Maqui (*A. chilensis*) properties, scientific evidence

Usually the metabolism and cellular respiration produce, secondarily, reactive species, potentially harmful, called free radicals. Free radicals are molecules that have a missing electron in their structure, so they are very chemically unstable and seek to combine with biomolecules of the cellular structure. It is normal that we have free radicals in the body, but when they are in excess they begin to produce damage, as they chemically react with lipids, proteins, carbohydrates and DNA inside the cells and can trigger an irreversible deterioration that contributes to the development of chronic diseases, such as atherosclerosis and cancer.

Naturally the organism has an antioxidant system that inactivates free radicals by enzymatic mechanisms, however, these are not sufficient by themselves and it is necessary to obtain antioxidant substances from diet. On the other hand, the current lifestyle, the action of UV radiation, environmental pollution, strenuous physical exercise and other factors induce a greater production of free radicals. There is an imbalance between pro-oxidant substances and antioxidant mechanisms, this is called stress or oxidative damage and the only way to reverse it is through the consumption of antioxidants. Antioxidants are substances that "trap" excess free radicals and form stable compounds that are then eliminated.

OXIDATIVE STRESS: Situation in which there is both increase, in the rate of generation of reactive oxygen species and a decrease in defense systems, resulting in a higher concentration of reactive oxygen species.

ANTIOXIDANT CAPACITY: Potential to trap free radicals in order to prevent them from interacting with fundamental biological molecules

ANTIOXIDANTS: Different type of substances, which prevent or delay the molecular damage caused by free radicals



MAQUI *(A. CHILENSIS)*

Maqui has the highest level of antioxidants from all known fruits (as measured by Brunswick Laboratories USA). This fruit has high concentrations of phenols, anthocyanins and total proanthocyanidins (Lillo et al., 2016). The anthocyanins present in the maqui fruit constitute 0.2% and have been associated with high antioxidant activity (Jara et al., 2012). 34% of these anthocyanins correspond to delphinidin (Escribano et al., 2006), a compound of immense importance in the regulation of glucose. (Annex 2 and 3)

REGULATION OF GLUCOSE AND DELPHINIDINE LEVELS

Delphinidins (compounds highly present in maqui) induce significantly the secretion of insulin when the glucose concentrations rise. (Jayaprakasam et al., 2005)

Delphinidins have a potential effect on maintaining glucose balance. Oral administration of anthocyanins and delphinidin has been shown to reduce, dose-dependently, fasting blood glucose levels in a model of obese mice, also decreases glucose production in rat liver cells. Delphinidins also play an inhibitory role in the transport of glucose in the small intestine, which is reduced by approximately 60% (Jara et al., 2012).

MAQUI ACTS LIKE DRUG METFORMIN

Polyphenols have generally been shown to be effective in controlling hyperglycemia and insulin resistance. In an obese mice model, an anthocyanin concentrate was tested from maqui, and it was shown that this compound acts similarly to the drug metformin, as it reduces blood glucose levels after 4 and 6 hours. The results are shown in the chart in Annex 4 (Rojo et al., 2012).

MAQUI INHIBITS ENZYMES OF CARBOHYDRATE METABOLISM

A crude extract of leaves and fruits showed antioxidant activity, acting the maqui polyphenols, in the inhibition of the enzyme alpha-glucosidase and alpha-amylase, which is important because of the role these enzymes play in the metabolism of carbohydrates. Inhibition of digestive enzymes delay the digestion of carbohydrates, which decreases the rate of glucose absorption and consequently reduces postprandial hyperglycemia (Rubilar et al., 2011).