

MACA TECHNICAL STANDARD INFORMATION

FAMILY:

Cruciferae (Brassicaceae)

GENUS:

Lepidium

SPECIE:

Lepidium meyenii, Walp, or Lepidium peruvianus, Chacón

COMMON NAME:

English: Maca , Peruvian ginseng

Spanish and Quechua: maca, maka, maca-maca, maino, ayak chichira, ayac willcu

ORIGIN:

Junin Plateau, central highland region of Peru, at 4,100 meters above sea level, where maca has been domesticated before the Incas time..

THERAPEUTIC PROPERTIES:

Traditionally, maca was consumed to combat mental and physical fatigue and to balance the overall diet-with its high and varied minerals, amino acids, vitamins and other components - both important uses in our present age of accelerated life styles that neglect balanced living. Maca stimulates the functions of endocrine system in both men and women over 40, it helps to ameliorate the discomforts of the ageing process, including osteoporosis/anaemia and support a healthy sex life and fertility. Maca is considered an anti-aging and anti-stress product. Its sterol components offer benefits, in particular strengthening the immune system. In the Andes maca is considered the Fountain of the Youth.

DOSAGE:

Maca powder: one (2 grams) or two teaspoon daily at breakfast.

Three to four 500mg capsules daily at breakfast.

TOXICITY:

Research made in rats using sun dried maca powder showed that maca present one DL50 bigger than 1500mg/kilo (Dr. Arroyo and Sandoval). Maca has been consumed by Andean people for centuries and no side effects appeared.

AVAILABILITY:

Maca powder can be supplied. Also, maca extracts, gelatinized and in capsules can be supplied by request.

MACA POWDER:

From selected sun dried maca root, organically cultivated and processed, with a *Skal International* certificate (EKO logo). The process of its preparation starts with the washing

and disinfection of maca with a special washing machine and a biodegradable detergent; afterwards it is triturated in a machine to be dried in a cabin on trays at a maximum of 55 degrees centigrade hot air for 8 hours to obtain triturated maca at 8 % of humidity. This is immediately taken to be milled and packed. The maca powder obtained is pricked of cream colour, maintains its nutritive and medicinal properties, contains no chemical additives, is ready to be taken direct or for the preparation of capsules/tablets or to be used as an ingredient of any prepared food.

MICRO AND MACRO COMPONENTS OF MACA

The components vary, as in any plant material, according to the soils in which the product is cultivated. The following gives average nutritional values.

TABLE 1. Analytical composition of maca in percent (Air dried tuber)

Components	%
Water	10.4
Proteins	10.2
Lipids	2.2
Hydrolyzable carbohydrates	59.0
Whole fibre	8.5
Ash	4.9

Source: Table taken from: D. Deni, G. Migliuolo, L. Rastrelli, P. Saturnino, O. Schettino, "Chemical Composition of *Lepidium meyenii*", in Food Chemistry 49, USA1994; and Garró, Virginia, Macro y micro elementos de la maca, Mimeo, Lima, 1999.

TABLE 2 Vitamins

Vitamins	mg
B1 Thiamine	0.20
B2 Riboflavin	0.35
C	10.00
E	87.00
Other vitamins has been found	
Niacina, B6, D3 and P	

Source: B1 and B2 from Chacón, Gloria, La importancia de Lepidium Peruvianum (Maca) en la alimentación , y salud del ser humano, Lima, 1997; C and E from Garró Virginia, Op.Cit (1999).

TABLE 3 Amino acid composition of maca

Aminoacids	Mg concentration Gr protein
Aspartic acid	91.7
Glutamic acid	156.5
Serine	50.4
Histidine	21.9
Glycine	68.3
Threonine	33.1
Cystine	n/d
Alanine	63.1
Arginine	99.4
Tyrosine	30.6
Phenylalanine	55.3
Valine	79.3
Methionine	28.0
Isoleucine	47.4
Leucine	91.0
Lysine	54.3
Tryptophan	n/d
H.O. Proline	26.0
Proline	0.5
Sarcosine	0.7

Source: data taken from D. Din , O Migliolo, L. Ratrelli, P. Saturnino, O. Schettino, "Chemical Composition of *Lepidium meyenii*" in Food Chemistry, 49, USA, 1994, and Garro Virginia, Nuevo sistema de solventes para cromatografía de aminoácidos y participación cuantitativa de L. valina y L metionina, Tesis Doctoral, UNMSM, Lima, Peru, 1972

Table 4 Sterols as steryl acetate derivatives present in *Lepidium meyenii*

Sterol	Present of Sterol mixture	Retention time (min.)
Brassicasteryl acetate	9.1	22.4
Ergosteryl acetate	13.6	23.8
Campesteryl acetate	27.3	25
Ergostadienyl acetate	4.5	27.5
Sitosteryl acetate	45.5	19.5

Source: table taken from A. Dini, G. Migliuolo and others, Op. cit. 1994.

Table 5 Fatty acids as methyl ester derivatives, present in *Lepidium meyenii*.

Fatty acids	Percent of methyl Ester mixture
Dodecanoic (lauric)	0.8
7-tridecenoic	0.3
Tridecanoic	0.1
Tetradecanoic (myristic)	1.4
7-pentadecenoic	0.5
Pentadecanoic	1.1
9-esadecenoic (palmitolete)	2.7
Esadecanoic (palmitic)	23.8
9-heptadecenoic	1.5
Heptadecanoic	1.8
9,12 octadecadienoic (linoliec)	12.6
9-octadecenoic (oleic)	11.1
Octadecanoic (stearic)	6.7
11- nonadecanoic	1.3
Nonadecanoic	0.4
15-eicosenoic	2.3
Eicosanoic (archidie)	1.6
Docosanoic (behenic)	2.0
15 tetracosenoic (nervonic)	0.4
Tetracosanic (lignoceric)	0.4
Fatty acid saturated (%)	40.1
Unsaturated (%)	52.7
Saturated/unsaturated ratio	0.76

Source: data from A. Dini, G. Migliuolo, L. Rastrelli, other, Op. Cit, (1994)

Table 6 Mineral composition of *Lepidium meyenii* (mg/100 g fry matter)

Minerals	mg/100 g fry matter
<i>Fe</i>	16.6
<i>Mn</i>	0.8
<i>Cu</i>	5.9
<i>Zn</i>	3.8
<i>Na</i>	18.7
<i>K</i>	2,050.0
<i>Ca</i>	450
<i>P</i>	230

Source: data from A. Dini, G. Migliuolo and others Op. cit, (1994) and Garró Virginia, Op. Cit (1999).

Other components: fructose, glucosinalatos, flavonoids, sterols, alkaloids, steroids, and tannin, other minerals such as bismuth, tin, aluminium, silica, magnesium.