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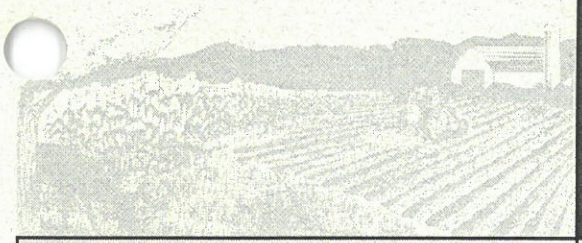

North Carolina Crop Profile
Cucumbers

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College of Agriculture and Life Sciences, NC State University
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PRODUCTION FACTS

- Cucumbers in North Carolina are produced for two markets—processing (pickles) and slicing (fresh market), the latter products being consumed primarily as salad items without processing.
- North Carolina ranks second nationally in the production of cucumbers. Every year, 27,000 to 30,000 acres (about 20 percent of national acreage) are planted for pickling cucumbers and 5,000 to 8,000 acres (about 10 percent of national acreage) for slicing cucumbers.
- About 90,000 to 100,000 tons of pickling cucumbers are harvested yearly (value $20 million to $25 million), plus about 300,000 to 400,000 hundredweight of slicing cucumbers (value $4 million to $6 million).
- Fruit for slicing cucumbers are generally longer, darker green, and have thicker skins than fruit for pickling cucumbers.
- Pickling cucumbers are produced on bare ground (no plastic), while some slicing cucumbers are produced on plastic.

PRODUCTION REGIONS

Most cucumber production is in eastern North Carolina. A smaller center of production is in the mountains, south of Asheville.

PRODUCTION PRACTICES

Cucumbers are grown in two production seasons (spring and summer), and the average time from seeding to first harvest is 36 to 45 days. Cucumbers are adapted to a wide range of soils, but grow best on fertile, well-drained, loamy soils. Soil pH should be between 6 and 6.5. There are various options for fertilizing cucumbers grown in North Carolina. Pollination of cucumber flowers by bees is important for production of quality fruit. In North Carolina, most cucumbers are hand harvested.

DISEASES

Management

Diseases usually are much more severe in the summer crop than in the spring one. Disease pressure and resulting losses can vary greatly from year to year and season to season. This variation is primarily weather-dependent, but it is also related to crop rotation, seed quality, and availability of effective management tools (e.g., fungicides). Crop loss from all diseases for 1988 was 30 percent. Important diseases are root-knot (8 percent crop loss), downy mildew (5 percent), target spot (5 percent), belly rot (4 percent), gummy stem blight (4 percent), anthracnose (2.5 percent), cottony leak (2.5 percent), damping-off (2.1 percent), powdery mildew (0.3 percent), Alternaria leaf spot (0.1 percent), and angular leaf spot (0.1 percent). Bacterial wilt is also an occasional problem.

Root-knot nematode (*Meloidogyne* spp.)

Approximately 20 percent of growers use nematicides to manage nematodes in cucumbers (probably 40 percent of acreage). The decision to treat is based on nematode populations in the soil. Products used, in order of acreage treated, include Telone C-17, Telone II, Mocap, methyl bromide, and Vydate.

Damping-off (*Pythium, Phytophthora, Rhizoctonia, Fusarium*)

Cucumber seeds are generally treated with Ridomil (metalaxyl), thiram, or captan to control fungi that cause damping-off. The disease usually occurs during cool, rainy weather in early spring. Ridomil Gold (mefenoxam) is incorporated into the soil (0.5 lb active ingredient/acre) preplant in approximately 10 percent of the spring crop and 6 percent of the summer crop. Both seed and preplant treatments are effective but provide only temporary protection. Prolonged periods of cool, wet weather will eventually break down fungicidal protection. The seed treatment is considered essential since it requires such small amounts of fungicide and provides good protection against damping-off fungi.

Fungal leaf spots

Alternaria leaf spot (*Alternaria solani*)
Anthracnose (*Colletotrichum orbiculare*)
Gummy stem blight (*Didymella bryoniae*)
Target spot (*Corynespora cassiicola*)

Bravo (chlorothalonil @ 2 lb active ingredient/acre) and Mancozeb (2 lb active ingredient/acre) are applied on a 7- to 14-day schedule starting at vine running in the summer crop. In the 1994 summer crop, 41 percent of the acreage were treated with Bravo and 3 percent were treated with mancozeb (total of 13,400 lb applied). Approximately 10 percent of the spring acreage were treated similarly. Use of mancozeb has risen (perhaps 10 to 15 percent now) as growers realize it is quite effective when applied in a timely and thorough manner and is less costly than Bravo. Quadris (azoxystrobin) was registered for use on cucumbers in 1999. It is more effective than Bravo or Mancozeb on leaf spots and controls powdery mildew very well (see below).

Downy mildew (*Pseudoperonospora cubensis*)

Most varieties possess good resistance to the disease, but occasionally disease pressure is sufficiently high to warrant additional control. Bravo or mancozeb provides excellent control when coupled with host resistance.

Powdery mildew (*Sphaerotheca fuliginea*)

Most varieties possess good resistance to this disease.

Angular leaf spot (*Pseudomonas syringae* pv. *lachrymans*)
Bacterial wilt (*Erwinia tracheiphila*)

Occasionally these diseases can cause economic losses. Fixed copper compounds are the only products with activity against them.

Fruit rots

Belly rot (*Rhizoctonia solani*)

Pickle packers consider this their greatest problem. Yearly outbreaks are sporadic, and the conditions that favor the disease are not well understood. Several severe outbreaks have occurred in the state, and effective disease control methods are badly needed.

Bravo (6 lb active ingredient/acre) is applied to 18 percent of the spring crop and 24 percent of the summer crop. Topsin-M is also registered, but not used as much. Good data on efficacy are needed. Materials are applied to the bed top before vine running.

Cottony leak (*Pythium spp.*)

Ridomil (0.5 lb active ingredient/acre) is applied to 3 percent of the spring crop and 10 percent of the summer crop.

INSECTS

Management

Seed corn maggots, cucumber beetles, and pickleworms are the most important pests of cucumbers in North Carolina. Seed corn maggot is a problem in the spring on seeds planted too deeply in cold, wet soils having a high percentage of organic matter. The overuse of animal manure and some bone meal fertilizers can attract adult flies. The use of seed treatments and correct seeding procedures will favor plant emergence and good stands over insect development and reduced stands. Drenches of diazinon will help neutralize heavy infestations.

Cucumber beetles (spotted and striped) overwinter as adults and await tender cucumber cotyledons. Again, seeding and early plant establishment will compensate for beetle feeding. The use of Furadan granules preplant, the addition of the new reduced risk insecticide Admire to the soil, or the foliar application of Provado will give season-long control of cucumber beetles. Adios feeding-attractant-and-bait offers some early detection and control of low beetle populations. Sevin or thiodan applications well timed for adult feeding will give effective control.

Pickleworms are migratory pests that move into North Carolina in late June and July. They pose a serious threat to the processing industry, and, hence, zero pickleworms is the threshold established by consumers. Trapping and monitoring for pickleworm moths are in various states of development. A network forecasting service is planned along the coast of North Carolina to alert growers and processors to the

population levels and movement of this economic pest. Frequent foliar sprays are needed to prevent pickleworms from entering and contaminating pickles. Sevin, thiodan, Asana, or Lannate are suggested materials that give good control when applied in a safe and timely manner.

Insecticides

Diazinon

This material (Diazinon 14G @ 1-3 lb active ingredient/acre) is applied before planting to approximately 1 to 2 percent of the cucumber acreage to control seed corn maggots and wireworms, respectively.

Carbaryl

This material (Sevin 80 S @ 1 lb active ingredient/acre), plus esfenvalerate (Asana 0.66 XL @ 0.03-0.05 lb active ingredient/acre), endosulfan (Thiodan 3 EC @ 0.75 lb. active ingredient/acre), and methomyl (Lannate 90 LV @ 0.45-0.9 lb active ingredient/acre), is used to control cucumber beetles and flea beetles. Carbaryl goes on 10 to 25 percent of the acreage, esfenvalerate on 5 to 15 percent, endosulfan on 5 percent, and methomyl on 1 to 10 percent.

Methomyl

This material (Lannate 90 LV @ 0.45-0.9 lb active ingredient/acre), plus carbaryl (Sevin 80 S @ 1 lb active ingredient/acre), esfenvalerate (Asana 0.66 XL @ 0.03-0.05 lb active ingredient/acre), and endosulfan (Thiodan 3 EC @ 0.75 lb active ingredient/acre), is applied in middle to late summer to control pickleworms. Methomyl goes on approximately 45 percent of the acreage, carbaryl on 15 percent, esfenvalerate on 10 percent, and endosulfan on 5 percent. Pickleworms are not usually a problem in spring plantings.

Esfenvalerate

This material (Asana 0.66 XL @ 0.03-0.05 lb active ingredient/acre), plus carbaryl (Sevin 80 S @ 1 lb active ingredient/acre), endosulfan (Thiodan 3 EC- @ 0.75 lb active ingredient/acre), and methomyl (Lannate 90 LV @ 0.45 to 0.9 lb active ingredient/acre), is used to control other insects (aphids, cabbage loopers, cutworms, leafminers, thrips, wireworms) and mites. Esfenvalerate is applied to 6 percent of the cucumber acreage, carbaryl to 3 to 8 percent, endosulfan to 2 to 4 percent, and methomyl to 1 to 3 percent.

Other strategies

Early planting and harvest in June will avoid pickleworms. However, thorough and timely applications of approved insecticides with a high-pressure (200 pounds per square inch) sprayer will give good control. Aerial applications and low-pressure sprayers are used but are not as effective. Well-timed seeding and plant establishment will often overcome any feeding damage by cucumber beetles and seed damage by seed corn maggots. Biological control exists, but it is not timely and readily available to control these pests of this highly valued crop.

Other pests exist but are not limiting factors in cucumber production in most years. These include aphids, leafminers, thrips, mites, and several lepidopterous caterpillars. They are usually controlled with treatments used for other insects.

WEEDS

Management

The major weeds in North Carolina cucumbers are annual and perennial grasses (large crabgrass, fall panicum, and goosegrass), common lambsquarters, and pigweeds (Palmer, redroot, and smooth). Management becomes difficult when grasses are taller than 4 inches. As large crabgrass matures, it produces roots at each node (joint), making it difficult to manage by cultivation and postemergence herbicides. Other weeds in cucumbers are common ragweed, common cocklebur, and annual morningglory.

The critical weed-free period for common lambsquarters and pigweed in cucumbers appears to be 14 to 32 days after emergence. Interference from weeds during that period of growth greatly reduces yield and quality. It also appears that if as little as 5 percent of the weeds are left to compete with cucumbers, a yield reduction of more than 50 percent can occur. Producers use three methods of managing weeds: 1) cultural control, including crop rotation; 2) mechanical control, including cultivation and hand removal; and 3) chemical control, including preplant-incorporated, preemergence, and/or postemergence herbicides.

Mechanical control.

Cultivation and hand-weeding are used to manage weeds in cucumbers. Cucumbers are usually cultivated three times and hand-weeded once or twice.

Chemical control.

Preplant herbicides

Gramoxone (paraquat) is labeled for preplant application to non-selectively kill emerged weeds before cucumbers come up. This herbicide is used on less than 5 percent of the cucumber acreage, probably because producers rely on tillage to kill sprouted weed seeds and emerged weeds. Killing weeds before planting is critical because any weeds that survive can reduce cucumber yield drastically.

Preplant-incorporated herbicides

Prefar (bensulide) gives preemergence weed control of most annual grasses and small-seeded broadleaf weeds. It can also be applied in irrigated cucumbers

and then followed by irrigation for more effective weed control. Preplant incorporation of Prefar is difficult because most cucumbers are grown on beds. That may explain why it is used on less than 5 percent of cucumber acreage in North Carolina. Alanap (naptalam) is sometimes applied with Prefar for control of more broadleaf weed species than Prefar alone offers.

Preemergence herbicides

Curbit (ethalfluralin) is applied preemergence immediately after cucumber seeding for controlling most annual grasses and small-seeded broadleaf weeds. It is used on approximately 60 percent of the cucumber acreage. Alanap is sometimes applied with Curbit for control of more broadleaf weed species than Curbit alone gives. Alanap is applied preemergence on approximately 14 percent of the cucumber acreage. It improves control of common ragweed and common cocklebur by Curbit. It does not give good control of annual grasses and, thus, is usually applied with either Prefar or Curbit. Alanap also is applied on approximately 10 to 15 percent of the cucumber acreage for preemergence weed control and control of small common lambsquarters and pigweed.

Postemergence herbicides

Poast (sethoxydim) is applied on approximately 12 percent of spring cucumbers and 3 percent of summer cucumbers for controlling emerged grasses.

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Prepared by

Gerald J. Holmes, Extension specialist, Department of Plant Pathology, North Carolina State University

David W. Monks, Extension specialist, Department of Horticultural Science, North Carolina State University

Jonathan R. Schultheis, Extension specialist, Department of Horticultural Science, North Carolina State University

Kenneth A. Sorensen, Extension specialist, Department of Entomology, North Carolina State University

200 copies of this public document were printed at a cost of $34.00, or $.17 per copy.

Published by

North Carolina Cooperative Extension Service

11/99—JL—200
E00-39175

AG-598-8