Greenhouse Cucumber Production

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CUCUMBERS (*Cucumis sativus*)

Producing cucumbers in a protective structure, such as a greenhouse or high tunnel, offers a much improved environment for growth. This improved environment allows for higher marketable yields especially with thin-skinned varieties, extended harvest periods, and reduced pest pressure. Trellising and pruning, along with an uninterrupted supply of water and nutrients, are necessary to produce the quality fruits demanded in today's marketplace.

VARIETY SELECTION:

Varieties must have certain characteristics in order to be successful in a greenhouse setting. Please refer to our technical sheet Cucumber Types and Terminology for additional information for selecting cucumbers based on type.

- **Parthenocarpic:** If you do not intend to provide some sort of pollinator, like honey bees, it is necessary to use parthenocarpic varieties. Many greenhouses exclude pollinators and other insects to prevent cross-pollination of seeded and seedless varieties.
- **Gynoecious:** Gynoecious varieties bear almost all female flowers, and so produce the highest number of fruits — this trait aids in receiving a higher return-on-investment for using tunnel space.
- **Disease Resistance:** A strong disease-resistance package keeps a plant producing for a long season. Of the number of diseases that can present themselves, powdery mildew is one of the most common in greenhouse cucumbers.

CULTURE:

Cucumbers require a warm, well-drained soil with a pH of 6.8–7.2. High fertility levels along with sufficient and consistent irrigation will keep the plant producing over a long season—12–16 weeks of harvest is not uncommon. As cucumbers are sensitive to the cold, laying plastic mulch in advance to planting will warm the soil and suppress weeds.

TRANSPLANTING:

Three to four weeks before your intended transplant date, sow 1–2 seeds per cell in 50-cell plug trays, ½ inches deep. Maintain temperatures at 80–85°F/27–29°C until seedlings emerge—using a heat mat can aid in maintaining consistent temperatures.

After germination, keep temperatures at 73–76°F/23–24°C during the day, and a minimum of 70°F/21°C at night.

Plants are ready to transplant 3–4 weeks after sowing, when they have 2–4 true leaves. Place seedlings in greenhouse soil or grow bags, spaced 18–24 inches apart in rows 4–5 feet apart. Make sure to only transplant when soil or ambient greenhouse temperatures rise to 65–70°F/18–21°C. Grafted plants can typically tolerate cooler soil temperatures. For the first week after transplanting, maintaining both day and nighttime temperatures in around 75°F/24°C helps to promote rapid foliar and root growth. At fruit set, lower nighttime temps at about 65°F/18°C and begin monitoring plants to manage them towards season-long productivity.

TRELLISING:
In order to grow straight fruits, pruning and trellising the plants is a necessity. Not only does this allow for quality fruit production, it also uses the limited space of a covered growing structure in a more efficient manner. Proper trellising also helps provide adequate air flow to prevent disease issues.

Many types of trellis systems may be employed. A simple option is providing a mesh trellis for the vines to climb—this is the preferred method if you are growing field varieties in a tunnel, which you wouldn't necessarily prune.

For varieties bred for greenhouse production, it is best to prune the vines to a single leader, much like you would for indeterminate tomatoes. This method requires a strong wire suspended 6–8 feet above the greenhouse floor. The wires may be supported by the roof trusses and attached to the end walls running the length of the greenhouse. Roof purlins may also be used to hang the trellis strings. Individual strings should be hung from the wire for each cucumber plant. The strings are then tied or attached with tomato clips to the base of each stem just above the soil surface, or secured with a single overhand knot. As the plants grow, either attach more clips or wrap the stems around the string. Always wrap the string in the same direction to avoid unraveling and the plants falling down. Also be aware of any developing fruit to avoid wrapping the string over them.

PRUNING:
There are two common pruning techniques used for string trellising greenhouse cucumbers: 1) "Lower and Lean" or "Lower-and-Coil" and 2) the "Umbrella" method. Consider a "Lower-and-Lean", or "Lower-and-Coil" system if you have a long season, capable structure, and enough labor. The "Umbrella" system fits better for those growers with a very short growing season or more limited labor.

"Lower-and-Lean" requires the use of a spooling tool (e.g. Rollerhooks) that hang a spool of string from the top wire and allow for the easy unrolling and extension of the trellis over the course of the growing season. As the plant grows up the string, remove all the lateral buds, leaving the top of the plant unpruned in case the main leader is damaged. Pruning the lateral buds allows the plant to direct its energy to producing fruit rather than an abundance of foliage. Leaves should also be removed up to just below the level of the next harvestable fruit, for similar reasons. Once the vine has reached the top wire, the string can be let down from the spool, lowering the top of the cucumber plant back below the wire. As the plants are lowered, the hooks on which they hang should also be slid along the top wire, causing the plants to "lean" in the direction you are moving the hooks. This allows for the plant to continue to grow over a long season, without having to top the plants or losing plants in the rafters of the greenhouse. Beds with two rows of plants should have each row lean in the opposite direction of one another. As the plants continue to grow in length, they will eventually wrap around the end of the bed and lean back up the opposite row.

A variation on this technique is called the "Lower and Coil," method, where rather than sliding the hooks and leaning the plants, as the vines are lowered and carefully coiled in loops around the base of the plant. Care must be taken in this method to avoid the looping lower vines from sprawling into the pathway, or getting overly tanged with one another, and it is especially important to keep up with the pruning of suckers and lower leaves to avoid a mess of broken foliage at the base of the plant that would invite pests and disease.

Watch a video demonstration of lower and lean at Johnnyseeds.com/lower-lean

The **"Umbrella"** system is the other common method for pruning greenhouse cucumbers. This method can be done with only a single string tied to the top wire, without the use of spooling tools. Initially prune plants in the same way as the two lowering methods: as the plant grows up the string, remove all the lateral buds and lower leaves up until the plant reaches the top wire. In addition to the lateral buds, all the fruits should also be removed up to the 6th node, where a leaf joins the stem—this will be approximately the first 3½-foot section of the main vine. After this point, all of the fruits on small-fruited varieties, such as snackers, cocktail, and pickling varieties, can be left intact. For large-fruited varieties, such as slicing, long European, and Beit Alpha types, prune fruit to one fruit per node; if allowed to produce more than one fruit per node, the large-fruited types may experience fruit drop. if the plants are stressed from either lack of water or fertility.

Once the vine has reached the top wire, let 2–3 secondary or lateral buds grow from the top of the plant, and once these are established, remove the terminal leader, allowing those 2–3 saved lateral buds to become the new leaders. Train these 2–3 new leaders to grow over the top wire, and then hang back down again. Follow the same method of removing lateral buds as the plant continues to grow downward, this time for all three leaders.

DISEASES:
Prevent the occurrence of disease by practicing crop rotation, managing pests that spread disease, removing debris, controlling humidity and choosing disease-resistant varieties. The best defense against disease is varieties with genetic resistance. Viruses that cause disease are very regional, so it is best to select varieties that are common in your area.

Powdery mildew presents itself on the leaves as irregularly shaped, white, powdery spots. This symptom can progress to the point of the leaves turning yellow and dying. The best method of prevention is to select disease-resistant varieties, but powdery mildew thrives in the humidity of a high tunnel, so ensure your structure is well ventilated. Mildew Cure®, MilStop®, and OxiDate® may provide some measure of control.

PESTS:
Within the greenhouse or high tunnel, biological controls, such as predatory mites, are an effective option for spider mites and thrips, especially if released before pest issues arise. For squash bugs and cucumber beetles, PyGanic® and Safer® Insect Soap may be effective controls. Cucumber beetles can act as a vector for bacterial wilt. The use of yellow sticky traps may provide some control against cucumber beetles.

HARVEST AND STORAGE:
Pick fruits daily once the plant begins bearing. Keep cucumbers for up to 2 weeks by refrigerating at 50–55°F/10–13°C and 95% relative humidity

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