CUCUMBERS

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CUCUMBERS

GROWING

Cucumbers are warm season plants and grow best between 65° to 75°F. The plants do not tolerate prolonged exposure to temperatures below 55° or above 90°F.

Cucumbers are grown in either fields or green houses. Field grown cucumber plants are typically started as seeds and are either mechanically or hand planted. Many commercial operations train their plants to grow on poles or trellises to keep the fruit suspended. Several training systems are used for trellis growing, but the umbrella system is the most common. In the umbrella system, all the lateral branches are removed as they appear until the main stem reaches a predetermined height. The plant is then allowed to grow more freely so the plant can concentrate on growing fruit, rather than height. Some growers plant bush type varieties and allow the fruit to spread along the ground. To accommodate different harvesting practices, field cucumbers grown for the fresh or sliced market are spaced about 36 to 72 inches apart versus eight to 10 inches for cucumbers grown for pickling.

In contrast to field grown cucumbers, greenhouse cucumbers are normally established as transplants. Greenhouse cucumber plants have very large leaves and grow vigorously. Each plant is provided five to seven square feet of space and is always grown on a trellis. Greenhouse cucumbers require close monitoring of nutrients to maintain good health and productivity.

Like most commodities, cucumbers do best under certain soil and temperature conditions. Cucumbers can be planted on a wide variety of soil types; however, deep, fertile soils that are well drained with a pH between six to six and a half are ideal. Poor plant growth and reduced yield can result from soil that is excessively acidic with pH below six. To protect the fruit from frost and to control temperatures in the early and late season, cucumbers can be grown under plastic row covers. The covers can later be dropped and converted into windbreaks to protect the plants from foot traffic and wind damage.

Weed and pest control are also important management practices to ensure optimum production. Weed control in cucumber production is accomplished through a variety of methods including use of cover crops and mulches, cultivation and hand weeding, and applications of herbicides targeting the specific types of common weeds in a particular field. Cucumber plants are susceptible to a variety of insect, bacterial, fungal, and nematode infections. Early identification of such infections or infestations is key to appropriate and rapid control methods. Disease prevention strategies include crop rotation, careful field selection, sanitation, soil treatments, and appropriate seed selections.

It is a common practice to utilize soil mulches for controlling weeds and protecting from insects as well as modifying soil temperatures, conserving water, and for controlling erosion. Mulches can include peat moss or other organic material. Many commercial operations use plastic covering as a mulch to protect crops. Depending on the effect desired, producers can employ colors such as clear, black, white, or aluminum. These colors all have a warming effect on the soil in the evening, but can warm, cool, or have no effect during the daytime.

Irrigation is accomplished either through flooding furrows or direct drip lines laid along the planted rows. Cucumbers require frequent irrigation during the growing period. Too little moisture will affect fruit shape whereas water soaked fields can lead to mildew and other disease problems.

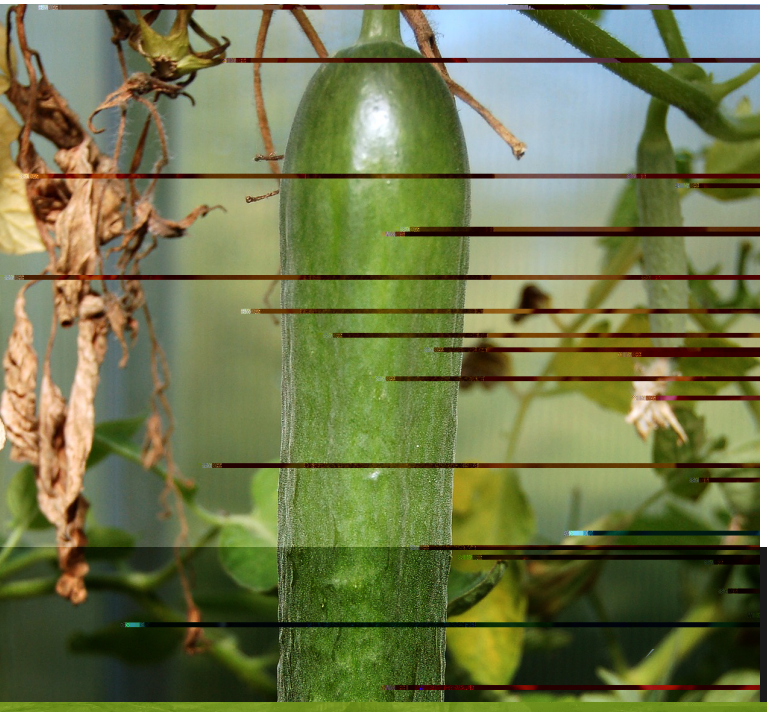
Determining the need for fertilization of cucumber growing areas is generally made through both soil nutrient analysis

(typically done at least four months before planting) and plant tissue nutrient analysis. For plant tissue analysis, growing leaves are sampled and analyzed for macro- and micronutrient content. Depending on results of these analyses, needs for fertilization to provide macronutrients such as nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur are determined.

HARVESTING

Growers normally plant from 40,000 to 90,000 plants per acre. Some growers plant as many as 150,000 per acre. Although most cucumbers are picked by hand, the larger operations are mechanically harvested. The time from planting to harvest can be relatively quick in as few as 36 to 40 days from planting depending on variety and weather conditions. As an approximation, a first harvest date can be predicted by counting forward eight to 10 days from the first appearance of fully opened female flowers.

Cucumbers are harvested at a variety of stages, from quite young to mature before seeds reach final maturity and harden. Those that are harvested prior to maturation of seeds are marketed as seedless. Fruit is harvested when uniform length, shape, and diameter are reached and before yellowing appears at the blossom end. In general, harvest length is determined by target market. Typical fruit length in English type cucumbers for the fresh whole market is 12 to 14 inches, garden cucumbers destined for the fresh sliced market are harvested at 7.5 to 8.5 inches, and although no USDA standards exist for mini-cucumbers, these fruits are generally harvested when they reach five to eight inches in length.



Frequent harvests are necessary because fruits mature quickly. Continued, timely harvest keeps the plants in a productive mode since cucumber plants have a limit to the number of fruits they can support at any one time. Cucumbers destined for the fresh sliced market are hand harvested one to three times per week depending on weather and stage of growth. Pickling cucumbers are generally harvested by hand more frequently or they can be mechanically harvested in larger quantities to free up the land for replanting or rotation to another crop. Cucumbers are inspected in the field prior to harvest for mechanical damage, disease, and cosmetic defects. Unmarketable fruit are pulled from the plants and disked into the soil after harvest is completed.

Total expected yield depends directly on length of harvest period. Yields range from one to three pounds of fruit per plant per week during the peak harvest period. A normal harvest period of 12 weeks in a well-managed crop can yield a total of 20 to 25 pounds of fruit per plant.

PACKING

Marketable garden type cucumbers are sorted by size and quality and packed in fiberboard cartons. Size classifications represent the number of cucumbers packed in a standard carton. Fruit is generally graded and sized in farm sheds and packed by counts of 30, 32, 36, 40, 42, or 46 per fiberboard carton. Box weights average about 25 to 30 pounds. Yields can range from 2,000 to 3,000 cartons per acre. Higher yields have been achieved when favorable field and weather conditions prevail.

Thin skinned English cucumbers that are grown in greenhouses are susceptible to water loss and softening after harvest. Each fruit is individually wrapped in a shrink-

wrap film before packing. Shrink-wrapping minimizes moisture loss and extends shelf life. Since each fruit is shrink-wrapped, this crop is very labor intensive and time consuming to produce.

Mini-cucumbers are much less susceptible to water loss and do not require shrink wrapping. Mini-cucumbers are normally bulk packed in small to medium sized waxed boxes appropriate for the target market.

HOLDING

Following harvest, cucumbers are chilled as quickly as possible to remove field heat. Methods for cooling harvested cucumbers include hydrocooling with chilled water and forced-air cooling. Where sophisticated methods of cooling are not possible, drenching of fruit with cold well-water is also used as a way to reduce build-up of respiration heat in bulk containers.

Cucumbers are held in chill rooms, but not below 50°F or the fruit will suffer from pitting and color changes. The fruit is also susceptible to ethylene gas, which is used to ripen green tomatoes. Shippers must be careful not to hold cucumbers near vegetables such as tomatoes, cantaloupes, apples, and peaches which emit ethylene gases as they ripen.

CONCLUSION

Having a basic understanding of the way cucumbers are grown, harvested, and cooled will provide the basic background information that will be helpful to regulators when completing inspections or investigations in the field.

The agricultural practices described in this production summary are common on most large commercial farms like those found in major cucumber producing regions in the United States. There are undoubtedly variations in these practices depending on the region, operation size, and individual grower preferences. This is especially true of farms outside of the U.S.

REFERENCES

"2012 Agricultural Statistics Annual." *United States Department of Agriculture National Agricultural Statistics Service*. USDA, 23 Oct. 2015. Web. 02 Dec. 2015.

"Agricultural Statistical Overview." *California Agricultural Statistics Review 2013-2014* (2015): 47-50. Web. 02 Dec. 2015.

Fayed, Sayed. "What Is the Difference Between English and Regular Cucumbers?" *About.com Food*. About.com, n.d. Web. 15 Dec. 2015.

Hochmuth, R. "Greenhouse Cucumber Production—Florida Greenhouse Vegetable Production Handbook, Vol 3." *EDIS*. University of Florida: IFAS Extension, 2012. Web. 02 Dec. 2015.

Maier, Karyn. "What Are Persian Cucumbers?" *EHow*. Demand Media, n.d. Web. 15 Dec. 2015.

Schrader, Wayne, Jose Aguiar, and Keith Mayberry. "Cucumber Production in California." *Agriculture and Natural Resources, Publication 8050*. University of California, 2013. Web. 02 Dec. 2015.

Schultheis, Jonathan, Charles Averre, Mike Boyette, Ed Estes, Gerald Holmes, David Monks, and Kenneth Sorensen. "Commercial Production of Pickling and Slicing Cucumbers in North Carolina." *Cooperative Extension*. NC State University, 1 Jan. 2000. Web. 02 Dec. 2015.

Starrs, Paul F, and Peter Goin. *Field Guide to California Agriculture*. Berkeley: University of California Press, 2010. 300-302. Print. 02 Dec. 2015.

Swaider, J. M., G. W. Ware, and J. P. MacCollum. "Commercial Cucumber Production." *B's Cucumber Pages*. Interstate Publishers Inc., 5 Sept. 1996. Chapter 17. Web. 15 Dec. 2015.

"Types of Cucumber: Lemon, Persian, Hothouse, Armenian, Gherkin, and More." *Berkeley Wellness*. Remedy Health Media, 2 Aug. 2015. Web. 15 Dec. 2015. 15 Dec. 2015.

Watson, Molly. "Cool Cucumbers: 6 Varieties and How to Use Them." *About.com Food*. About.com, n.d. Web. 15 Dec. 2015.

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