Original article

Nutrient and mineral assessment of edible wild fig and mulberry fruits

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Nutrient and mineral assessment of edible wild fig and mulberry fruits.

Abstract – Introduction. Edible wild plants are nature's gift to mankind. Considering the growing need to identify alternative bio-nutritional sources, some underutilized species of figs (*Ficus carica* L., *F. palmata* Forssk., *F. racemosa* L.) and mulberries (*Morus alba* L., *M. nigra* L, *M. laevigata* Wall.) of the family Moraceae were evaluated as wild edible fruits to study their nutritive and mineral composition in order to prioritize their edibility for indigenous people. **Materials and methods**. The major proximal components (moisture, ash, lipids, proteins, fibers and carbohydrates) were determined by standard AOAC methods. The concentration of various minerals (K, Ca, Mg and Na) and trace elements (Fe, Mn, Zn, Cu and Ni) were recorded by using an atomic absorption spectrophotometer. **Results**. Our results indicated a range of moisture contents from 17.82–80.37 $g \cdot 100\ g^{-1}$ (fresh weight basis) in *F. carica-M. laviegata*; protein, 6.31–13.50 $g \cdot 100\ g^{-1}$ (dry weight basis) in *F. glomerata-M. alba*; crude fats, 1.02–2.71 $g \cdot 100\ g^{-1}$ in *F. palmate-F. glomerata*; carbohydrates 69.47–75.58 $g \cdot 100\ g^{-1}$ in *M. alba-M. nigra*; and fiber 7.63–17.81 $g \cdot 100\ g^{-1}$ in *M. laviegata-F. palmate*, respectively. The significantly highest energy value was computed in *M. laviegata* (367.7 $kcal \cdot 100\ g^{-1}$). Moreover, sufficient quantities of essential elements were found in all the studied materials. The highest levels of N [(0.24 ± 0.07) $mg \cdot g^{-1}$] and Fe [(1.43 ± 0.42 $mg \cdot g^{-1}$] were found in *M. laviegata*; Na [(1.92 ± 0.11 $mg \cdot g^{-1}$] and Mg [(6.92 ± 0.37 $mg \cdot g^{-1}$] in *F. palmate*; and K [(17.21 ± 0.03 $mg \cdot g^{-1}$] in *F. glomerata*. Significant variation existed among the selected species in all the nutritional parameters. **Conclusion**. According to our results, fig and mulberry fruits are recommended for commercial-scale production for the green industry to overcome food crises as they are potential food sources, particularly *Morus laviegata* and *Ficus palmata*, with rich nutritional attributes and mineral profiles.

Pakistan / *Morus* / *Ficus* / fruits / proximate composition / mineral content

Évaluation des nutriments et des ressources minérales des fruits de figuiers et de mûriers sauvages comestibles.

Résumé – Introduction. Les plantes sauvages comestibles sont un don que fait la nature à l'humanité. Considérant le besoin croissant d'identifier de nouvelles sources de bio-nutrition, certaines espèces sous-utilisées de figuiers (*Ficus carica* L., *F. palmata* Forssk., *F. racemosa* L.) et de mûriers (*Morus alba* L., *M. nigra* L, *M. laevigata* Wall.) de la famille des Moraceae ont été évaluées en tant que fruits sauvages comestibles pour étudier leur composition nutritive et minérale afin de prioriser leur consommation auprès des populations autochtones. **Matériel et méthodes**. La composition globale des fruits étudiés (humidité, cendres, lipides, protéines, fibres et glucides) a été déterminée par utilisation de méthodes AOAC standards. La concentration en divers minéraux (K, Ca, Mg et Na) et en oligo-éléments (Fe, Mn, Zn, Cu et Ni) a été déterminée en utilisant un spectrophotomètre d'absorption atomique. **Résultats**. Nos résultats ont révélé une gamme de teneurs en humidité de 17,82–80,37 $g \cdot 100\ g^{-1}$ (poids frais) pour *F. carica-M. laviegata* ; en protéines, de 6,31–13,50 $g \cdot 100\ g^{-1}$ (poids sec) pour *F. glomerata-M. alba* ; en graisses brutes, de 1,02–2,71 $g \cdot 100\ g^{-1}$ pour *F. palmate-F. glomerata* ; en glucides, de 69,47–75,58 $g \cdot 100\ g^{-1}$ pour *M. alba-M. nigra* ; en fibres, de 7,63–17,81 $g \cdot 100\ g^{-1}$ pour *M. laviegata-F. palmate*, respectivement. Une valeur énergétique significativement élevée a été calculée pour *M. laviegata* (367,7 $kcal \cdot 100\ g^{-1}$). En outre, des quantités non négligeables d'éléments essentiels ont été trouvées chez toutes les espèces étudiées. Les plus hauts niveaux de N [(0,24 ± 0,07) $mg \cdot g^{-1}$] et Fe [(1,43 ± 0,42 $mg \cdot g^{-1}$] ont été trouvés dans *M. laviegata* ; de Na [(1,92 ± 0,11 $mg \cdot g^{-1}$] et Mg [(6,92 ± 0,37 $mg \cdot g^{-1}$], dans *F. palmate* ; et K [(17,21 ± 0,03 $mg \cdot g^{-1}$], dans *F. glomerata*. Des variations significatives sont apparues entre les espèces étudiées pour tous les éléments nutritionnels. **Conclusion**. Selon nos résultats, les fruits de figuiers et de mûriers devraient être recommandés à l'échelle d'une production commerciale pour l'industrie verte afin de surmonter les crises alimentaires en tant que source potentielle en alimentation quotidienne, particulièrement les fruits de *Morus laviegata* et *Ficus palmata* qui ont de riches propriétés nutritionnelles et profils minéraux.

Pakistan / *Morus* / *Ficus* / fruits / composition globale / teneur en éléments minéraux

1. Introduction

In recent years, wild food plants have become very attractive to the food industry, prompting their use as replacements for synthetic chemicals and nutraceuticals. Food plants are an integral part of the subsistence strategy of rural people in many developing countries and they play a key role in preventing many diseases. In particular, the wild edibles with proven nutritional and pharmaceutical potential have emerged as potential resources for addressing issues of side effects of synthetic chemical-based food ingredients in many regions [1, 2]. Among the green natural edibles, some species of the genus *Ficus* (*F. carica, F. racemosa, F. palmate*: common figs) and *Morus* (*M. alba, M. nigra, M. laviegata:* common mulberries) are consumed widely by the tribal communities of the Himalayan range, significantly for their nutritional security. However, such neglected and underutilized natural food resources are suffering from less attention and research, and their nutritional, economic and socio-cultural potential are not fully exploited.

Figs and mulberries are perennial woody trees that belong to the family Moraceae. They can grow in a wide range of climatic and topographical conditions, *viz.*, tropical, subtropical and temperate parts of the world. Some species (*M. alba, M. nigra, F. racemosa*) are preferred due to their foliage yield and delicious fruits, while others (*F. carica* and *M. laviegata*) have strong environmental adaptability. These fruits can be eaten fresh or dried and also be processed into juices, paste or pulp [3, 4]. A number of detailed studies show the health benefits of these medicinal fruits as they have considerable antimicrobial, antifungal, anti-allergic, antioxidant and antihypoglycemic activities. Kostic *et al.* reported the high phenolic content and antioxidant activity of black and white mulberries grown in Serbia, showing the nutritive and medicinal potential of the fruits [5]. The leaves, bark and branches of white and black mulberries have long been used in traditional Chinese medicine for the treatment of arthritis, diabetes and rheumatism [6–8]. Wild figs (*F. carica* and *F. palmata*) are rich in minerals and sugars, predominantly fructose and glucose. Their fruits are known to be a rich source of minerals, phenolics, anthocyanins and flavonoids [9, 10]. The chemical composition and nutritional status of plant edibles may be influenced by the physiological and environmental factors of the area, such as soil chemistry and climatic conditions [11].

Among the known edible fruits of Moraceae, only a few have been analyzed for their mineral contents (*Morus alba, Morus nigra*) [12, 13]. However, in previous studies there was no conclusive and comprehensive investigation reported on the nutritional composition of *Ficus carica* L., *F. palmate* Forssk., *F. racemosa* L., *Morus alba* L., *M. nigra* L. and *M. laevigata* Wall. Our study presents a comparative account of macro- and micronutrients in green fruits that will probably be used in the future in the green industry for healthy food on a commercial scale.

2. Materials and methods

2.1. Materials

Fresh fully ripened fruits of three seasons (2011–2012) were collected from different localities of the lesser Himalayan region of Pakistan in order to make composite samples. Their botanical identification was confirmed with specimens in the Herbarium of Pakistan (ISL) Qauid-i-Azam University, Islamabad. Samples were oven-dried at 68 °C for 24 h and ground into fine powder for nutritional analysis. All chemicals used in this study were of analytical grade and purchased from Merck Chemicals (Germany).

2.2. Proximate analysis

The standard methods [14] were adopted to determine the proximate composition of fruit samples; moisture [weighing the fresh samples before and after oven drying at (103 ± 2) °C for 24 h], nitrogen (micro-Kjeldahl-UDK-127, VELP Scientifica, Italy), crude protein (calculated as $N \times 6.25$), ash (incineration in a muffle furnace at 550 °C), crude fat (solvent extraction in a Soxhlet apparatus using petroleum ether with a boiling point range of 60–90 °C), crude fiber (extraction with 1.25% NaOH, drying the residue for 4 h at 102 °C followed by muffle incineration at 600 °C for 30 min) [15, 16], total carbohydrates [17] and gross food energy [4 × protein, 4 × carbohydrate, 9 × fat) kcal·100 g^{-1}] [18, 19].

2.3. Mineral assessment

The acid digestion methods of Toth *et al.* [20] and Hussain and Khan [21] with some modifications were followed to determine inorganic constituents. Each sample (0.2 g) was digested with a mixture of HNO_3 and $HClO_4$ (4:1, v/v) at room temperature overnight and heated at 130 °C for 1 h until a clear solution was obtained (about 2 mL). The solution was subsequently transferred to a 25-mL volumetric flask and diluted with ultrapure water after cooling. A blank digest was carried out in the same way. The amount of inorganic elements, *viz.*, Na, K, Ca, Mg, K, Fe, Mn, Zn, Pb, Ni, Co, Cd and Cu, were estimated by using an Atomic Absorption Spectrophotometer (Perkin Elmer, AA Analyst 200, USA). Phosphorus was estimated from the same acid digest by following the method described by Sekine *et al.* [22].

2.4. Statistical analysis

Descriptive statistics were performed by using Microsoft Excel 2007 to calculate mean and standard errors for nutritional contents of fruit samples.

3. Results and discussion

3.1. Nutritional properties

The data on proximate composition of nutrients in fig and mulberry fruits show that mulberries contain higher moisture content [(80.37 ± 0.14) g·100 g^{-1} fresh weight in *M. laviegata*) than figs [(17.82 ± 0.21) g·100 g^{-1} fresh weight in *F. carica*] (*table I*). The moisture content is one of the important factors as many of the physical properties of edible fruits may vary due to changing its value [23]. The percentage of moisture in mulberries [(80.37 ± 0.14) g·100 g^{-1} fresh weight in *M. laviegata*] was similar to that in most of the conventional fruits (about 75–95%), while it was lower in figs [(17.82 ± 0.21) g·100 g^{-1} fresh weight in *F. carica*] as compared with other wild berries such as strawberry (56%) [24].

The highest quantity of lipid and protein was found in *F. glomerata* [(2.71 ± 0.03) g·100 g^{-1} dry weight] and *M. alba* [(13.50 ± 0.28) g·100 g^{-1} dry weight], respectively (*table I*). Nutritionally, fat is the less abundant macronutrient, being lower than 2%, and the protein level is usually 5% or above and varies in different fruits [25, 26]. The figs and mulberries contain a higher protein quantity [*M. alba:* (13.50 ± 0.28) g·100 g^{-1} dry weight and *F. carica:* (8.60 ± 0.96) g·100 g^{-1} dry weight] than the edible part of sunberry (2.7%) and Dabai fruit (3.8%) [27, 28]. *Ficus palmata* could be a good source of fibers, with exceptionally high crude fiber content [(17.81 ± 0.03) g·100 g^{-1} dry weight] among all the studied fruits (*table I*). *Morus* species also have a considerable content of dietary fiber [*M. alba:* (11.0 ± 0.75) g·100 g^{-1} dry weight], which is higher than that of other fruits such as Indian Dabai fruit (4.3 %) [28]. The carbohydrates were found to be the most abundant macronutrient: (75.58 ± 0.54) g·100 g^{-1} dry weight in *M. nigra* (*table I*). The content of total available carbohydrates in mulberries and figs was three-fold that in other wild fruits, *viz.*, strawberry (23.55%), dabai (22.1%), etc., resulting in their high caloric value [24, 28]. Other authors reported that wild edible fruits have a good composition of different carbohydrates, either monosaccharides or polysaccharides, making them very nutritious for health products [24].

Fig and mulberry fruits show reasonably high food energy values due to higher carbohydrate content. The highest value of food energy was reported in *Morus laviegata*

Table I.
Moisture, nutrient profile and energy values in fig and mulberry fruits (means ± standard deviation; $n = 3$).

Fruit species studied		Moisture ($g \cdot 100\ g^{-1}$ fresh weight)	Ash	Fats	Fiber	Protein	Carbohydrates	Energy ($kcal \cdot 100\ g^{-1}$ dry weight)
			($g \cdot 100\ g^{-1}$ dry weight)					
Mulberries (*Morus* spp.)	*M. alba*	80.24 ± 0.15	4.55 ± 0.09	1.48 ± 0.84	11.0 ± 0.75	13.50 ± 0.28	69.47 ± 0.69	345.4 ± 0.49
	M. nigra	80.14 ± 0.05	3.92 ± 0.01	1.93 ± 0.06	8.23 ± 0.07	10.34 ± 0.04	75.58 ± 0.54	361.1 ± 0.98
	M. laviegata	80.37 ± 0.14	3.46 ± 0.11	2.42 ± 0.32	7.63 ± 0.33	12.41 ± 0.05	74.09 ± 0.22	367.7 ± 0.35
Figs (*Ficus* spp.)	*F. carica*	17.82 ± 0.21	4.50 ± 0.41	1.50 ± 1.32	14.20 ± 0.38	8.60 ± 0.96	71.20 ± 0.29	332.7 ± 0.74
	F. glomerata	21.17 ± 0.03	3.90 ± 0.04	2.71 ± 0.03	16.80 ± 0.12	6.31 ± 0.08	70.31 ± 0.41	330.4 ± 0.74
	F. palmata	19.42 ± 0.16	4.31 ± 0.12	1.02 ± 0.19	17.81 ± 0.03	6.50 ± 0.18	70.40 ± 0.18	316.8 ± 0.82

[(367.74 ± 0.35) $kcal \cdot 100\ g^{-1}$ dry weight] (*table I*). The energy values of edible figs and mulberries were comparable with different species of *Grewia* and *Cordia*, while they were higher than species of *Berberis* (83.9 $kcal \cdot 100\ g^{-1}$ dry weight) [29, 30].

In our findings, the proximal profile of these fruits is in accordance with standard values for the same species (*M. alba, M. nigra*) of South Asian and Turkish origin [31]. Little variations in the quantity of moisture, protein, fiber, oil and ash contents from previous reports are probably due to different environmental conditions and analytical methods. The results show that the consumption of these fruits as snacks was appropriate for the particular purpose of satisfying hunger in view of their carbohydrate content and caloric potential. These wild fruit species are recommended as an important nutritious source in the daily diet of locals specifically during famine periods, as the results showed 45–55 mulberries (100 g) provide 345.4–367.74 kcal and 30–35 figs (100 g) produce 316.8–332.7 kcal.

3.2. Mineral composition

The essential minerals are important components of the daily diet required in greater quantity and represent 1% or less of body weight [32]. The results regarding the mineral and trace element levels in the figs and mulberries studied show that potassium has the highest concentration: (16.73 ± 0.37) $mg \cdot g^{-1}$ dry weight in *Morus alba* and (17.21 ± 0.03) $mg \cdot g^{-1}$ dry weight in *Ficus glomerata* (*table II*). These results show higher K levels for *M. alba* and *M. nigra* than those of Ercisli and Orhan [10] for the same species of Mediterranean origin [(1.66–9.22) $mg \cdot g^{-1}$ in *M. alba–M. nigra*]. Potassium is one of the important nutrients for controlling human blood pressure, therefore fig and mulberry fruits were recommended for hypertension in previous studies.

Similarly, calcium is a major component of bone and assists in tooth development [33]. In our findings, the highest Ca was reported in *Ficus carica* [(10.94 ± 2.75) $mg \cdot g^{-1}$ dry weight] and the lowest in *Morus alba* [(4.66 ± 1.67) $mg \cdot g^{-1}$ dry weight] (*table II*). The recommended daily calcium intake for adults ranges from 1000 mg to 1500 mg. It is also recommended to take supplements with food to aid in absorption. Compared with other metals, the calcium ion and most of its compounds have low toxicity [34].

The quantity of magnesium, sodium and phosphorus varies: (2.02 ± 1.42) to (6.92 ± 0.37) $mg \cdot g^{-1}$ dry weight in *F. carica - F. palmata*, (0.19 ± 0.02) $mg \cdot g^{-1}$ to (1.92 ± 0.11) $mg \cdot g^{-1}$ dry weight in *M. alba - F. palmata* and (0.12 ± 0.09) $mg \cdot g^{-1}$ to (1.50 ± 0.93) $mg \cdot g^{-1}$ dry weight in *M. alba - F. glomerata,* respectively. It is indicated that fig and mulberry fruits constitute a relatively higher amount of minerals than fruits such as mango [calcium (0.169 ± 2.0) $mg \cdot g^{-1}$, magnesium (0.067 ± 1.0) $mg \cdot g^{-1}$, potassium

Table II.
Macro and micro-elements (mg·g^{-1} dry weight) in figs and mulberries fruits (mean ± standard deviation; n = 3).

A) Macroelements

Fruit species studied	N	P	Na	K	Ca	Mg
Morus alba	0.18 ± 0.06	0.12 ± 0.09	0.19 ± 0.02	16.73 ± 0.37	4.66 ± 1.67	2.40 ± 0.39
Morus nigra	0.21 ± 0.10	0.24 ± 0.10	0.79 ± 0.09	12.72 ± 0.95	5.70 ± 1.27	2.12 ± 0.56
Morus laviegata	0.24 ± 0.07	0.68 ± 0.14	1.66 ± 0.19	15.46 ± 0.21	7.17 ± 3.18	2.25 ± 1.74
Ficus carica	0.09 ± 0.05	0.77 ± 0.31	0.49 ± 0.01	6.15 ± 0.06	10.94 ± 2.75	2.02 ± 1.42
Ficus glomerata	0.07 ± 0.04	1.5 ± 0.93	1.63 ± 0.24	17.21 ± 0.03	6.93 ± 0.12	6.73 ± 0.78
Ficus palmata	0.14 ± 0.08	1.36 ± 0.16	1.92 ± 0.11	12.63 ± 0.13	9.28 ± 0.14	6.92 ± 0.37

B) Microelements

Fruit species studied	Fe	Zn	Cu	Pb	Mn	Ni	Co	Sr	Cr
Morus alba	0.47 ± 0.24	0.05 ± 0.01	0.03 ± 0.01	1.00 ± 0.11	0.02 ± 0.01	0.02 ± 0.01	0.07 ± 0.03	0.04 ± 0.02	2.28 ± 0.61
Morus nigra	0.59 ± 0.13	0.06 ± 0.02	0.02 ± 0.01	0.75 ± 0.08	0.06 ± 0.04	0.16 ± 0.10	0.06 ± 0.02	0.02 ± 0.01	1.78 ± 0.29
Morus laviegata	1.43 ± 0.42	0.03 ± 0.01	0.04 ± 0.02	0.03 ± 0.01	0.19 ± 0.10	0.12 ± 0.05	0.04 ± 0.02	0.01 ± 0.004	2.21 ± 1.02
Ficus carica	0.31 ± 0.19	0.06 ± 0.05	0.03 ± 0.01	0.27 ± 0.12	0.41 ± 0.17	0.004 ± 0.001	0.08 ± 0.05	0.05 ± 0.03	1.68 ± 0.81
Ficus glomerata	0.88 ± 0.24	0.05 ± 0.01	2.01 ± 1.22	0.04 ± 0.03	0.95 ± 0.05	0.01 ± 0.00	0.02 ± 0.001	0.06 ± 0.02	2.91 ± 0.14
Ficus palmata	0.82 ± 0.03	0.52 ± 0.14	0.04 ± 0.02	0.06 ± 0.03	0.24 ± 0.09	0.009 ± 0.003	0.01 ± 0.00	0.04 ± 0.01	1.16 ± 0.48

(0.98 ± 1.0) mg·g^{-1}, phosphorous (0.07 ± 0.8) mg·g^{-1}]. These minerals also act as cofactors for many enzymes in the human body [35].

Trace minerals (Fe, Zn, Cu, Pb, Mn, Ni, Co, Sr and Cr) are required in smaller amount but are essential as their excess or lack may be harmful for the body.

Iron (Fe) content was highest [(1.43 ± 0.42) mg·g^{-1} dry weight] in *Morus laviegata* and lowest in *Ficus carica* [(0.31 ± 0.19) mg·g^{-1}) (*table II*). An adequate level of Fe is required for hemoglobin formation in blood, while excessive intake can result in hemochromatosis. Iron-containing enzymes and proteins participate in many biological oxidations and in transport [36]. The copper, zinc and manganese content of the figs and mulberries varied from (0.02 ± 0.01) mg·g^{-1} to (2.01 ± 1.22) mg·g^{-1}, (0.03 ± 0.01) mg·g^{-1} to (0.52 ± 0.14) mg·g^{-1} and (0.02 ± 0.01) mg·g^{-1} to (0.95 ± 0.05) mg·g^{-1}, respectively (*table II*). It is reported that a deficiency of Mn, Zn and Cu may lead to bone deformities, reduced hair growth and cardiac abnormalities [37]. The present contents of K, Ca, Mg, Fe and Cu in white [(16.73 ± 0.37), (4.66 ± 1.67), (2.40 ± 0.39), (0.47 ± 0.24) and (0.03 ± 0.01)] mg·g^{-1} and black [(12.72 ± 0.95), (5.70 ± 1.27), (2.12 ± 0.56), (0.59 ± 0.13) and (0.02 ± 0.01)] mg·g^{-1} mulberries were high with respect to the results of Ercisli and Orhan [10]. Indeed, the authors reported, for *M. alba* and *M. nigra*, K: (1.66 and 9.22) mg·g^{-1}, Ca: (1.55 and 1.32) mg·g^{-1}, Mg: 1.06 mg·g^{-1} in both, Fe: 0.04 mg·g^{-1} in both species, and Cu: (0.005 and 0.004) mg·g^{-1}. Our results regarding the content of Mn were (0.02 ± 0.01) mg·g^{-1} for *M. alba* and (0.06 ± 0.04) mg·g^{-1} for *M. nigra*. Contents of Zn for *M. alba* were (0.05 ± 0.01) mg·g^{-1} and (0.06 ± 0.02) mg·g^{-1} for *M. nigra*. These contents were comparable with pre-existing reports [for *M. alba* and *M. nigra*, Mn: (0.03 and 0.04) mg·g^{-1}, Zn: (0.02 and 0.03) mg·g^{-1}]. These variations might be due to growth conditions and geographical variations. Our study reports a similar concentration of Cr in *Ficus glomerata* [(27.68 ± 2.81) mg·g^{-1}] to that in a previous investigation (27.07 mg·g^{-1}) [38]; Cr is very useful in improving heart function, and balancing blood sugar and cholesterol levels [39].

According to our results, the wild mulberries and figs studied contain higher concentrations of trace elements as compared with cultivated fruits such as orange, grapes and apple [(1.31 ± 0.4) mg·100 g^{-1} of Fe, (0.17 ± 0.2) mg·100 g^{-1} of Cu, (0.54 ± 0.12) mg·100 g^{-1} of Zn, and (0.58 ± 0.10) mg·100 g^{-1} of Mn]. The daily trace mineral requirements of an adult man range from: 10–15 mg Fe, 12–15 mg Zn and 2–3 mg Cu [40]. In our study, *Morus laviegata* and *Ficus palmata* possess superior nutritional status in terms of macro- and micronutrients.

4. Conclusions

Six wildly grown fruits of figs and mulberries were studied for nutritional and mineral composition by following standard proximate analyses. Our findings show that figs and mulberries are promising sources of protein, carbohydrate, fibers and vitamins, with high energy values and essential micronutrients such as K, Mg, Ca, P and Fe. Further research should therefore be conducted on fruits such as figs and mulberries and the results of such studies should be disseminated to the public. This will ensure dietary diversity and food security in different parts of the world.

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Evaluación de los nutrientes y de los recursos minerales de los frutos de higueras y moreras silvestres comestibles.

Resumen – **Introducción**. Las plantas silvestres representan un regalo de la naturaleza para la humanidad. Teniendo en cuenta la creciente necesidad de identificar nuevas fuentes de bionutrición, ciertas especies poco utilizadas de higueras (*Ficus carica* L., *F. palmata* Forssk., *F. racemosa* L.) y de moreras (*Morus alba* L., *M. nigra* L, *M. laevigata* Wall.) de la familia de las Moraceae se evaluaron como frutos silvestres comestibles para estudiar su composición nutritiva y mineral, con el fin de priorizar su consumo entre las poblaciones autóctonas. **Material y métodos**. Se determinó, empleando métodos oficiales de la AOAC, la composición global de los frutos estudiados (humedad, cenizas, lípidos, proteínas, fibras y glúcidos). Se definió, mediante el empleo de un espectrofotómetro de absorción atómica, la concentración de diversos minerales (K, Ca, Mg et Na) y de oligo elementos (Fe, Mn, Zn, Cu y Ni). **Resultados**. Nuestros resultados revelaron una gama de contenidos de humedad de 17,82–80,37 g·100 g^{-1} (peso fresco) para *F. carica-M. laviegata*; de proteínas, de 6,31–13,50 g·100 g^{-1} (peso seco) para *F. glomerata-M. alba*; de grasas brutas, de 1,02–2,71 g·100 g^{-1} para *F. palmate-F. glomerata*; de hidratos de carbono, de 69,47–75,58 g·100 g^{-1} para *M. alba-M. nigra*; de fibras, de 7.63–17,81 g·100 g^{-1} para *M. laviegata-F. palmate*, respectivamente. Se calculó un valor energético significativamente elevado para *M. laviegata* (367,7 kcal·100 g^{-1}). Asimismo en todas las especies estudiadas se encontraron cantidades nada despreciables de elementos esenciales. Los niveles más altos de N [(0,24 ± 0,07) mg·g^{-1}] y Fe [(1,43 ± 0,42 mg·g^{-1}] se encontraron en *M. laviegata*; de Na [(1,92 ± 0,11 mg·g^{-1}] y Mg [(6,92 ± 0,37 mg·g^{-1}], en *F. palmate*; y K [(17,21 ± 0,03 mg·g^{-1}], en *F. glomerata*. Para todos los elementos nutricionales aparecieron variaciones significativas entre las especies estudiadas. **Conclusión**. Según nuestros resultados, los frutos de higueras y de moreras deberían recomendarse a escala de una producción comercial para la industria verde, con el fin de vencer las crisis alimentarias en cuanto a fuente potencial de alimentación cotidiana, particularmente los frutos de *Morus laviegata* y *Ficus palmata*, los cuales poseen ricas propiedades nutricionales y perfiles minerales.

Pakistán / *Morus* / *Ficus* / frutas / composición aproximada / contenido mineral