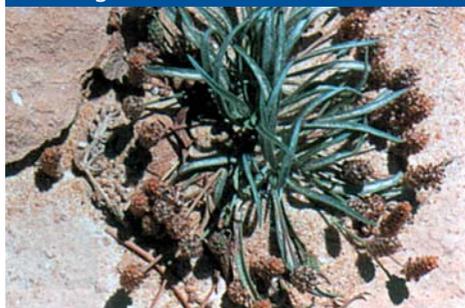


## *Plantago ovata* Forssk.

Plantaginaceae



Compiled by: Prof. F. M. Hammouda, Prof. S. I. Ismail,  
Dr. N. S. Abdel-Azim and Dr. K. A. Shams

Edited by: Prof. K. H. Batanouny

Photo by K. H. Batanouny

### ■ Morphological Description

Eglandular grey to white-hairy, short stemmed annual, subcaulescent herb. Leaves are in rosettes, narrow linear, obtuse to acute, entire or remotely denticulate, 3-nerved, covered with wooly hairs. Scapes scarcely exceed the leaves; spikes are dense, globular to ovate or oblong. Bracts, rotund-ovate, glabrous, obtuse, midrib herbaceous, margin scarious; sometimes slightly hairy. Sepals are ovate, carinate, obtuse, glabrous. Corolla-tube, lobes ovate or orbicular, glabrous. Stamens exerted. Capsule c.3 mm long. Seeds 2, cymbiform, smooth. Seeds, which are oval and boat-shaped, vary in colour from pale pink to greyish brown and even reddish yellow. Plants bloom about 60 days after planting.

### ■ Geographical Distribution

**Local:** It is common in the Mediterranean coastal region, Sinai proper, Isthmus desert and the Arabian desert East of the Nile.

**Regional:** North Africa.

**Global:** India, Iran, Pakistan, countries of the Arabian Peninsula.

### ■ Ecology

The plant is native to the Mediterranean region and cultivated widely throughout the world.

### ■ Status

The plant grows in the deserts of Arab countries in sandy habitats. Its appearance and prosperity are

## *Plantago ovata* Forssk.,

Fl. Aegypt-Arab, 31 (1775)

*Plantago decumbens* Forssk., Fl. Aegypt-Arab, 30 (1775).

### Names

**Arabic:** Geneima جنيمة , Qurayta قرية .

**English:** Spogel Plantain.

**French:** Ispaghula.

affected by the irregular rainfall. Because of its wide use in the pharmaceutical industry, the plant is cultivated at Rashid (El-Behera Governorate, Egypt). *P. ovata* is a 119 to 130 day crop that responds well to cool, dry weather. It has a moderate water requirement. An environmental requirement of this crop is clear, sunny and dry weather preceding harvest. It grows best on light, well drained, sandy loams.

### ■ Part(s) Used

Seeds or Ispaghula Husk, which consists of the epidermis and the collapsed adjacent layer removed from the dried ripe seeds of *Plantago ovata* Forssk.

### ■ Collection

the harvested seed must be dried below 12% moisture to allow for cleaning, milling and storage.

### ■ Preparation

decoction, infusion, powder.

### ■ Use

oral, external.

### ■ Constituents

Constituents include a mucilaginous polysaccharide, consisting of a highly branched acidic arabinoxylan with axylan backbone and branches of arabinose, xylose, and 2-O-(galacturonic acid)-rhmnose residues, about 2.5% fixed oil, linoleic leic, and palmetic acids. Other constituents include aliphatic hydrocarbons and starch.

### ■ Pharmacological Actions and Toxicity

The main pharmacological actions of *plantago*

*ovata* can be attributed to the mucilage component. Ispaghula is documented to be used as a bulk laxative. The swelling properties of the mucilage enable it to absorb water in the gastro-intestinal tract, thereby increasing the volume of the faeces and promoting peristalsis. Bulk laxatives are often used for the treatment of chronic constipation. Ispaghula is also known to be used in the treatment of diarrhoea and for adjusting faecal consistency in patients with colostomies and with diverticular disease or irritable bowel syndrome. Soluble fibre intake with mucilage decreases serum cholesterol, mainly LDL. Both the dried seeds and the seeds husk are demulcent, emollient and laxative. They are used in the treatment of dysentery, catarrhal conditions of the genito-urinary tract, and inflamed membranes of the intestinal canal.

An alcoholic extract lowered the blood pressure of anaesthetized cats and dogs, inhibited isolated rabbit and frog hearts, and stimulated rabbit, rat and guinea pig ileum. The extract exhibited cholinergic activity.

A clinical trial of a *Plantago ovata* flour-based solution demonstrated it to be an effective treatment for dehydration due to acute diarrhoeal diseases.

It is used in reducing the number of bleeding episodes among patients with internally bleeding hemorrhoids. Probably due to its soluble-fiber content, Ispaghula has also improved glucose tolerance in some cases of diabetes.

The seeds, when taken with Mesalamine (anti-inflammatory drug), were more effective in treating ulcerative colitis. The use of fresh leaves prevented itching and the spread of dermatitis in poison ivy-induced dermatitis.

The oil in the seed embryo has been used to prevent atherosclerosis. It is also effective in reducing blood cholesterol.

Ispaghula husk is nearly as effective as Simvastatin in improving the lipid profile of hyperlipidemic patient. Psyllium has also been recommended for Crohn's disease.

Using *Plantago ovata* in recommended amounts is generally safe and non toxic.

Unlike some laxatives, Ispaghula husk is not addictive, and can be taken daily.

As Ispaghula supplements may reduce or delay the absorption of certain medications, these should be taken at least one hour before or between two and

four hours after taking Ispaghula.

In common with all bulk laxatives, Ispaghula may temporarily increase flatulence and abdominal distension, and may cause intestinal obstruction. If swallowed dry, Ispaghula may cause oesophageal obstruction.

The drug can be used during pregnancy and breast feeding and is contraindicated in cases of intestinal obstruction.

### ■ Pharmacopoeia

BPC 1973 (Ispaghula husk)

British pharmacopoeia 1980, 1983, 1990

(Ispaghula husk)

Martindale 30th edition

Pharmacopoeias-U.S. under the title *Plantago Seed*

Ayurvedic pharmacopoeia

French pharmacopoeia

German pharmacopoeia

### ■ Pharmaceutical Products

Agiolax (Madaus, CID)

Laxiplant (Minapharm)

Biolax (Sekem)

### ■ Traditional Medicine and Indigenous Knowledge

**History:** Decoction of Ispaghula has been used either as a cooling demulcent drink, or the seeds mixed with a little sugar and taken dry. In this form they take up water in the intestinal canal, the resulting mucilage acting as a protection to the swollen mucous membranes. The crushed seeds mixed with hot water are used externally as a poultice for rheumatism. Seeds are known to be taken dry or mixed with water in chronic diarrhoea and in atony of the intestine with constipation. Sold in the "Attarin" (traditional herbs' seller shops) in Cairo, they are used as contraceptive vaginal pessary for 7 days.

Seeds or Ispaghula husks tend to swell in contact with water, creating a feeling of "fullness" in the body, which can also help curb appetite. Ground seeds or husks are used as a laxative, and also as an emollient, demulcent and astringent, particularly in chronic colitis. Seeds are used in urinary infections as an ancillary treatment. Seeds are crushed and applied in a poultice for furunculosis. Fresh leaves are applied topically to treat various skin irri-

tations including poison ivy reaction and insect bites and stings as well as haemorrhoids. Spaghula husks seem to help soften stools and reduce the pain associated with haemorrhoids. Spaghula has also been used effectively to treat yeast infections. Psyllium has also been used in traditional herbal systems of China and India to treat haemorrhoids, bladder problems, and high blood pressure. Spaghula may also be used to treat irritable bowel syndrome, and reduce cholesterol and blood sugar levels. Young leaves of this plant are eaten in salads. Ground seeds are added to cereal or yogurt. The husk mucilage is used as a thickener or stabilizer in certain frozen dairy desserts. Spaghula husks can also be incorporated into soups, sauces or smoothies. The dehusked seed that remains after the seed coat is milled off is rich in starch and fatty acids and is used in India as chicken and cattle feed. Technical grade *Plantago ovata* has been used as a hydrocolloidal agent to improve water retention for newly seeded grass areas and to improve transplanting success with woody plants.

#### ■ Traditional Medicinal Uses

- Helps soften stools.
- Laxative, emollient, demulcent and astringent, particularly in chronic colitis.
- Skin infections and insect bites.
- Urinary infections.
- Weight loss and obesity.
- Yeast infections.

**Other uses of the plant:** Contraceptive, food supplement, thickener or stabilizer in frozen dairy desserts. Also used as a hydrocolloidal agent to improve water retention for newly seeded grass.

#### ■ References

Abraham; Z.D. and Mehta, T. (1988). "Three- week psyllium husk supplementation: Effect on plasma cholesterol concentration, fecal steroid excretion, and carbohydrate absorption in men". *Am. J. Clin. Nutr.* 47(1): 67-74.

Anderson; J. R., Bukhave; K., Hojgaard; L., Rasmussen; J., Hermansen; N., Worning; H. and Karg; E., (1988). "Decomposition of wheat bran and isabgol husk in the stomach and small intestine of healthy men". *J. Nutr.* 118(3):326-331.

Anderson; J.W., Deakins; D., Floore; T., Smith; B., Whitis; S., (1990). "Dietary fiber and coronary heart disease". *Crit. Rev. Food Sci. Nutr.* 29(2): 95-147.

Bell; L.P., Hectorn; K., Reynolds; H., Hunninghake; D., (1990). "Cholesterol- lowering effects of soluble-fibre cereal as part of a prudent diet for patients with mild to moderate hypercholesterolemia". *Am. J. Clin. Nutr.* 52(6): 1020-1026.

Bhagat; N.R. (1980). "Studies on variation and association among seed yield and some component traits in *Plantago ovata* Forsk". *Crop Improv.* 7: 60-63.

Chan; J.K.C. and Wypyszyk; V., (1988). "A forgotten natural dietary fibre: psyllium muciloid". *Cereal Foods World* 33(11):919-922.

Gupta; R. (1982). "Recent advances in cultivation of Isabgol" (*Plantago ovata* Forsk.) in India. In *Cultivation and Utilization of Medicinal Plants*. C.K. Atal and B.M. Kapar eds. Pages 406-417.

Hammouda; F.M., (1964). "Chemical Investigation of Certain Egyptian Desert Plants", Ph. D. Thesis, Cairo Univ. Faculty of Science.

Mehta; K.G., Modi; J., Gupta; R., (1976). Psyllium. *Indian J. Agron.* 21(4):509-510.

Rubis; D.D. (1990). "Personal communique in regard to *Plantago* and psyllium".

Stewart; R.B., Jale; W., Moore; M., May; F., Marks; R., (1991). "Effect of psyllium hydrophilic muciloid on serum cholesterol in the elderly". *Dig. Dis. Sci.* 36(3):329-334.

Wolever; T.M.S., Vuksan; V., Eshuis; H., Spafadora; P., Peterson; R., Chao; E., Storey; M., and Jenkins; D., (1991). "Effect of method of administration of psyllium on glycemic response and carbohydrate digestibility". *J. Am. Coll. Nutr.* 10(4):364-371.

#### General References

Batanouny, K. H., (1999). "Wild Medicinal Plants in Egypt". (With contribution of: E. Aboutabl, M. Shabana & F. Soliman). With support of the Swiss Development Co-operation (SDC). Academy of Scientific Research and Technology, Egypt. The World Conservation Union (IUCN), Switzerland. pp. 72-75.

Bisset; N.G. (1994). "Herbal Drugs and Phytopharmaceuticals" (Wichtl M, editor, German editon). Stuttgart: Medpharm.

- Boulos, L. (2000). "Flora of Egypt", volume three, pp. 120, printed by Al Hadara Publishing, Cairo, Egypt.
- Bradly; PR, (1992). "British Herbal Compendium", Vol.1, Bournemouth: British Herbal Medicine Association.
- British Herbal Pharmacopoeia, (1983). Keighley: British Herbal Medicine Association.
- British Herbal Pharmacopoeia, (1990). Vol. 1, Bournemouth: British Herbal Medicine Association.
- Jafri; S.M.H. and Gadi; A.E., (1979). "Flora of Libya".
- Leung; A.Y., (1980). "Encyclopedia of Common Natural Ingredients Used in Food, Drugs and Cosmetics". New Yourk-Chichester: Wiley.
- Liebman; B., (1988). "The laxative that lowers cholesterol". Nutr. Action Health Letter 15(9): 9.
- Martindale, (1993). "The Extra Pharmacopoeia" 30th edition. (Reynolds JEF, editor). London: The Pharmaceutical Press.
- Weiss Rudolph Fritz. (1988). "Herbal Medicine", Gothenburg Sweden: Arcanum Press P. 114 Chapter 4.
- Wren; R.C. (1988). "Potter's New Cyclopedia of Botanical Drugs and Preparations" (revised, Williamson EW, Evans FJ). Saffron Walden: Daniel.