Amaranthus are colourful, quick growing and nutritious plants suitable for growing as a backdrop in sunny border garden. Amaranths are locally known as Batu, Bhabhri, Cholai, Ganhar, Harave, Keere, Maarsu, Marsha, Pung-keerai, Rajakeera, Ramdana, Sawal and Sil. They have recently gained popularity as an ornamental plant. Amaranth is a useful annual addition to the garden during the warmer months. It is refreshing to have the annual plant varieties like Amaranths in garden. Plants in the Amaranths family thrive in the sun and poor soil and grow quickly to the size of a small shrub. They grow vigorously, resist drought, heat and pests and adept readily to new environments, as weeds also that are inhospitable to conventional cereal crops. They grow 2 to 2.5m tall and have tough, woody trunks. *Amaranthus cruentus* Linn. and *A. hypochondriacus* Linn. are the best grain producers and they are also decorative, yielding giant monochromatic or bicoloured plumed flower clusters in green, red, burgundy or gold sometimes with purple foliage or leaves that turn brilliant red as the seed matures in early autumn.

Amaranthus are both historic and contemporary plants. The varieties and species belonging to the genus *Amaranthus Linn.* are complex and diverse both genetically and taxonomically. Even within one species the ranges of forms and uses are remarkable.

The grains of Amaranth contain high protein content with relatively high lysine levels. People around the world utilize either the grain or the leaves in a variety of recipes. In India and South America, popped Amaranths appear in many confections. Amaranths also are used medicinally and as a protein supplement for infants and children. In the United States, Amaranths are grown mainly for the natural and health food markets. In pre-columbian times Amaranth grain was one of the basic foods of the new world nearly as important as corn and beans. In the passage of time corn and beans became two of the leading crops that feed the world while grain Amaranth faded into obscurity. However, the Spanish were so overwhelmed with the beauty of the magnificent plants that they gathered the seed and introduced them to Europe where they were widely grown as ornamentals. This is why gardeners in Australia, North America and Europe have grown Amaranths for the past 200 years, not as a valuable food source, but as ornamentals. Only recently has a lot of attention been given to the truly incredible potential of the Amaranth species as one of the most important food sources of the planet. Amaranths are new commercial crops in China and are becoming important due to their high productivity and diversity of uses.

In India Amaranths are chiefly grown in Himalayas from Kashmir to Bhutan and also in South Indian hills. It is gaining popularity in the north western plains of India as well as in Gujarat under the common names *Rajgira* "king seed", *Ramdana* and *Keerai*. Although a major use is for animal feed, the plants can be processed into protein, starch, oil and pigments for use in the food industry. In countries such as Greece, Africa, India, Pakistan, Nepal, Tibet and China, Amaranths are used as edible greens, herbs and grains. One of the largest areas of grain Amaranths production is now in Nebraska. Fortunately, the beauty of the Amaranths did not escape some Europeans and they cultivated it, not as an edible, but for its ornamental qualities. The resultant cultivars are both heat and drought tolerant.

Detailed tests on the red pigments of Amaranths proved that they are chemically similar to red beet pigments, widely used in the food industry.
Utilization

As food

It is traditionally eaten during Fasts and given to people who are recovering from illness. It is an excellent substitute for those who are allergic to grains. Cooking increases the nutritive value of Amaranth. Though seeds of all Amaranths are edible, the small, black seeds of vegetable and ornamental varieties are not as useful as grain, mostly because they are more difficult to grind.

The most common form of its usage is to grind the grain into flour for use in breads, noodles, pancakes, cereals, granola, cookies or other flour-based products. The flour is usually mixed with wheat or rice or millet-flour to make Indian breads and other everyday preparations. Since the flour lacks gluten, Amaranth is best kept to less than a quarter of the total flour called for in most bread recipes. Amaranths flour also makes a good additive to cookie dough and other baked-dessert recipes. The grain can also be popped like popcorn or flaked like oatmeal. The popped grain makes a very crunchy breakfast cereal.

Nutritional value

Nutritionally, it is similar to soybeans. It is like a nutritious dish which contains abundant provitamin-A, the vitamin particularly necessary in the tropics for eye health. Amaranth protein, however, has nearly twice the lysine content of wheat protein; three times that of maize and in fact as much as is found in milk, the standard of nutritional excellence. It is, therefore, a nutritional complement to conventional cereals. Amaranth protein itself is low in leucine, but this amino acid is found in excess in conventional plant protein sources.

There has been recent interest in Amaranth just because of its useful nutritional qualities. The grains have 12 to 17% protein, which is high in lysine, an essential amino acid in which cereal crops are generally low. The grain is high in fiber and low in saturated fats, factors which contribute to its use by the health food market. Studies also claim to link Amaranth to reduction in cholesterol in laboratory animals. It is a cheaper, and now-a-days claims to be, preventive to nutritional anaemia, rather than buying expensive tablets, tonics, health drinks, branded flour and breakfast cereals fortified with iron.

As forage

Little is known about the production and utilization of Amaranth as a forage. The leaves, stem and head are high in protein (15-24% on a dry matter basis). In areas where corn silage yields are low due to moisture limitations, grain Amaranth may become a suitable silage alternative.

Cultivation

Amaranthus species are scattered throughout Asia, India, Africa and the Caribbean. Two of the three species of grain Amaranth, *Amaranthus hypochondriacus* Linn. and *A. cruentus* Linn. originated in Central America, while the third, *A. caudatus* Linn. was independently domesticated in the Andes. *A. edulis* Speg., is considered as a race of *A. caudatus*, native to Peru and other Andean countries. Red root pigweed, *A. retroflexus* Linn., is a common garden weed found in coast to coast and North to South. Seabeach Amaranth (*A. pumilus* Raf.), once common to Long Island sanddunes, is now one of the rarest plants on the planet. Two important leafy Amaranths are *A. lividus* Linn. (*Choti chauali*) and *A. tricolor* Linn. (*Badi chauali*) and their many cultivars.

Soon after coming to existence, Indian Institute of Vegetable Research, Varanasi, Uttar Pradesh made an exhaustive effort in collaboration with other agencies, in collecting the rich vegetable germplasms of India. In this regard, the cooperation and assistance extended by the National Bureau of Plant Genetic Resources (NBPGR) and other agencies, enabled this Directorate to collect and maintain germplasm lines: ‘Amaranth Pusa Early Bunching’, ‘Bari chauali’, ‘CO-1’, ‘CO-2’, ‘CO-3’, ‘CO-4’, ‘Pusa Kirti’, ‘Pusa Kiran’.
Climate: Grain Amaranth is reportedly drought-tolerant similar to sorghum, provided there is sufficient moisture to establish the crop. Amaranth, for instance, does well on its own in almost any climate. Amaranth responds well to high sunlight and warm temperatures. Early season frost damage is not a problem because the crop is not sown until late May or early June. However, frost plays an important role in the harvest of the crop.

The ornamental Amaranths require a warm, moist soil and sunny situation. In semi-shaded situation the variegated colour of the foliage does not develop.

Seedbed preparation: It is important to use a seed source with as few black seed as possible to prevent excessive black seed at harvest. Certified seed should have less than 0.02 percent black seed. Seeds are very small, so it is important to have a firm seedbed. Seedbed preparation can be done with a field cultivator or disk; followed by cultipacking or spiketooth harrow and planting, preferably using a planter with press wheels. Seeds should be planted no more than 1/2 inch deep, depending on soil texture and surface moisture at planting time. Since seeds are shallow planted, there is potential for them to wash out on sloping ground. However, heavy textured soils should be avoided. If crusting is a problem, rotary hoeing at a slow speed may be helpful. Poor emergence, as low as 50%, is not uncommon.

Seeding period: In North India the leafy Amaranths are sown from the middle of March to the end of June. In South India they are sown throughout the year, though September-October sowings give the maximum yield of leafy plants.

The ornamental Amaranths are sown during January - February or June-July. In the hills sowings can be done during February and March.

Irrigation: For the grain crop the first irrigation is given just after broadcasting the seed. Germination starts 5-6 days after the first irrigation. The next irrigation is given after 15-20 days and then at intervals of 10-15 days till the crop is 2.5-3.0 months old. In all it requires 6-7 irrigations.

Harvesting: In North India grain crop is harvested from September onwards and in South India during August-September. Foliage Amaranths are cut periodically, when the leaves are crisp and green. The first cutting is done after 3-4 weeks of sowing and subsequent cuttings may be done after 7-10 days.

The grain Amaranths have large colourful seed heads and can produce over 800-1000kg of grains per hectare, though a portion of this grain yield may be lost in harvesting. Colourful flower heads appear in mid summer, gradually maturing their heavy yield of grain toward autumn. Grain ripeness can be assessed by two ways. First, watch the birds. As the seeds mature, small-seed eaters, such as finches, will begin to take obvious (and eventually destructive) interest. Second, rub the flower heads between fingers into the palm of your hand. When seeds shatter out easily and abundantly from most of the flower clusters, it's time to harvest.

Threshing by hand is the most time-consuming part of the process. Sitting on a approx. 100 litres bucket or wooden stump, one can vigorously rub each seedhead between hands, loosening the seeds, then hang them out against the bucket or stump. Hands quickly become coloured from the seedheads, but the dye washes off. The threshing fresh-harvested seed are much preferred to the alternative technique of drying the heads first. However, the prickly texture of dried Amaranth sometimes precludes hand rubbing. The dried Amaranth can also be threshed by stomping on the heads on a concrete floor, then screening them. However, in that case one needs to separate all parts of the seedheads, which is a bulky, prickly and more difficult process.

Drying: Once threshing all the heads is complete, the grains are spread out, rake out most of the larger chaff and the threshed grain are dried in the sun. Two or three warm days are usually sufficient for thorough drying.

Economics of Production and Markets

Perhaps the greatest problem facing the development of Amaranth as a crop is finding markets. The markets in India are still very small. The primary market for Amaranth may be the food industry, where it can be used in 40-50 products. A farmer entering the market with grain from several hectares of Amaranth could cause a surplus and drastically lower prices. For this reason Amaranth should be grown only after
identifying a market for the crop, and preferably after arranging a contract with a buyer. The above account should help farmers and researchers to develop a prospective crop, which is likely to overshadow in future, the existing maize and jawar crop, economically.

References

2. Amaranth Grain Production Guide produced by the Rodale Research Center (RD 1, Box 323, Kutztown, PA 19530) and the American Amaranth Institute (Box 216 Bricelyn, MN 56097).
Ayurveda discussed about a disease namely ‘Shwasa’, wherein there are set of complaints such as difficulty in breathing, anorexia (loss of appetite), fatigue, etc. As depicted by its name itself shwasa means breath, so whenever there is difficulty in breathing in (shwasa) and breathing out (Nishwasa), the disease is called as Shwasa in common language. Ayurveda has classified this disease into further five subtypes. Of which one is Tamakashwasa, which shows a great similarity in its symptomatology with bronchial asthma. There are various medications oral, local and also of certain Panchakarma. Ayurvedic practitioners for bronchial asthma especially recommend therapy like Vamana therapy.

Causes

As per the ancient classical text of Ayurveda, diet which can aggravate vitiated vata (dushta vata) for example, chana, vatana (peas), rajama, dried food items (fast food), more oily, more spicy or those food articles causing increased kapha, viz. curd, yoghurt, cold drinks, ice-creams and fish should be avoided. Also there is a mention of pollutants like fumes and smoke (dhoomra) and pollen grains, which can also leads to the exacerbation of the complaints. Psychosomatic parameters like Bhaya (fear), Krodha (anger), Shoka (grief), Chinta (stress), etc. can also leads to the exacerbations of the disease.

Symptoms

Patient suffering from Tamakashwasa exhibits following symptoms and signs.

(i) Patient cannot breath properly, breaths with great difficulty tries to loosen clothings at neck chest and waist, gets increased perspiration.

(ii) There is typical whistling sound (sound of pigeon – Kapotkujanavat dhwani) while breathing.

(iii) Patient feels better and less trouble in breathing while in a sitting posture.

(iv) There exists great difficulty in breathing in lying down position.

(v) Patient feels better with hot articles (hot water for drinking, oil massage of luke warm oil to chest and then there after fomentation with hot water bag).
Management of Tamakashwasa

Vamana therapy is one of the therapies which has been recommended in Ayurveda for the management of bronchial asthma. It is a systematic medically induced emesis with the help of which we can remove the excess quantity of vitiated *kapha dosha*, thereby helping in the therapy of *vatakaphaja* type of Tamakashwasa. Whereas *Snehana* (Oleation massage with *til* oil) and *Swedana* (Sudation/steaming with medical decoctions) should be undertaken in both types.


Home Remedies

- Take ¼ th teaspoonful (tsf) dry ginger powder + ¼ th tsf turmeric powder + pinch of salt + 1 tsf Honey – Lick this mixture as a linctus.
- Make a decoction of *Tulsi* leaves (8 to 10) +3 to 5 Black Pepper seeds + Ginger powder ¼ tsf +1 clove + *Gavatichai- ki- patti* (Lilly Tea) 1 + *Kadishakkar* +1 cup water – Boil it on low flame without putting lid, up to ¼ th cup. Then strain it, and get *Kadha*. This has to be taken thrice a day. To be prepared fresh and consumed fresh every time.
- Take 1 tsf of *Ajawayan* +1 tsf of turmeric + 1 tsf of licorice powder + ¼ tsf of dry ginger powder + pinch of black pepper + 1 cup of water – Boil it on low flame without putting lid, up to ¼ th cup. Then strain it, and get *Kadha*. This has to be taken thrice a day. To be prepared fresh and consumed fresh every time.

Do’s & Don’t

- Do not have chilled, cold drinks, ice creams, etc.
- Do not have fish / seafood products.
- Do not have excessive oily and spicy, pungent food.
- Do not sleep at very late night (because that can also increase vitiated *vata*).
- Do not take curds, curd products.
- Do not take tension or stress.
- Do not have any self medication (even though it is Ayurvedic Medicine).
- Take medications regularly without any gap from a qualified doctor.
- Do not eat food which are known to create exacerbation of the disease.
- Certain diet rules (*Pathya*) are also to be followed for controlling or even eradicating this dreadful disorder.

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Dr. Aashish Phadke
Centre for Ayurveda & Panchakarma Therapy
Eye Care Clinic
F-15, Sector-1 Market, 1st Floor,
Opp. Apana Bazar, Vashi,
Navi Mumbai, Pin - 400 703. INDIA
E-mail: ayurinstitute@yahoo.com;
ayurvision@hotmail.com .
Website: www.ayurvision.com
Mobile. 9869041295, 09892698275, Res. +91 – 022- 27823588