in polyunsaturated fatty acid (PUFA). PUFA (Omega-3 and omega-6) are necessary in the normal functioning of all tissues of the body. Their deficiencies exhibit the symptoms of disorders especially abnormalities in the liver and kidney, changes in the blood, reduced growth rates, decreased immune function, depression, and skin changes, including dryness and scaliness. The comparatively high amounts linoleic acid which is an omega 6-fatty acid, is highly significant because this acid is easily converted to n-6 eicosanoids, n-6 prostaglandin and n-6 leucotriene hormones. This provides targets for drug development in artherosclerosis (B.P), asthma, arthritis, immunity development etc. Linoleic acid is also very popular in beauty products as helping in moisture retention, acne reduction, and anti-inflammatory. Lack of linoleic acid causes dry hair, hair loss, and wound healing. Therefore, the consumption this millet containing oil will yield the same advantages to the consumer. Oleic acid, which is an omega-9 fatty acid as the major fatty acid also is equally important having all the health benefits of linoleic acid. In cases of reduced availability of omega-6-fatty acids, omega-9-fatty acids are converted to omega-6-fatty acids. Adequate intake of the minor millets results in numerous health benefits.

CONFLICT OF INTERESTS

None

FINANCIAL DISCLOSURE

NIL

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