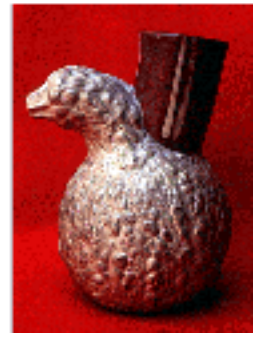




Ethnobotanical Leaflets



Ephedra: Asking For Trouble?

By Scot Peterson

A member of the phylum Gnetophyta, the *Ephedra* genus is a perennial, dioecious shrub that reaches 1 1/2 to 4 feet tall (7). There are multiple species of this genus that inhabit the desert regions in certain parts of the world. The three species *E. sinica*, *E. intermedia*, and *E. equisetina* are found in Asia, particularly China and Mongolia. *Ephedra distacha* is from Europe. India and Pakistan are home to *E. gerardiana*. North American species consist of *E. nevadensis* (Mormon tea), *E. viridis* (desert tea), *E. americana*, and *E. trifurca* (7). It takes an average of four years for the shrub to achieve maturation (10) and is harvested in the fall (11). Ephedra has been used medicinally for hundreds, even thousands of years in the regions where it grows.

For more than 5000 years, Ephedra's stems have been dried to cure multiple ailments in China. The first records of its use can be found in a Chinese compilation of herbs called Shen Nong Ben Cao Jing (11), which dates back to the first century A.D. (5) *E. sinica*, called *Tsaopen-Ma Huang* (2), is the most common species used. *Ma Huang* refers to the stem and branch, whereas *Ma Huanggen* refers to the root and rhizome. *Ma Huang* was used primarily in the treatment of the common cold, asthma, hay fever, bronchitis, edema, arthritis, fever, hypotension, and urticaria (hives). *Ma Huanggen's* effect is believed to oppose that of the stem and branches. Its use was limited to the treatment of profuse night sweating" (7). *Ma Huang* was believed to relieve other ailments such as headaches, urinary tract infections, and venereal diseases (10).

The Chinese prepared Ephedra different ways, such as extracts and compresses. However, the most common preparation of *Ma Huang* was as a tea. The stems were dried in the sun and either broken into pieces or crushed into a powder. It was then boiled in a mixture of honey and water. Sometimes it was boiled until only the residue remained, and then consumed (8).

Tea appears to be the most common preparation of Ephedra as a medicine in India and North America as well. In India and Pakistan, the stems of *E. geradina* were used to treat asthma (8). An ancient collection of Hindu sacred writings called the *Rigved* gives mention of a drink called *soma*. *Soma* was a juice made from Ephedra and was believed to promote longevity (6).

The natives and early pioneers of the American southwest used *E. nevadensis* and *E. trifurca* to make "Mormon tea" and "Squaw tea" (3). These two teas were brewed not only to treat allergies and other cold symptoms, but also as a stimulant. *E. antisiphilitica* stems were used by the Native Americans of West Texas and Northern Mexico to treat kidney problems (8) and possibly venereal diseases as well (anti-syphilis?). This same culture ground the roasted seeds of *E. nevadensis* into flour to cure urogenital disease (8). Use of Mormon tea dates back to 1552; however it is questionable that the drink has a stimulant effect on the body (1).

The compounds in the Ephedra plant that gave its desired effects were not known until 1887. Nagi, an oriental biochemist was the one to isolate ephedrine as the main alkaloid responsible (4). Although it was available in Germany in 1896 (6), it was not widely recognized in America until 1924 when two scientists named Carl Schmidt and K.K. Chen had discovered its physiological properties (4). Pseudoephedrine was also discovered to be an alkaloid of Ephedra and was a weaker version of ephedrine. By 1927, ephedrine could be synthesized and put into use as over-the-counter drugs such as Sudafed and Primatine (7). Studies have indicated that only the Chinese species of Ephedra contain enough of the alkaloids to be effective as medicinal (5).

Ephedrine is very similar to adrenaline (epinephrine) in the human body. It is rapidly absorbed and lasts longer than adrenaline (7). It stimulates the sympathetic nervous system, which increases the heart rate, blood pressure, and blood flow to the heart, brain, and skeletal muscle (7). It is also responsible for opening the bronchioles of the lungs and relieving swelling of mucous membranes (9). As a result, the air passages that are affected by asthma, hay fever, and other allergies are opened for clearer breathing. Although pseudoephedrine does not have as strong of an effect on the body as ephedrine, in fact it causes drowsiness rather than stimulation, it helps by opening up the upper respiratory tract (nasal area) (3). In addition to allergy relief, ephedrine has also been found to treat arthritis, rheumatism, narcolepsy, and hives (3).

The Chinese herbalists long ago believed that Ephedra (*Ma Huang*) should be taken with other herbs to either increase effectiveness or decrease any side effects. For example, prolonged use of Ephedra can weaken the adrenal glands and therefore reduce the effect of ephedrine. However, licorice (*Glycyrrhiza glabra*) and *Panax ginseng*, or vitamin C, magnesium, zinc, vitamin B6 and pantothenic acid sustains the adrenal glands and does not hinder the effectiveness of ephedrine. Also, expectorants are used in conjunction with Ephedra when used for cold and allergy-like symptoms (7). In China, Ephedra is mixed with cinnamon, licorice root, and almond to make a cold medicine to relieve head and body aches, coughing, and fever by promoting sweating (11).

"Please note that self-medication with Ephedra sinensis may be extremely dangerous, the chinese name *Ma Huang* means approximately 'asking for trouble'. The emergence of ephedra-extracts which are being sold as 'Herbal Extasy' or herbal slimming-pills' has given the herb a very bad reputation since various fatalities have been attributed to these products...." (10). This disclaimer is from an online site that sells *E. sinensis*. Because Ephedra has such a stimulating effect on the cardiovascular and respiratory system, it has become popular among athletes. The herb allows them to train and compete

above their normal performance (8). Unfortunately, this can lead to abuse and the users are subject to injuring themselves.

Recently, ephedrine has been found to be important in weight loss. Various studies have been and still are being conducted to verify how well the drug works and how safe it is. Ephedrine suppresses the appetite, but more importantly, it speeds up the metabolism. When food is consumed, some of it is stored as fat while the rest is turned into heat energy. Ephedrine, by stimulating the sympathetic nervous system, increases the amount of heat produced from food (called thermogenesis) and therefore decreases the amount of fat stored (7). This is dangerous knowledge to the person who does not understand that ephedrine alone is not fully responsible for weight loss. Although it can help burn energy, it works better when combined with coffee, tea, cola nuts, or guarana (7). Studies have shown that even aspirin combined with ephedrine proved to be more effective than ephedrine alone. Subjects who had taken only ephedrine have shown more side effects than the subjects who took ephedrine with one of the other substances mentioned above (7). Easy weight loss from a pill is desirable, however, a very dangerous thing if abused. For this reason, the FDA has strict regulations on the sale and use of weight loss and dietary supplements containing ephedrine (11).

There are many side effects resulting from an excess of ephedrine. Insomnia, irritability, headaches, nausea, vomiting, difficulties with urination, accelerated heart rate, and muscle twitches are some of the lesser side effects (11). Prolonged use can lead to disturbances in the heart's rhythm, high blood pressure, an amphetamine-like dependency, and eventually heart failure (2). Ephedrine has also been known to substitute for illicit street drugs such as methamphetamines.

References

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