

CUCUMBER PRODUCTION in Greenhouses



HGA-00434

Varieties

There are two major types of cucumbers grown in the greenhouse for both home and commercial production. The most popular are the long seedless varieties often referred to as European, Japanese or English. The old traditional varieties have seeds and white spines.

Seedless varieties have parthenocarpic fruit, or fruit that do not develop seed. With these varieties there is no need for pollination. The skin is smooth and often has longitudinal ridges. Fruit are long, ranging from 12-24 inches when ready for harvest.

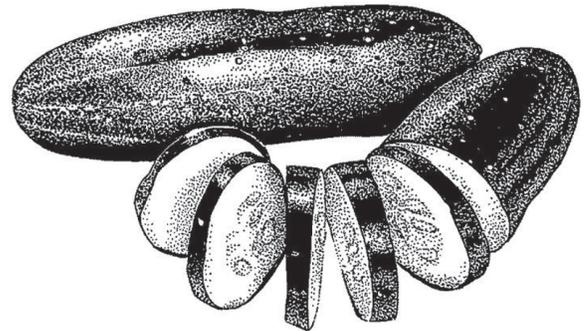
Seeded varieties require pollination to form healthy fruit. There are both male and female flowers produced. Pollen from the male flowers must be transferred to female flowers. Outdoors under good weather conditions, insects normally do the pollinating. In the greenhouse, it is the grower's responsibility to transfer pollen. When cucumbers are not properly pollinated, the fruit will be misshapen and poorly developed, especially on the blossom end of the fruit.

Cucumbers are very sensitive to growing conditions, such as the fertilizer salts, light, air temperature, humidity, carbon dioxide and moisture. Great fluctuation in any of the growing conditions will result in less fruit being produced and bitter tasting cucumbers.

Seeding

Sow seeds in sterile seeding medium. Members of the squash family, like cucumbers, do not like their roots disturbed. If only planting a few plants, sow seeds in individual pots to reduce transplanting shock. For large scale production, sow in flats. Use care not to damage roots when transplanting.

The optimum germination temperature for seedless varieties is 80°F to 82°F. Germinate seeded varieties at 70°F to 75°F. The seed will often come with the specific germination temperature printed on the pack.



Check the temperature requirements to be sure. Cover the flats with glass or plastic to reduce heat loss and to prevent drying out. Remove the cover as soon as the seeds have germinated and emerged. Maintain daytime temperatures between 70°F to 75°F and night temperature of 65°F. Keep seedlings moist.

When the first seed leaves have expanded, transplant to 4 inch pots containing good media. A good potting mixture has good water holding capacity and adequate drainage. Peat, vermiculite and coconut fiber are the most popular amendments added for waterholding. Perlite and horticulture grade sand are commonly used to improve drainage.

Begin fertilizing three days after transplanting or when true leaves have begun to emerge. Plants should be watered frequently with a fertilizer solution. A minimum of 14 hours of strong direct light is required for developing seedlings.

Planting in the Greenhouse

In two to three weeks the plants will be ready to transplant into the permanent location in the greenhouse. Prior to planting, moisten the media with warm water. Allow seedless cucumbers 1 to 1.5 plants per square yard and each seeded cucumber plant 0.5 square yard of bed space. This will insure good air circulation and adequate light for fruit production.

Basic Feeding Formula

Formulas	Concentration (ppm)	oz/100 gal
A. Potassium Chloride (0-0-62)	200 K	4.3
Magnesium sulphate	25 Mg	1.6
Diammonium phosphate (21-53-0)	36 P	0.9
Calcium nitrate (15.5-0-0)	33 N	11.6
	135 N	
	148 Ca	
or		
B. Potassium chloride (0-0-62)	80 K	1.72
Potassium nitrate (13-0-44)	30 N	3.0
	84 K	
Magnesium sulfate	25 Mg	1.6
Monopotassium phosphate (0-53-34)	36 P	0.9
Calcium nitrate (15.5-0-0)	44K	
	140 N	12.0
Minor Elements for Both Formulas		
	Concentration (ppm)	gms/100 gal
Iron chelate (10% Fe) Fe	1.0	3.78 g
Manganese sulphate (28% Mn) Mn	0.3	0.4 g
Boron (20.5% B) B	0.7	1.3 g
Zinc sulphate (36% Zn) Zn	0.1	105.0 mg
Copper sulphate (25% Cu) Cu	.03	45.0 mg
Molybdenum (54% Mo) Mo	.05	35.0 mg

Table 1 Formula A may require the addition of sulfuric or phosphoric acid to lower pH of the fertilizer solution. A milky precipitate after tank mixing indicates the need for pH adjustment.

Fertilizing

As the plants grow and have more tissue to feed, the fertilizer requirements will increase. Start with one quart of fertilizer solution per day for each plant. Adjust feeding volumes upward as sunlight and size of the plants increase. A mature plant will need 1 to 2 gallons of solution per day. Warm the fertilizer solution to room temperature before using. Nitrogen is the most important element during the growing season. Be sure to apply continually through the irrigation water.

It is easier to purchase a premixed complete fertilizer with micronutrients. If you choose the commercial mix, start with a weak strength and increase dosage as the plant grows.

Most commercial producers will want to mix up their own fertilizer tailored to specific crop requirements and water analysis. Water can vary in pH, calcium, sodium and micronutrient levels. Water should be tested so that the feeding formula can be altered for various conditions. If the water is particularly alkaline (high pH level), phosphoric acid may be used as the phosphorous source.

Training and Pruning

Shoots, foliage, flowers and fruit are pruned to maintain a proper balance between the vegetative growth and fruit load to maximize production. Training maximizes the plant's ability to get the sun needed for growth. A dense canopy of leaves will shade fruits from sunlight, causing them to be pale. Flower production depends on the production of shoot growth and leaf axils. Fruit removal stimulates shoot growth.

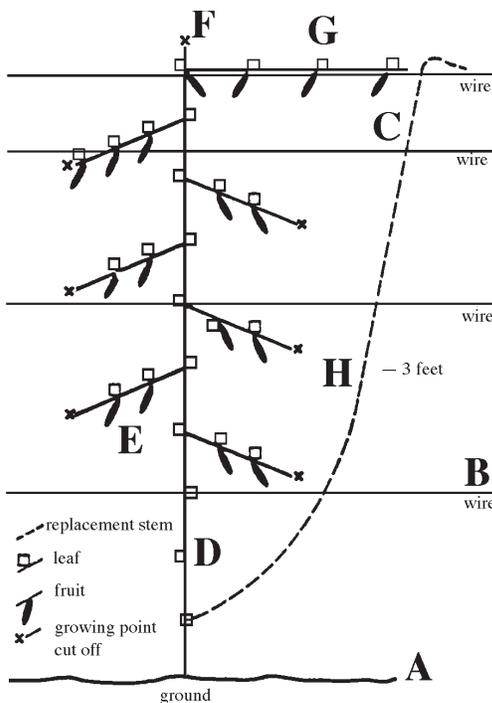
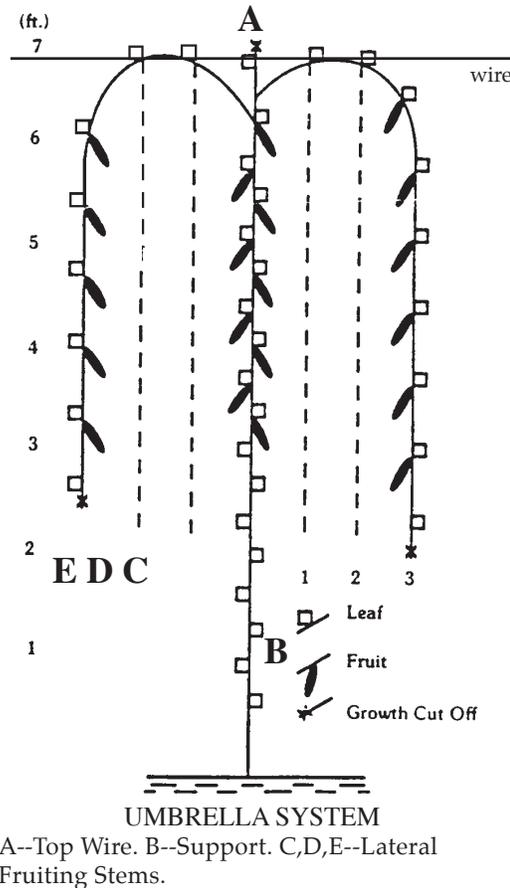
If too many fruits are allowed to form at any one time, a large proportion will abort because the plant may not have sufficient food reserves. If a heavy load of fruit sets, fruits will be malformed, or poorly colored. Only one fruit should be allowed to develop in a leaf axil.

Cucumbers are trained on a string or wire system. The system varies for seedless and seeded varieties reflecting the growth and fruiting habits of each variety. The umbrella system used for seedless varieties is straightforward, not too demanding in labor. For seeded cucumbers, use the tree system method.

Umbrella System

This system is straightforward, not too demanding in labor and easily understood.

1. Tie the cucumber plant to a vertical wire (A), 7 feet tall. Pinch out the growing point at the top.
2. Provide support for all fruit that develops on the lower part of the main stem.
3. Remove all laterals in the leaf axis on the main stem. (B)
4. The top two laterals should be trained over the wire to hang down on either side of the main stem. Allow these to grow to two-thirds of the way down the main stem. (E)
5. When the fruits on the first laterals have been harvested (C), those laterals should be removed back to a strong shoot, allowing the second laterals to take over (D). Repeat this process for lateral (E).
6. This renewal system will maintain productivity of plants.



A — Ground level. B — Wire. C — Support string.
 D — Leaves and laterals remove. E — Fruiting area.
 F — Tip nipped out. G — Lateral Trained along top wire.
 H — Replacement Lateral.

Tree Trellis System

In the following description, the letters in parentheses correspond to bold letters in Figure 2.

1. Tie the cucumber plants to horizontal wires (B) spaced about 2 feet apart. The top wire should be about 6 feet from the ground.
2. Remove all the leaves and laterals on the bottom 20 inches of the plants. (D)
3. When the main stem has reached the top wire, tie it and remove the growing tip. (F)
4. Allow the laterals at each leaf axis along the main stem to develop two leaves, then cut the growing point. (E)
5. Train the top shoot developing the leaf axis along the wire. (G)
6. When most of the fruit has been harvested on the main stem, allow a lateral to develop as replacement and prune in the same manner as the main stem. (H)

Pollination

Male and female flowers are physically different. Both have the same size yellow petals, but below are different. Male flowers are attached to the stem by a thin stalk. Between the yellow petals and flower stem is a small immature spiny cucumber. To transfer pollen, remove the male flower petals, exposing the pollen. Touch the pollen filled anthers to the center of the female sticky stigma (center of the flower).



Female flower on top, and male flower on bottom.

Harvesting

Cucumbers are harvested as immature fruit when filled out. If left on the plant, they decrease fruit production. To reduce damage and disease use a sharp clean tool to cut the fruit from the plant. Cucumbers have thin skin and lose moisture, softening in storage. Handle carefully being sure not to damage the skin. To extend storage life, wrap in clear plastic and store at high humidity below 45°F.



Squash seedlings in individual 4-inch pots.

Disease Control

The most common diseases include gray mold, powdery mildew and mosaic viruses. Gray mold becomes a problem when ventilation is poor. Powdery mildew is encouraged by high humidity and excessive use of nitrogen fertilizers. Removing the lower leaves and controlling the greenhouse humidity is the best defense against these problems. Many viruses are transmitted by aphids from alternative hosts or plants. The best way to keep insects from becoming a problem is to continually monitor and get rid of a problem as soon as it starts. Controlling unwanted vegetation in and around the greenhouse will also help to keep aphids from becoming established.

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