

*College of Agriculture & Life Sciences*  
 Department of Horticultural Science

**FRESH MARKET PRODUCTION CUCUMBERS**

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**Introduction**

The slicing cucumber is an important crop to North Carolina, with yearly production fluctuating between 5,000 to 8,000 acres, depending on season and market conditions. North Carolina slicing production accounts for approximately 10% of the U.S. production acreage.

Most commercial cucumber production is concentrated in the N.C. coastal plain with some substantial acreage also south of Asheville, N.C.

“Slicing” refers to cucumbers that are sold fresh for immediate consumption as a salad item. Characterized by thick, uniform, dark green skins, slicing cucumbers are longer than processing types, and their thicker skins are more resistant to damage during handling and shipping. “Pickling” refers to cucumbers that are primarily used for processing and pickling. Increasingly, more pickling cucumbers are being sold fresh for immediate consumption. Some consumers have a preference for the pickling type because they have thinner skins compared with slicing cucumbers.

**Soil Selection**

Soil must be well-drained, not subject to standing water. Soil pH should be 6.0 or greater with optimum at 6.1 to 6.5. A smooth, firm seedbed is necessary to obtain a satisfactory plant stand. Select fields which were not planted to cucumbers or other

cucurbit crops the previous year. To reduce pest problems, cucumbers should be part of a land rotation and should not be planted after cucurbits (pumpkin, squash, melon, and watermelon) for at least 2 years.

**Fertilization**

Take a soil sample at least 4 months before planting, submit to the North Carolina Dept. of Agric. & Consumer Services, 4300 Reedy Creek Road, Raleigh, NC 27607-6465 and follow the soil test report. If no soil test has been taken, two general fertilizer options are recommended (see Table 1).

**Nematode Control\***

A nematode assay should be made in each field. Samples may be submitted to Agronomic Division (Soil or Nematode Lab), North Carolina Dept. of Agric. & Consumer Services, 4300 Reedy Creek Road, Raleigh, NC 27607-6465. If treatment is recommended, use fumigant-type nematicide. Observe a 2 to 3 week waiting period, depending on fumigant used. Double rate of nematicide on high organic soils.

**Cultivars**

Cultivars should be chosen and a seed source identified several months before planting to ensure availability of high-quality seed. Slicing cucumbers must meet the standards set by the packer, wholesaler, retailer and consumer. Thus, growers should investigate

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these standards before choosing a cultivar. The slicing cultivars recommended for North Carolina can be found in Table 2.

The cultivars listed have grown well and yielded high quality fruit under North Carolina growing conditions. Disease resistance is an important consideration. Normally, disease incidence increases as the season progresses. Thus, growers may need to choose a cultivar with high disease resistance at the expense of some yield and quality. Cucumber diseases occurring frequently in North Carolina are mosaic diseases, gummy stem blight, anthracnose, angular leaf spot, target spot, root-knot, belly rot, and damping-off.

### Seeding and Planting on Bare Ground

Use a precision seeder; this reduces seed cost and improves yields. Use only seed treated with a fungicide and insecticide. For earliest crop, plant on sandy soil. Windbreaks of small grain will provide protection from sand blasting and warmer temperatures for young seedlings in spring. Soil temperature at the 2 inch depth should be above 60°F at planting. Plant seeds 1/2 to 1 inch deep in spring. Plant seeds 1 to 1 1/2 inch deep for fall crops for better soil moisture and cooler temperatures for seed germination. Uniform soil moisture is especially

critical during plant establishment. If the soil lacks good moisture at planting, 1/2 to 3/4 inches of water should be applied to provide uniform moisture. This will result in more uniform, complete plant stands which in turn results in improved, concentrated fruit yields and efficient use of machinery and labor. If soil is dry and requires irrigation after seeding, reduce water droplet size by increasing delivery pressure. Large water droplets often lead to soil crusting, which can inhibit plant emergence. Soil crusting leads to reduced stands that are not uniform. Obtaining a complete, uniform stand is especially critical because plant and fruit development must be uniform throughout the entire growing season to maximize yield. The final stand should be about 6 to 10 inches between plants. Row width can be from 30 to 48 inches apart depending on equipment. Generally, plant populations are 20,000 to 25,000 plants per acre. Plant on raised beds (6 inches high) to improve soil warming and drainage.

### Getting and Keeping a Good Stand\*

The first insects to feed on young cucumbers are usually striped and spotted cucumber beetles. Insecticide applications are necessary. Ridomil needs to be applied at planting. It needs to be taken up by the roots to be effective against damping-off. This situation is more likely to occur on poorly drained soils.

**Table 1. Fertilizer Recommendations for Slicing Cucumbers on Unmulched Soil.**

| Nutrient Requirements   |  |   |
|---|--|---|
| <u>Option 1 - Initial Application Broadcast before Planting</u> |  |   |
| <i>Method</i>   | <i>Application Time</i>                      | <i>N-P-K (lb/acre)<sup>a</sup></i>  |
| 1. Broadcast  | Preplant (7 to 10 days)                      | 80-100 N, P, and K  |
| 2. Sidedress  | Before vines tip over and run (before layby) | 20-30 N and K <sup>b</sup>  |
| <u>Option 2 - Sideband Application</u>                          |  |   |
| <i>Method</i>   | <i>Application Time</i>                      | <i>N-P-K (lb/acre)<sup>a</sup></i>  |
| 1. Sideband   | At planting                                  | 40 N and K<br>30-40 P<br>(9-12 gal/acre 18-34-0 or 65-90 lb/acre 18-46-0) |
| 2. Sidedress  | 10 to 14 days after planting                 | 20-30 N and K   |
| 3. Sidedress  | Before vines tip over and run (before layby) | 20-30 N and K <sup>b</sup>  |

<sup>a</sup>N = nitrogen, P=phosphorus (P<sub>2</sub>O<sub>5</sub>), K=potassium (K<sub>2</sub>O)

<sup>b</sup>Only in low K<sub>2</sub>O soils

**Table 2. Recommended Slicing Cucumber Cultivars for North Carolina.**

| Cultivar    | Seed Company <sup>a</sup> | Fruit Length <sup>b</sup> | Yield Earliness <sup>c</sup> | Potential <sup>d</sup> | Comments <sup>e</sup>   |
|-------------|---------------------------|---------------------------|------------------------------|------------------------|---|
| Centurion   | Ab,N                      | medium-long               | M                            | medium                 | spring/summer   |
| Dasher II   | Ab,P,S,W                  | medium-long               | M                            | high                   | N.C. standard cultivar <sup>f</sup><br>Spring only (tends to be short in fall)                            |
| Daytona     | P                         | medium-long               | M                            | high                   | ZYMV, PRSV, WMV   |
| General Lee | H                         | medium-long               | M                            | high                   | spring/fall   |
| Indy        | P                         | medium-long               | M                            | high                   | ZYMV, PRSV, WMV   |
| Lightning   | A                         | long                      | E                            | high                   | dark green  |
| Meteor      | A                         | medium-long               | M                            | medium                 | angular leaf spot   |
| Poinsett 76 | Ab,A,Ho,<br>N,P,W         | medium                    | L                            | medium                 | monoecious, open-pollinated,<br>most Southern foliar leafspot resistant<br>slicer cucumber, fall planting |
| Revenue     | HM                        | long                      | M                            | medium                 | spring/fall   |
| Slice Nice  | Su                        | medium-long               | M                            | medium                 | spring/fall   |
| Speedway    | P,S                       | medium                    | E                            | high                   | spring  |
| Striker M   | A                         | long                      | L                            | medium                 | spring/fall   |
| Thunder     | A                         | long                      | E                            | high                   | less vine mass (not recommended for<br>early spring planting due to end<br>cracking)                      |
| Turbo       | P,S                       | medium-long               | L                            | high                   | spring/fall   |

<sup>a</sup>A=Asgrow Seed Co., Ab=Abbott & Cobb Seed Co., Ho=Hollar and Co., HM=Harris Moran Seed Co., N=Novartis, P=Peto Seed Co., Se=Seedway, Su=Sunseeds, W=Willhite Seed Co.

<sup>b</sup>Fruit length: medium=7.5 to 8 inches, medium-long=7.8 to 8.2 inches, long=8.2 to 8.6 inches

<sup>c</sup>Refers to time when most fruit maturity occurs relative to Dasher II: E=early, M=midseason, L=late

<sup>d</sup>Yield: Medium indicates that consistent good yields can be expected, yet they typically are somewhat lower than high-yielding cultivars.

<sup>e</sup>Indicates superior disease resistance (ZYMV=zucchini yellow mosaic virus, PRSV=Papaya ringspot virus, WMV=watermelon mosaic virus) and best seasons for planting. Contact your county Extension center for cultivar updates.

<sup>f</sup>Fruit length, earliness, and yield relative to Dasher II, a standard slicing variety for North Carolina.

### Irrigation

Cucumbers have a high water requirement and are very susceptible to water stress. Lack of water can result in reduced fruit quality and yields. Under normal conditions, the crop needs approximately 1 inch of water per week. When the crop is fruiting—especially during periods of hot, dry weather, under windy conditions, and when grown on sandy soils—up to 2 inches of water per week may be required by the crop.

Irrigation can increase yield by more than 50% in years of medium and low rainfall. Irrigation rate will depend

on soil type but applications should not exceed 0.40 inch per hour for sandy soils, 0.30 inch per hour for loamy soils, and 0.20 inch per hour for clay soils. Higher rates will waste water and cause soil erosion and fertilizer runoff.

### Plastic Mulch and Drip Irrigation

With more intensive management, plastic mulch and drip irrigation are worth the money and effort. Use raised beds 6-inches high. Fumigate the soil and lay plastic when there is good moisture. Plant two rows spaced 18 inches apart on each bed. Direct seed with a mulch seeder. Irrigate daily when soil moisture is below 70% available soil moisture.

For more detailed information, read the bulletin entitled “Plasticulture for Commercial Vegetables,” publication number AG-489.

### Weed Control\*

Generally in fresh market cucumbers utilizing black plastic, herbicides should be used for controlling weeds, especially early season grasses. In fresh market cucumbers not utilizing black plastic, a weed control program involving cultivation (usually twice) and herbicides should be implemented. Consult the current *N.C. Agricultural Chemicals Manual* for the latest recommendations. Avoid fields having weeds that are difficult to control such as cocklebur, bermudagrass and Johnsongrass. Use the “stale bed” technique, where weeds are allowed to germinate and are then killed with a contact herbicide prior to planting.

### Foliar Insects\*

In spring crops, insects are not usually a problem once the crop is established. After July 1st, growers should be scouting for pickleworms, which can be devastating. In general, after July 15, growers should begin spraying each field just before flowers open. Insecticides should be applied at five-day intervals, always after harvesting. Check the label for the harvest interval on all insecticides. Apply insecticides in the evening (after 4 pm) for minimal loss of pollinating insects.

### Foliar Diseases Except Bacterial Wilt\*

Planting “clean” seeds when practicing crop rotation will aid in reducing diseases. Scouting is critical to determine when fungicide sprays should start. To keep foliage diseases in check, start spray application at the first sign of occurrence of disease. Spray weekly when

the crop is planted in spring and twice per week for a summer planted crop. Use a high-pressure sprayer (200 psi plus).

### Fruit Diseases

Belly rot and other fruit rots can result in much financial loss to the cucumber grower. After last cultivation, spray the soil surface with a registered fungicide that will help control belly rot. Do not cultivate after this application. This treatment will not completely prevent belly rot but should greatly reduce it.

### Pollination

Cucumbers are dependent on bees to transfer pollen from the male to the female blossoms. Yield increases of 25% to 30% are common when honey bees are introduced into the field. Use one strong colony (25,000 to 30,000 bees) per acre in the field after blooming has started. An indication of adequate bee activity in a field is being able to hear the bees buzzing during their active time (morning). Cucumbers require large numbers of honey bees for adequate pollination because the female flower is only receptive for part of the day (morning and early afternoon). When the number of bees visiting flowers is insufficient for adequate pollination, misshapen fruit often results. Moisture stress also can have a similar effect, thus irrigation is critical to avoid lowering yields and inferior fruit quality. Be sure to protect bees from insecticide application by spraying late in the day.

### Harvesting

Start harvest as soon as a reasonable number of fruits meet grade. It is best to begin harvest before oversized fruits are observed. Typically, fruit are harvested about two to three times per week for three to four weeks.

**Table 3. US Grade Requirements. (Source: US Standards for Cucumbers - USDA, March 1, 1958).**

| <i>Grade</i>               | <i>Minimum Length</i> | <i>Maximum Diameter</i>                              |
|----------------------------|-----------------------|--|
| U.S. Fancy <sup>a</sup>    | 6 inches              | 2 <sup>3</sup> / <sub>8</sub> inches                 |
| U.S. Extra #1 <sup>a</sup> | 6 inches              | 2 <sup>3</sup> / <sub>8</sub> inches                 |
| U.S. #1 <sup>a</sup>       | 6 inches              | 2 <sup>3</sup> / <sub>8</sub> inches                 |
| U.S. #1 Small              | No requirements       | 2.0 inches (1 <sup>1</sup> / <sub>2</sub> inch min.) |
| U.S. #1 Large              | 6 inches              | None (2 <sup>1</sup> / <sub>2</sub> inch min.)       |
| U.S. #2                    | 5 inches              | 2 <sup>3</sup> / <sub>8</sub> inches                 |

<sup>a</sup> U.S. Fancy and U.S. #1 grades distinguished by color, with U.S. Fancy having better color than U.S. #1. The U.S. Extra #1 grade is a combination of at 50% U.S. Fancy and U.S. #1 grades.

Below, note that there is no size difference between the first three grades: the difference between U.S. Fancy (the best grade), U.S. Extra No. 1, and U.S. No. 1 is distinguished by quality (color, shape, and defects allowed). U.S. Extra No. 1 is a combination of at least 50% U.S. Fancy with the remainder being U.S. No. 1 grade. Size is the only difference between U.S. No. 1, U.S. No. 1 Small, and U.S. No. 1 Large. To maximize yield, harvesting should be done frequently to obtain the maximum number of U.S. Fancy and U.S. No. 1 cucumbers per acre.

### **Cooling**

Cucumbers are very perishable. Remove from the field, package and cool as soon as practical. Keep fruit in shade before packing to reduce weight loss. Use forced air cooling to reduce field heat rapidly. Hold in a cold room at 50 to 55°F prior to shipment. Make sure truck is cooled before loading.

### **Steps to Successful Fresh Market Cucumber Production**

1. Select well-drained soil.
2. Test soil to determine lime, fertilizer and nematicide needs.
3. Choose a cultivar well-accepted in the market.
4. Prepare a smooth, firm seed bed.
5. Use raised beds.
6. Don't use excessive amounts of seed. Use a precision seeder.
7. Side dress fertilizer to improve nutrient use efficiency.
8. Provide 1 bee colony per acre.
9. Spray for insects with high pressure sprayer.
10. Irrigate frequently because it pays.
11. Grade carefully.
12. Cool after packing.

A detailed production guide entitled *Commercial Production of Pickling & Slicing Cucumbers in North Carolina*, publication AG-552, is available for \$5.00. Call 919/515-2861 to order.

### **For Further Reading**

1. Ambrose, J.T. 1995. *Cucumber Pollination*. Dept. Entomology Insect Note No. 7B. North Carolina Cooperative Extension Service.
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4. Boyette, M.D., L.G. Wilson, and E.A. Estes. 1994. *Forced-air cooling*. Ag-414-3. North Carolina Cooperative Extension Service.
5. North Carolina Cooperative Extension Service. *North Carolina Agricultural Chemicals Manual*. North Carolina State University, College of Agriculture and Life Sciences.
6. Schultheis, J.R., C.W. Averre, M.D. Boyette, E.A. Estes, G.J. Holmes, D.W. Monks, and K.A. Sorensen. 1998. *Commercial Production of Pickling & Slicing Cucumbers in North Carolina*. Ag-552. North Carolina Cooperative Extension Service.
7. Zitter, T.A., D.L. Hopkins, and C.E. Thomas (eds.). 1996. *Compendium of cucurbit diseases*. St. Paul, Minn.: The American Phytopathology Society.

\* For up-to-date information on pesticides consult the *N.C. Agricultural Chemicals Manual* or your county extension agent.