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Chemo-Pharmacological Aspects of Alfalfa: A Review

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ABSTRACT

Alfalfa is a common sight in many temperate grasslands of the world. Alfalfa belongs to pea family (Fabaceae). The herbal remedies made utilizing the alfalfa have been generally prescribed by herbalist for the treatment of a variety of ailments and disorders. The alfalfa can be taken in the form of an herbal tea and it is also used in the form of herbal tablets or capsules, at times the dried plant itself is consumed by patients. In the UK, Australia, South Africa and New Zealand, it is also known as lucerne, and as lucerne grass in south Asia. In Hindi, it is known as chara (चारा), as (دشقه) in Pashto, and in Gujarati as *rajka* or *gadab*. It resembles clover, with clusters of small purple flowers.

Keywords: Alfalfa, SLE, Ayurveda, Fabaceae, Lucerne

INTRODUCTION

When we were little, we were probably told that we must "eat up your greens" if we want to grow healthy and strong. It still holds true for us as adults - leafy green vegetables provide us with a whole host of important vitamins and nutrients. But in today's busy world, when we all seem to be so time poor, making sure that you eat a healthy well-balanced diet can be quite a challenge.

But by taking alfalfa on a daily basis, we can help bring the balance back into your diet and benefit from the remarkable properties of this unique blend of green plants.

The effectiveness of the herbal remedies made from the alfalfa in treating disorders is available from many testimonials written by people who used the herbal alfalfa tea as a cure for different kinds of arthritic conditions, which includes serious conditions such as the rheumatoid arthritis - which affects a lot of people. In addition, these faithful advocates of the curative abilities of the alfalfa, inform us in these testaments that taking large quantities of the herbal alfalfa tablets before daily meals can prevent the excess absorption of cholesterol from food - this is a very beneficial effect, especially for the arterial blood flow and particularly so, for the heart and circulation in general. Many people have also claimed that alfalfa herbal tea is effective in treating or reducing diabetes, it is also said that the herbal remedy can help stimulate the slack appetite and that the herb can be used as a general tonic for treating appetite disorders. These claims, may be true, for example, the physical effects of an alfalfa aqueous extract at 1mg/ml on insulin release were recently conducted on streptozotocin-diabetic mice as subjects. Some noticeable effects such as insulin-releasing and anti-hyperglycemic activity were reported when the extract was given to the mice at doses of 62.5g/kg of body weight per test subject.

ECOLOGY

Alfalfa is a cool season perennial legume which can live more than twenty years, depending on variety and climate[1]. The plant grows to a height of up to 1 metre (3 ft), and has a deep root system, sometimes stretching more than 15 metres (49 ft)[1]. This makes it very resilient, especially to droughts[1]. It has a tetraploid genome[2].

This plant exhibits autotoxicity, which means it is difficult for alfalfa seed to grow in existing stands of alfalfa[3]. Therefore, it is recommended that alfalfa fields be rotated with other species (for example, corn or wheat) before reseeding[4].

VARIETIES

Considerable research and development has been done with this important plant. Older cultivars such as 'Vernal' have been the standard for years, but many better public and private varieties better adapted to particular climates are available[5]. Private companies release many new varieties each year in the US[6].

Most varieties go dormant in the fall, with reduced growth in response to low temperatures and shorter days[6]. 'Nondormant' varieties that grow through the winter are planted in long-seasoned environments such as Mexico, Arizona, and Southern California, whereas 'dormant' varieties are planted in the Upper Midwest, Canada, and the Northeast[6]. 'Nondormant' varieties can be higher yielding, but they are susceptible to winter-kill in cold climates and have poorer persistence[6].

Most alfalfa cultivars contain genetic material from sickle medick (*M. falcata*), a wild variety of alfalfa that naturally hybridizes with *M. sativa* to produce sand lucerne (*M. sativa* ssp. *varia*). This species may bear either the purple flowers of alfalfa or the yellow of sickle medick, and is so called for its ready growth in sandy soil[7].

Most of the improvements in alfalfa over the last decades have consisted of better disease resistance on poorly drained soils in wet years, better ability to over winter in cold climates, and the production of more leaves. Multi leaf alfalfa varieties have more than three leaflets per leaf, giving them greater nutritional content by weight because there is more leafy matter for the same amount of stem.

GENETICALLY MODIFIED ALFALFA

Roundup Ready alfalfa, a genetically modified variety patented by Monsanto Company, is resistant to Monsanto's glyphosate. Although most broadleaf plants, including ordinary alfalfa, are sensitive to Roundup, growers can spray fields of Roundup Ready alfalfa with Roundup, and so kill the weeds without harming the alfalfa crop.

The California Alfalfa Workgroup[8] (UC Davis) has an up-to-date listing of alfalfa variety trial data[1] by location as well as Agronomy Progress Reports for each year.

ACTIVE CONSTITUENTS

While the medicinal benefits of alfalfa are poorly understood, the constituents in alfalfa have been extensively studied. The leaves contain approximately 2-3% saponins[9]. They also contain also contain flavones, isoflavones, sterols, and coumarin derivatives. Alfalfa contains protein and vitamin A, vitamin B1, vitamin B6, vitamin C, vitamin E, and vitamin K. Nutrient analysis demonstrates the presence of calcium, potassium, iron, and zinc.

PHYTOESTROGENS IN ALFALFA

Alfalfa, like other leguminous crops, is a known source of phytoestrogens[10]. Grazing on alfalfa has been suspected as a cause of reduced fertility in sheep.

PARTS USED

The parts of the plant used are as whole herb and leaf. Alfalfa sprouts are used as a salad ingredient in the United States and Australia. Tender shoots are eaten in some places as a leaf vegetable. Alfalfa has the potential to be the most prolific of all leaf vegetable crops, processed by drying and grinding into powder, or by pulping to extract leaf concentrate. Alfalfa has the highest feeding value of all common hay crops, being used less frequently as pasture.

TRADITIONAL USES IN REWIND MODE

For almost 1500 years now, alfalfa has been used as part of herbal medicine. As early as the year 490 BC, its use began and has been a predominant part of the Roman records.

- According to Chinese medicine, this herb was used to treat problems related to the digestive system (ulcers, for instance)[11] and it was also said to help in stimulating the appetite. It was generally almost always prescribed by traditional physicians of that time.
- The physicians of ayurveda used this herb in India to combat ulcers, arthritis pain and fluid retention of any sort.
- Native American Indians used this herb to promote the clotting of blood to avoid excessive blood loss and they also used it to treat jaundice.
- The Spanish were said to have brought alfalfa to their colonies somewhere in the 1700s, and the early settlers used it in the treatment of cancer, arthritis and painful boils. They were also said to use this herb in the treatment of scurvy and for urinary tract problems.
- Ancient day women were said to look at alfalfa as a means to bring on their menstrual period.
- Herbalists in the 19th century were said to be capable of creating a tonic using alfalfa and this tonic was known to treat anemia, dyspepsia and indigestion. They were also said to use it in the case of people dealing with a loss of appetite.

Although conspicuously absent from many classic text books on herbal medicine, alfalfa did find a home in the texts of the Eclectic physicians (19th-century physicians in the United States who used herbal therapies) as a tonic for indigestion, dyspepsia, anemia, loss of appetite, and poor assimilation of nutrients[12]. These physicians also recommended the alfalfa plant to stimulate lactation in nursing mothers, and the seeds were made into a poultice for the treatment of boils and insect bites.

HOW IT WORKS

While the medicinal benefits of alfalfa are poorly understood, the constituents in alfalfa have been extensively studied. The leaves contain approximately 2–3% saponins[9]. Animal studies suggest that these constituents block absorption of cholesterol and prevent the formation of atherosclerotic plaques[13]. One small human trial found that 120 grams per day of heat-treated alfalfa seeds for eight weeks led to a modest reduction in cholesterol[14]**.** However, consuming the large amounts of alfalfa seeds (80–120 grams per day) needed to supply high amounts of these saponins may potentially cause damage to red blood cells in the body[15]. Herbalists also claim that alfalfa may be helpful for people with diabetes. But while high amounts of an aqueous extract of the leaves led to

increased insulin release in animal studies, there is no evidence that alfalfa would be useful for the treatment of diabetes in humans[16].

Alfalfa leaves also contain flavones, isoflavones, sterols, and coumarin derivatives. The isoflavones are thought to be responsible for the estrogen-like effects seen in animal studies[17]. Although this has not been confirmed with human trials, alfalfa is sometimes used to treat menopause symptoms. Alfalfa contains protein and vitamin A, vitamin B1, vitamin B6, vitamin C, vitamin E, and vitamin K. Nutrient analysis demonstrates the presence of calcium, potassium, iron, and zinc.

DOSAGE

Dried alfalfa leaf is available as a bulk herb, and in tablets or capsules. It is also available in liquid extracts. No therapeutic amount of alfalfa has been established for humans. Some herbalists recommend 500-1,000 mg of the dried leaf per day or 1-2 ml of tincture three times per day[18].

SIDE EFFECTS

Use of the dried leaves of alfalfa in the amounts listed above is usually safe. There have been isolated reports of people who are allergic to alfalfa. Ingestion of very large amounts (the equivalent of several servings) of the seed and/or sprouts has been linked to the onset of systemic lupus erythematosus (SLE) in animal studies[19]. It has also been linked to the reactivation of SLE in people consuming alfalfa tablets[20]. SLE is an autoimmune illness characterized by inflamed joints and a high risk of damage to kidneys and other organs. The chemical responsible for this effect is believed to be canavanine.

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