



Onions

FILE 26.57

Extension Bulletin E-1307 (Replaces E-675-M), July, 1979

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Production: 660 bags (50 pound) per acre state average. Good yield is 800 bags (50 pound) per acre.

Use: Most Michigan onions are packed for fresh market, either at harvest or from storage.

Recommended Varieties: **Early:** Abundance, Garnet. **Storage:** Downing Yellow Globe, Spartan Banner, Spartan Gem, Spartan Sleeper.

Climatic Requirements

Onions initiate bulbing in response to day length. Therefore, plant only varieties developed for long days of northern latitudes in Michigan. Onion seeds germinate at temperatures above 45°F; the optimum germination temperature is 75°F. Optimum foliar growth occurs at daytime temperatures of 65° to 68°F. Onion seedlings are tolerant to moderate frosts (28°F), but grow slowly in cold, wet soil.

Onions are usually planted during April to obtain as much foliar growth as possible before bulbing is induced by the long days and warm temperatures of summer. Generally the earlier onions are planted, the greater the yields. Onions should not be planted after June 1.

Onions need a regular supply of water during growth. Dry periods cause premature drying of outer scales. When growth resumes following rain, the onion bulb expands rapidly and the outer scales split. This results in "bald" onions at harvest.

Soil Requirements

Onions grow well on loose, friable soils, both mineral and organic. A well worked, firm, consistent seedbed is essential for good uniform germination. Heavy soils compact easily and may reduce and spread emergence of seedlings. Heavy and rocky soils interfere with mechanical harvesting. Most onions are grown on muck soils in Michigan.

Fertilization

Muck soils should be limed to a pH of 5.2 or higher. A pH of 6.0 to 6.5 is optimum on mineral soils.

On muck soils, average supplemental nutrient requirements to produce a 1,000 bag (50 pound) per acre onion crop include 150 pounds P₂O₅ and 260

pounds K₂O. Determine actual phosphate and potash requirements with a soil test.

Supplemental nutrients can be supplied through combinations of preplant broadcast, seeding-time band and mid-June topdress applications. Two possible combinations are:

A. Broadcast and disc-in 430 pounds of 0-0-60 per acre (258 pounds K₂O). Band 300 pounds 18-46-0 per acre 3 inches below the seed at seeding (54 pounds N and 138 pounds P₂O₅). Topdress in mid to late June with 200 pounds of 45-0-0 or 265 pounds of 34-0-0 per acre (90 pounds N).

B. Broadcast and disc-in 500 pounds of 12-24-24 and 250 pounds of 0-0-60 per acre (60 pounds N, 120 pounds P₂O₅ and 270 pounds K₂O). Topdress with 200 pounds 45-0-0 or 265 pounds 34-0-0 per acre (90 pounds N).

Copper deficiency may be a problem in onion production. If soil test levels are below 20 ppm, apply 3 pounds of copper as copper sulfate or copper oxide in the banded fertilizer. The copper should not be in contact with the seed. If broadcast, use 10 pounds copper per acre.

Manganese should be applied annually as a component of the banded fertilizer (8 to 12 pounds manganese, as manganese sulfate, per acre) or as a foliar spray during July (5 to 6 pounds manganese sulfate per acre per application). Broadcast applications of manganese are not recommended.

Zinc deficiency may occur on new muck. Addition of 3 pounds of zinc per acre for 3 to 4 years will prevent the deficiency. No more zinc should be needed once 25 pounds per acre have been applied.

On mineral soils, a complete fertilizer should be applied before planting. Broadcast and disc-in 1,000 pounds 12-24-24 (120 pounds N, 240 pounds P₂O₅, and 240 pounds K₂O). Topdress with 100 pounds 34-0-0 per acre (34 pounds N) in mid June.

Spacing and Planting

Optimum yields of bulbs over 2 inches in diameter are obtained with plant populations around 250,000 plants per acre. This gives each plant about 25 square inches of space. This population can be obtained by planting onions in 16 inch rows, 7 to 8 plants per foot of row. Wider or narrower spacings which result in the same amount of space per plant

can also be used, e.g., 8 inch rows with 4 plants per foot of row, or 32 inch rows with 14 to 16 plants per foot of row. A double row at 32 inch spacing is sometimes used; this may result in greater total yields but reduced yields of onions over 2 inches in diameter.

Approximately 3.5 to 4 pounds of seed are needed to plant one acre. Since plant population is important, check the number of seeds per pound and germination rate to determine seeding rate. For example, if the seed you buy has a 90% germination rate, and there are 100,000 seeds per pound, each pound will produce approximately 90,000 plants. Since we want 250,000 plants per acre, divide 250,000 by 90,000 which equals 2.8 pounds of seed. Some plants do not develop into bulbs, so plant slightly more seed. In this case, 3 to 3½ pounds of seed per acre is sufficient. Onion seed loses its viability rapidly, so plant only fresh seed.

Plant onion seed in moist soil 0.5 to 1 inch deep. If soil is dry and wind erosion may be a problem, plant seeds 1.3 to 1.5 inches deep.

Wind breaks will help reduce erosion. Rye strips planted at time of onion seeding should be no more than 50 feet apart to be effective. Remove the rye when onions are 5 to 6 inches high. A rough soil surface will also help reduce wind erosion.

Dry onions can also be grown from sets. Approximately 25 bushels (800 pounds) of sets 15/16 inch or less in diameter are needed to plant 1 acre. Set onions can be planted at the same populations as seeded onions. Fertilization practices are the same as for seeded onions. Set onions often mature 2 to 3 weeks earlier than seeded onions. Yellow Ebenezer and Golden Globe are the most commonly planted varieties of yellow set onions.

Spanish onions are usually grown from transplants in Michigan. Approximately 120,000 to 140,000 plants are needed to plant 1 acre. They are planted 3 to 4 inches apart in 15-to-24-inch rows with a vegetable transplanter. Yellow Sweet Spanish is the variety most commonly grown in Michigan.

Harvest and Postharvest

For long term storage of onions, apply 5.3 pints maleic hydrazide (MH-30) in 100 gallons water per acre to onions 1 to 2 weeks before harvest. Apply the spray when the bulbs are mature and 50% of the tops have fallen. At least 5 to 8 green leaves should be present on each plant to absorb enough MH-30 to be effective. These green leaves may be lying down. Rain within 24 hours of spraying will reduce the effectiveness of the MH-30. Applying MH-30 too early will result in soft, spongy onions and poor storage. Under good conditions, MH-30 will add several months to storage life of good storing cultivars.

Onions are topped and harvested after leaves have died down. Under-cutting the onions hastens

the drying process. Harvest onions 5 to 7 days after under-cutting. Onions can be harvested into small crates, bulk crates, or bulk bins. Whichever system is used, curing the bulbs is essential to minimize disease development in storage and to maintain good skin color. Curing can take place in the field or storage.

For field curing, onions are left in the field for 2 to 3 weeks. Onions are placed in bulk boxes and covered with black plastic to keep them dry. The best curing occurs at temperatures of 75° to 80°F and relative humidity of 60 to 70%. Onions harvested in bulk are usually cured in storage. An external heat source can be used to maintain a drying temperature of 85° to 90°F. Force the air up through the onion pile for at least 4 to 5 days, or until necks of onion bulbs are tight. Air volume should be 1.5 cubic feet per minute for each cubic foot of stored onions. Do not pile onions more than 12 feet deep in bulk. After curing, gradually decrease the storage temperature. Do not cool onions more rapidly than outside temperatures, since a few warm days will result in sweating, discoloration, and decay. Air flow can be reduced to 0.75 cubic feet per minute per cubic foot of onions. By late October, onion temperatures should be about 45°F and by late November they should be 32° to 35°F and relative humidity at 60% to 70%. Fans can be run for 2 to 4 hours a day, 1 or 2 days per week, to maintain uniform temperature and remove moisture from upper layers.

Pests

The major weed problems in onions are annual grasses (especially crabgrass, barnyardgrass, and stinkgrass), yellow nutsedge, and several annual broadleaf weeds. Prostrate spurge has become a very common weed in recent years, but its effect on yield appears to be negligible. It does create problems at harvest.

The onion maggot is the most important pest in onion production. It is essential to control this pest throughout the growing season. Apply granular insecticide with seed in the furrow at planting. Apply foliar sprays as soon as adult flies appear.

Onion thrips usually appear during midsummer. Damage is most severe at the base of the leaves. Thrips are especially troublesome during dry periods. Foliar sprays will usually control thrips.

Treat onion seed with a fungicide to control smut. Foliar diseases (downy mildew, purple blotch and *Botrytis* leaf blight) can be controlled by foliar fungicide sprays.

See the latest editions of Extension Bulletins E-433, "Weed Control Guide for Vegetable Crops" and E-312 "Control of Insects, Diseases and Nematodes on Commercial Vegetables" for current pest control recommendations.