

by most leaf-chewing insects. Tarnished plant bug, leafminers, flea beetles, grasshoppers, caterpillars and amaranth weevils, are potentially significant insect pests of amaranth. Flea beetles damage young leaf tissue. The adult amaranth weevil feeds on leaves, but the larval stage is more damaging because they bore into the central tissue of roots and occasionally stems, causing rotting and potential lodging. Not many diseases are observed. Disease problems may develop in large monoculture production systems. Damping-off of young seedlings caused by *Pythium* can be a problem under some environmental conditions, as well as *Rhizoctonia* and stem canker, caused by *Phoma* or *Rhizoctonia*. *A. tricolor* also seems to be very susceptible to *Phomopsis*, which colonises leaves and stems and causes dieback.

Control of pest and diseases can be done by practising good weed control. The weeds can act as a host for pests and diseases. Neem products might help. Damping-off can be controlled by using clean seed and establishing sterilised soil before sowing seeds. Seed trays should be washed with commercial bleach. Establish seedlings in well-drained soil in an area with good ventilation.

Harvesting

Individual leaves and growth tips can be harvested or the entire plant can be cut back. Seed can be harvested from plants when the leaves start to lighten or yellow.

Uses

Amaranth is used as vegetable. The cooked leaves are eaten in different ways as vegetable, soup or sauce.

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Amaranth

Further information can be obtained from

Directorate Plant Production
Private Bag X250
PRETORIA 0001

Tel. +27 12 319 6072
Fax +27 12 319 6372
E-mail Thabo.Ramashala@daff.gov.za
Website www.daff.gov.za

Scientific name: *Amaranthus* spp.

Common names: Amaranth, Thepe, Vowa, Umfino, Imbuya, Hanekam, Imbuya, Isheke

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Origin

Amaranth is reported to have originated from Central America, Mexico and Africa.

Production areas in South Africa

Amaranth is found in all the provinces of South Africa mainly occurring naturally.

Description

Stems

Often tinged reddish, erect, occasionally ascending, branched, with linear marks on the surface, and hairless to moderately pubescent with multicellular hairs.

Leaves

The leaves are variable in size, green or purplish with slender stalks.

Flowers

Tiny green flowers are borne in dense, elongated clusters, usually on the tips of the branch. They are borne as spikes or plumes and are white, green, pink or purplish in colour.

Seeds

Seeds are usually shiny black in colour.

Climate and soil requirements

Temperature

Temperature should be at least 18 °C at planting. Amaranth can tolerate quite high temperatures of 30 to 35 °C. It also requires warm and sunny conditions.

Rainfall

Amaranth is reported to be drought tolerant, but cannot tolerate waterlogging.

Soil

Amaranth grows on loose and friable soils with a high organic matter content. It grows best in light soils, with a pH of between 5,5 and 7,5.

Cultural practices

Propagation

Amaranth is propagated from seed.

Planting

Sow seeds in seedbeds or sow directly in rows in the field. Nurseries should be in flat areas, with fertile soil and near to the water source but not in shaded areas. Mix the seed with sand at a ratio of 1:2 and sow at a depth of 0,5 to 1 cm in rows or broadcast directly in the field. Cover the seeds with a thin layer of soil followed by watering; be careful not to wash seed available. Alternatively, water first, then spread the seed and cover with a thin layer of dry soil.

Fertilisation

When using a chemical fertiliser, purchase a 3:2:3 or 3:2:1 (NPK) mixture. Using a hoe, open up a furrow and apply the fertiliser mixture in the bottom of the furrow at the rate of 40 g/m. A normal-size teacup takes about 200 g of chemical fertiliser and would cover 5 m. After spreading the fertiliser evenly in the furrow, use a stick to mix the fertiliser with the soil. Water the furrow and then make the holes for the transplants. For really good growth, add limestone ammonium nitrate (LAN) at the rate of 20 g/m when the plants have about 5 to 6 leaves. One teacupful of LAN should be spread along a row of 10 m. When applying LAN to the growing crop, open up a furrow with a hoe about 10 to 15 cm away from the row of plants, mix the fertiliser with the soil using a stick, water the furrow and then close it.

When using poultry or pig manure, use a 10-ℓ bucket in a band of about 20 cm wide over a length of 15 m, work the manure into the topsoil, water the band thor-

oughly and wait one or two weeks before transplanting. When you use kraal manure, follow the same procedure but use a 10-ℓ bucket over a length of 5 m.

Irrigation

Water plants regularly because plants that suffer from drought will begin to flower and stop producing leaves. Water requirements vary with the crop's growth stage, soil type and weather condition (hot or cold). Frequent irrigation will be required for sandy soils as these drain quickly. Clay soils, on the other hand, drain quite slowly and hold more water than sandy soils. There are few 'rules of thumb' to use as a starting point for irrigation frequency and volume. First, sandy soil should be irrigated three times a week. Second, sandy loam should be irrigated twice a week. Third, clay, clay loam and loam soils should be irrigated once a week. For the first 30 to 35 days after transplanting, irrigate 4 ℓ a day for a 1 m x 1 size plot (20 ℓ a week for 1 m x 1 m).

Thereafter, irrigate between 5 and 6 ℓ a day for a 1 m x 1m size plot. Sprinkler and drip irrigation can be used to irrigate amaranth; however, water savings with drip are substantial and roughly half as much water can be just as effective as a sprinkler system. If sprinkler irrigation is unavoidable, stay away from late afternoon irrigation to prevent foliar diseases. Excess water application leaches nutrients away from the roots of the plants, therefore careful planning of irrigation volume and frequency is required to prevent crop stress and to produce large, healthy vegetable amaranth.

Weed control

Early weed control by tillage is important as amaranth grows slowly during the first few weeks. Use of chemicals is not recommended because of the risk of poisoning.

Pest and disease control

Amaranth is susceptible to a number of insects although the plants are able to recover after feeding