Crop Profile for Potatoes (Irish) in North Carolina

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General Production Information

- North Carolina ranks 14th in the United States in the production of Irish potatoes.
- North Carolina produces 0.018 percent of the U.S. crop.
- A total of 1,710 tons of potatoes valued at more than $22,572,000 was produced on 17,700 acres in North Carolina during the 1997 production year.
- Annual production costs are $800 to $1,000 per acre.
- Approximately 80 percent of the potatoes produced are processed into potato chips.

Production Regions

Almost all of the potato production in North Carolina is located in 10 eastern counties. These counties, in order of acreage produced, are Pasquotank, Camden, Washington, Pamlico, Tyrrell, Currituck, Hyde, Carteret, Beaufort, and Chowan.

Production Practices

Potatoes in North Carolina are planted in late February and March and harvested in June and July. Fertile, well-drained soils with a pH of 5.5 to 6.5 are recommended, as is a three-year crop rotation. Production is generally on raised beds, 38 inches apart, with seed-piece spacing from 9 to 12 inches, depending on the variety. Irrigation is not traditionally used here. Harvest for chip stock is done before skin is set to take advantage of the market window and to avoid internal heat necrosis due to high summer temperatures.

Insect Pests

Colorado potato beetle

The Colorado potato beetle is the most important insect pest on potatoes in North Carolina. Adult feeding on potato plant foliage is seldom damaging; however, larvae can cause extensive defoliation, resulting in significant yield losses.

Chemical control:
Bacillus thuringiensis tenebrionis (*Bt tenebrionis*) is used at 2 to 3 pounds or 2 to 3 quarts per acre. Good spray coverage is needed to control resistant beetle populations. Sodium aluminofluoride (Kryocide) at 10 to 12 pounds per acre is recommended for resistant beetle populations. Use at 30 percent egg hatch in a minimum of 25 gallons of water per acre. It is used on less than 1 percent of the potato acreage in North Carolina. Endosulfan (Phaser and Thiodan) 50 WP or 3 EC is suggested at 1 pound of active ingredient per acre. This is 1.3 quarts or 2 pounds, respectively. This is a slow-acting material. Endosulfan is used on 4 percent of the potato acreage in North Carolina. Imidacloprid (Admire) 2 F at 0.014 to 0.020 pound per 1,000 feet of row or 0.9 to 1.3 ounces per 1,000 feet of row of formulation per acre is a most effective material for Colorado potato beetles when used preplant and rotated over time and space. Admire is used on less than 1 percent of the potato acreage in North Carolina. Imidacloprid (Provado) 1.6 F at 0.05 pound of active ingredient per acre or 3.75 ounces of formulation per acre can be used as a foliar material. Provado is used on approximately 50 percent of the potato acreage in North Carolina.

Other chemical insecticides exist, and a rotation of Guthion, Vydate, and others is suggested over time.

Alternatives:
Several chemical classes of insecticides exist, and rotation is suggested to avoid the development of resistance to any chemical group or individual insecticide.

Cultural control:
Sanitation, crop destruction, avoidance of volunteer plants, and rotation are important to effectively manage Colorado potato beetles. The use of insect vacuums, flamers, and trenches around overwintering sites of adult beetles are effective when managed. Placing a plastic cover on rows around field margins will attract and trap adult Colorado potato beetles in the early spring. These early rows can be treated with insecticides. Crop rotation of several hundred feet will effectively manage overwintering beetle populations.

Biological control:

Natural controls exist and include cold temperatures in the winter, excessive rainfall in the winter and early spring, and various natural enemies. Biological control agents consist of several species of adult lady beetles that are active in the spring and feed on Colorado potato beetle egg masses. Egg-hatch destruction is effective and narrows the egg-hatch time period, so that well-timed sprays can be made. Wasps and other predators and parasites should be conserved; they offer some limited but integrated control.

Other issues:
Crop and insecticide rotations (chemical classes) must be used every year. Monitoring for resistance must be an on-going program. The use of *Bt* potatoes should be restricted to limited acreage, and rotational designs are suggested.

European corn borer

The European corn borer is a common stem-boring insect pest of potatoes in eastern North Carolina. It also serves as a vector for the bacterium *Erwinia carotovora*, the causal agent of blackleg. This insect continues to cause concern among growers of fresh-market potatoes

Chemical control:

- Carbofuran (Furadan) 4 F at 0.5 to 1 pound of active ingredient per acre or from 1 to 2 pints of formulated material per acre is effective as applied when 30 percent of the stems are infested. A second application 7 to 10 days later may be needed. It is used on 24 percent of the potato acreage in North Carolina.

- Metamidophos (Monitor) 4 F at 0.75 to 1.0 pound of active ingredient per acre or at 1.5 to 2 pints per acre of formulation can be used when 30 percent infested stems are obtained. It is used on 27 percent of the potato acreage in North Carolina.

- Methyl parathion (Penncap M) 2 F at 0.5 to 1 pound of active ingredient per acre or 1 to 2 quarts of formulation per acre can be used when infested stems are first observed. It is used on an estimated 5 percent of the potato acreage in North Carolina.

Alternatives:
None

Cultural control:
Avoid planting after or adjacent to field corn. Destroying field corn stalks in the early fall is advised to reduce overwintering sites of corn borer.

Biological control:
Biological controls exist but are not timely on potatoes at this time.

Other issues:
Using *Bt* specifically for corn borers and incorporating the *Bt* gene in potatoes offers some promise in the future. However, *Bt* cotton and resistance management might restrict acreage patterns.

Wireworms

Wireworms may attack seed pieces at planting or tubers late in the season. Their damage can result in reduced plant stands or the rejection by processors of shipments of potatoes.

Chemical control:
Phorate (Thimet) 15 G at 2 to 3 pounds of active ingredient per acre or at 15 to 23 ounces per 1,000 feet for any row spacing preplant will give some protection to the seed piece. It also provides early season aphid, flea beetle, and Colorado potato beetle control. Phorate is used on 40 percent of the potato acreage in North Carolina.

Alternatives:
None

Cultural control:
Crop rotation from fields with a history of wireworms is suggested. The use of bait stations will detect the species and indicate relative population levels. Avoid planting in fields with high organic matter and where no previous cultivated crops were grown. Land out of production usually contains high populations of soil insects.

Biological control:
None

Other issues:
Other sporadic pests of potatoes include seed corn maggots, flea beetles, leafhoppers, white grubs, and aphids. These can be effectively managed following integrated pest management (IPM) practices.

Diseases

Seed-piece decay

Seed-piece decay can be a major problem when heavy rainfall occurs after planting. Bacterial seed-piece decay is usually caused by *Erwinia* bacteria and is encouraged by saturated soil conditions. The bacteria are often present on lenticels, and can enter through natural openings, cut surfaces, and wounds. In waterlogged soils, these bacteria can rapidly cause decay of seed pieces. Fungal dry rot of internal potato tissue is generally caused by several species of *Fusarium.* These fungi can enter through cut surfaces and wounds as well as under a wide range of environmental conditions.

Chemical control:
Thirty-two percent of the growers use fungicides for treating seed pieces to manage Rhizoctonia and seed-piece decay (*Erwinia* and *Fusarium*). For seed-piece treatment, Captan is applied to seed pieces on approximately 50 percent of the planted acreage. Mancozeb-based products account for approximately 2 percent of the acreage, and Tops (thiophanate methyl) is used on 7 percent.

Alternatives:
Maxim (fludioxinil), a new fungicide that is a *low-risk pesticide,* was recently registered for use on potato seed pieces. This material is very effective for managing seedborne diseases and should be considered as an alternative. However, this material is four times as expensive as Captan and twice as expensive as Tops.

Cultural control:
Buy high-quality seed, avoid planting on poorly drained soils, and avoid wounding during planting.

Biological control:
A biological agent, T-22, can provide some relief from seedborne diseases, but it is usually not that effective when used alone and must be used with a synthetic fungicide.

Late blight

Worldwide, late blight (caused by the fungus *Phytophthora infestans*) is the most devastating potato disease and was responsible for the Irish Potato Famine in the 1840s. It becomes a problem when the weather is consistently cool and rainy. With late-blight infections, losses can reach 100 percent, especially if the tubers are infected and deterioration continues in storage. Historically, late blight has not been a consistent problem in North Carolina, but some devastating late-blight incidents have occurred over the last few years.

Early blight

Early blight is caused by the fungus *Alternaria solani.* Though some early blight can occur every year, the disease has a significant impact on yield only when frequent rainfall favors early development of the disease. The pathogen overwinters in infested plant residue and soil.

Chemical control:
Sixty-seven percent of the growers use fungicides for managing foliar diseases (early blight, Botrytis vine rot, and late blight). Although some growers do not apply any fungicides, most growers make 1 to 3 applications per season. Chlorothalonil (Bravo) and mancozeb-based fungicides (Dithane, Manzate 200, Penncozeb, etc.) are the most commonly used. Approximately 30 to 50 percent of the acreage is treated with Bravo and an estimated 10 to 30 percent of the acreage with Dithane. Occasionally, copper-based fungicides are used (less than 2 percent of the acreage), but they are not as efficacious for managing late blight as Bravo and Dithane.

Alternatives:
None

Cultural control:
Purchase good quality seed, and control volunteer plants.

Biological control:
None

Other issues:
Fungicide use is highly dependent on the weather, particularly if conditions have been favorable for late blight and if late blight has been observed in eastern North Carolina. The fungicides are used as part of an integrated pest management program, which relies on a weather-based advisory system.

Weeds

The major weeds in North Carolina potatoes are common lambsquarters, pigweed, jimsonweed, smartweed, common ragweed, common cocklebur, annual morningglory, and several grasses, both annual (fall panicum, large crabgrass, goosegrass) and perennial (Johnsongrass). These weeds are heavy seed producers and can spread quickly in potato fields. Among the annual grasses, producers are most concerned with fall panicum, a weed that emerges after the soil warms. Growth of fall panicum occurs in late season and coincides with potato tuber formation. Interference from weeds during this period of

growth greatly reduces yield and quality. Some weeds such as nutsedge can penetrate potato tubers, making them non-marketable. Researchers have found that potatoes must be nearly weed-free from 4 to 6 weeks to prevent yield and quality reduction. Uncontrolled weeds can result in a 40 to 60 percent yield reduction.

Producers use three options for controlling weeds: cultural, including crop rotation; mechanical, including tilling and cultivation; and chemical, including preplant-incorporated, preemergence, and postemergence herbicides.

Chemical control:

Preplant herbicides

- Glyphosate (Roundup 4 EC @ 1-5 lb active ingredient per acre) is applied preplant in potatoes to kill emerged annual and perennial weeds. It is applied to approximately 6 percent of the potato acreage. EPTC (Eptam 7 EC @ 3 lb active ingredient per acre) is applied preplant-incorporated in potatoes to give preemergence control of yellow and purple nutsedge. It also provides control of annual grasses and small-seeded broadleaf weeds. EPTC is applied to less than 2 percent of the potato acreage.

Preemergence herbicides

- Metolachlor (Dual 8 EC @ 2 lb active ingredient per acre) is applied preemergence after planting for control of annual grasses and small-seeded broadleaf weeds. It is used on approximately 8 percent of the potato acreage. Metribuzin (Lexone or Sencor 75 DF @ 0.67-1.3 pounds active ingredient per acre) is applied preemergence after planting for control of broadleaf weeds and some annual grasses. It is applied to approximately 70 percent of the potato acreage. Metribuzin sometimes is applied with metolachlor for improving control of annual grasses over metribuzin alone. Linuron (Lorox 50 DF @ 1-2 lb active ingredient per acre) is applied preemergence after planting for control of various broadleaf weeds and a few grasses. It is applied to 1 to 2 percent of the potato acreage.

Postemergence herbicides

- Metribuzin (Lexone or Sencor l75 DF @ 0.25-0.5 lb active ingredient per acre) is applied postemergence to control emerged broadleaf weeds. It is used on approximately 50 to 55 percent of potatoes. Sethoxydim (Poast 1.5 EC @ 0.2-0.3 lb per acre) is applied postemergence for the control of annual and perennial grasses. It is applied to 40 percent of the potato acreage.

Cultural control:
Approximately 85 percent of potato acreage is rotated to another crop to prevent buildup of certain problem weeds associated with potatoes. Approximately 60 percent of potato acreage is hilled, resulting

in increased row height and weed control. Approximately 65 percent of potato acreage is cultivated, and most potato fields are cultivated twice.

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