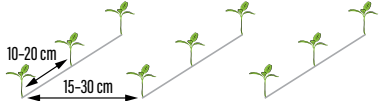


## Amaranth leaves

Preferred climactic conditions	
<b>Air temperature</b>	Wide range within tropical and subtropical regions
<b>Soil type</b>	Well-drained sandy loams, but can adapt to most soil types
<b>Climate conditions</b>	Hot-dry
<b>Sun/shade tolerance</b>	Full or partial sun
<b>Drought tolerance</b>	High
<b>Flood tolerance</b>	Low

Seed sowing and spacing	
<b>Direct sowing</b>	Seeds are very small, mix one part seed to ten parts sand for uniform stand. Sow into rows.
<b>Seed depth</b>	Cover seeds with light soil
<b>Between-plant spacing: 10-20 cm</b>	
<b>Row spacing: 15-30 cm</b>	

Cultivation
<b>Irrigation needs:</b> Although amaranth is relatively drought tolerant, insufficient water will reduce yield. Gently irrigate after sowing to reduce seed displacement. Water to ensure good germination and prevent wilting.
<b>Fertilizer:</b> Start with a well-drained fertile soil. If leaves appear yellow, apply half of a mineral water bottle cap of inorganic nitrogen fertilizer around the base of each plant or use a liquid foliar fertilizer.
<b>Special cultivation practices:</b> Staggered sowing results in continuous harvesting and regular consumption. Divide a well-fertilized bed into three parts. Make shallow trenches 15-30 cm apart. Sow seed in the first part and cover with a thin layer of soil. Since seeds are very small, mix 10 parts fine, dry sand with 1 part seed before sowing to get uniform distribution along the row. After 7-10 days, sow in the second part and do similarly in the third part 7-10 days later. To encourage leaf production, remove seed heads when they form.

Harvesting
<b>When to harvest:</b> Amaranthus leaves are ready for harvest in <b>20-45 days</b> after sowing depending on variety and planting time/season. Plant leaves may be harvested once or several times. For seed production, cut the entire seed head before visible shattering.
<b>How to harvest:</b>
<p>If plants are to be <b>harvested once</b>, uproot plant, wash them, and tie them in bundles. Wash leaves with uncontaminated water after harvesting.</p> <p><b>For multiple harvests</b>, either clip off full-grown side leaves (roughly fifty percent of foliage or tender stem) or cut the top of the plant to encourage side branching and more leaves. Depending on the variety, 3-5 cuttings can be done by harvesting the top portion of the plant. Harvest in 10-15 day intervals. Eventually, the plants begin to flower and develop fewer leaves. After the last harvest, the plant could be allowed to flower and produce seed. For seed production, cut the entire panicle inflorescence at its base.</p>



If young plants are harvested by uprooting, the plants can be grown closely together



Harvesting young plants in bundles



Plants for multiple harvests of the leaves or growing shoots



Seeds form on adult plants



Young plants ready for harvest



Amaranth can adapt to most soil types

# Amaranth pests

## AMARANTH LEAF WEBBER / BEET WEBWORMS

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Amaranth leaf webbers can cause up to 100% yield losses. They wrap and roll leaves to form shelters, feed by chewing between leaf veins (skeletonization of leaves), and leave behind brown frass deposits.

### CONTROL

- Use pest-resistant varieties, biopesticides, blends of synthetic floral attractants and pheromones, and natural enemies (parasitoid wasps).



*Caterpillar*



*Moth*



*Leaf webber damage*



*Leaf webber damage*

## AMARANTH STEM WEEVIL

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Larvae of the weevil forms galls in the stem and the adults feed on leaves and tender stems. This makes plants more susceptible to lodging and to secondary fungal infections.

### CONTROL

- Collect and destroy wild amaranthus hosts in the vicinity of cultivated crop.
- Collect and destroy affected plant parts along with grubs and adults.



*Stem damage*



*Stem damage*



*Adult weevil*

## TWO-SPOTTED SPIDER MITE

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Larvae, nymphs, and adults prefer to feed on plant sap from the underside the leaves, which causes white or yellow speckles. In severe infestations, they produce a spider web that covers the plants and forms a ball-like mass at the tip of the plant that can be carried by wind to new plants.

### CONTROL

- Regularly spray plants with water to keep spider mites in check and remove and destroy infested plants.
- Release predators such as predatory mites, ladybugs, pirate bugs, six spotted thrips or green lacewings.



*Webbing*



*Close-up of mite*



*Spider mite damage*



*Spider mite damage*

## LEAF MINER FLIES

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Female flies deposit their eggs within the leaf tissue so that the larvae or cylindrical maggots (soft body and no legs) feed inside the leaf tissue and cause irregular mines as they feed. Most larva cut an opening at the end of the mine and move to the soil for pupation. If several mines are formed in the same leaf, photosynthesis is reduced and the yield may be affected. If severe infestation occurred, the whole plant can die.

### CONTROL

- Remove and destroy individual affected leaves.
- Yellow sticky traps may reduce the density of leaf miners and traps can also be used to monitor populations.



*Pupae*



*Adult*



*Leaf miner insect damage on a leaf*