

College of Agriculture & Life Sciences  
Department of Horticultural Science

## LETTUCE PRODUCTION

Douglas C. Sanders, Extension Horticultural Specialist

Head lettuce is the most important salad vegetable grown in the United States. Per-capita consumption exceeds 25 lb annually.

Lettuce is adapted to cool growing conditions with the optimum temperatures for growth of 60 to 65°F. At 70 to 80°F, the plants flower and produce seed. Lettuce can tolerate a few days of temperatures from 80 to 85°F, provided that nights are cool.

Lettuce seed will germinate at 35°F, but optimum germination is 70 to 75°F. If the plants are sufficiently hardened, they will withstand freezing. Repeated exposure to subfreezing temperatures, however, can seriously injure or kill the crop.

Lettuce has a relatively high water requirement. Soil moisture shortage rainfall will seriously stunt growth and head quality. Irrigation greatly reduces risk of crop failure.

Considerable differences exist among lettuce varieties in heat tolerance. These differences are the primary reasons some lettuce varieties can be grown in warmer climates.

In North Carolina, the crop can be grown as both a spring and fall crop in eastern N.C. and even during midsummer in western N.C. at elevations over 3,000 ft. In the Piedmont, lettuce is intermediate in season and probably is best as a late spring and early fall crop.

Romaine has requirements similar to head lettuce, except it can stand more heat.

Butterhead and leaf types can stand even more heat and have a longer season of production.

**Varieties** — Request mosaic-tested (M.T.) seed from your seed supplier.

- **Head:** Strains of Ithaca, Salinas and Pennlake have performed best in N.C.
- **Romaine/Cos:** Romulus, Signal and Medallion, Ideal Cos, Parris Island.
- **Leaf:** (green) Salad Bowl, Slobolt, Royal Green, Green Vision, Grand Rapids; (red fringe) Royal Red, Red Sails; (red) Ruby.
- **Butterhead** (loose head): Buttercrunch, Nancy (a.k.a. Boston head), Esmeralda, Ermosa, Aquarius.

**Soils and Fertilizers** — Successful production of lettuce depends on vigorous growth. A wide range of well-drained soils can be used; however, the crop does best on fertile, high organic matter soils that have good water-holding capacity.

Adequate nutrients and a continuous moisture supply are essential to vigorous growth. A soil test is the only way of knowing the amount of lime and fertilizer required, and soil samples should be taken well ahead of field preparation. Your county Extension center can advise you in having your soil analyzed.

The pH should be 6.0 to 6.7. If soil potassium and phosphorous level is high, 500 to 600 lb

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of 10-20-20 equivalent per acre should be adequate. At least one-half of the fertilizer should be broadcast and disked in prior to making the rows. Side-place the remainder in either one or two bands 4 inches to the side and 2 inches below the seeded row. One or more sidedressings of 20 to 25 lb N per acre should be made. The first sidedressing should be made soon after plants begin to grow. The decision of whether to apply the second sidedressing will have to be based on the appearance of the crop and the rate at which it is growing.

**Spacing** — Choose a row width that complements your tillage equipment. For head lettuce, rows 30 to 42 inches apart are common. Regardless of the row width, the in-row spacing between each head lettuce plant should be 12 inches. If 42-inch rows are used, yield can be increased by planting 2 seed rows per bed. Leaf and butterhead types should be grown in double rows 12 inches apart and 8 to 10 inches in row spacing. With leaf type plant, on 5- to 6-ft centers with 3 to 4 seed lines on top of a 40- to 48-inch bedtop. Space plants 9 to 12 inches in row, depending on plant size.

**Planting The Crop** — Lettuce can be either transplanted or seeded. The method you choose will depend mostly on availability of transplants and the season in which you will grow the crop. Spring head lettuce often fails because it is planted too late, and for this reason you should consider transplants. Fall crop lettuce is most often started when the climatic conditions are hot and dry. In this period, direct seeding would be a good choice provided irrigation is constantly available until the plants are well established.

Plant the seed  $\frac{1}{4}$  to  $\frac{3}{8}$  inch deep. Be sure the seed is treated with a fungicide to reduce damping-off. About 1 lb of seed is needed per acre. Use a precision seeder like a Gasparido or StanHay (vacuum) for raw seed. StanHay (belt type) and Nibex seeders work well with coated seed.

**When To Plant** — Lettuce is relatively cold tolerant. Even the seedlings will withstand short periods of freezing temperatures provided they are reasonably acclimatized. Soft, succulent seedlings can be injured by exposure to freezing. The crop can be transplanted or direct seeded in late January and early February in eastern N.C. and during late March or early April in the west. The fall crop should be seeded about 80 days before the expected first hard

freeze (Aug. 15 to Sept. 1 in the East and July 25 to Aug. 15 in the West).

**Growing Plants** — Lettuce seed for transplants can be sown directly to greenhouses in 200-cell plastic trays.

In heated greenhouses, 4 to 6 weeks is required to grow an acceptable transplant. About 6 oz of seed and 300 ft<sup>2</sup> of bed space is needed to grow transplants for 1 acre. The seeds should be planted in rows 4 to 6 inches apart. Thin the plants to a uniform spacing of 1 to 2 inches. This will produce stocky plants and reduce the chances of damping-off.

You can reduce transplant shock by avoiding too rapid growth and by hardening the plants. Expose the plants to outside conditions during the last 2 to 3 days before transplanting.

Consult extension publication AG-337, *Production of Commercial Vegetable Transplants*.

**Irrigation** — Irrigate to establish a stand and to keep the crop growing. Irrigation to cool crop for early fall plantings is important.

**Cultivation** — Lettuce is shallow rooted, and shallow cultivation (1  $\frac{1}{2}$  inches or less) is all that is necessary. Late cultivation, especially when soil is moved toward the plant, may result in excessive soil in the lower part of the head. Herbicides are available for weed control in lettuce. Check the *1999 North Carolina Commercial Vegetable Recommendations* (AG-586) for current recommendations.

**Insects and Diseases** — Lettuce is attacked by aphids, armyworms, imported cabbage worm, and loopers. The pest pressure on summer and fall crops is much greater than on spring crops.

Damping-off is a serious disease of young seedlings, whereas mildews and sclerotinia are serious on the more mature plants.

Both insects and diseases can be controlled if the correct chemicals are properly applied. Consult your Cooperative Extension agent regarding pest build-up, proper diagnosis, and control.

**Harvesting and Packaging** — In most instances, the head lettuce will be ready for harvesting in 70 to 80 days after seeding or 60 to 70 days after transplanting. Cut only those heads that are firm. Leave 3 to 4 “wrapper” leaves to protect the head. Most leaf types are ready in 50 to 60 days after seeding and 30 to 45 days after transplanting. You will have to harvest every 2 to 3 days, depending on moisture and temperature.

Packing should be done in the field. A wire-bound or waxed fiber carton designed to hold 20 to 24 heads is used. Lettuce should be packaged “flat pack” (non-bulge) to avoid crushing the heads. There are two layers of heads; the bottom layer is packed stem-down and the top layer stem-up. This keeps the milky latex from the stems from smearing the heads. All heads in a crate should be of similar size and weight.

Whole plants of leaf lettuce are often put in a plastic sleeve and sold 24 to 36 per fiber-board carton. Butterhead types are also sleeved or can be packed like head lettuce with 24 heads to a smaller sized carton.

**Cooling and Shipping** — Unless the crop is to be sold locally, the lettuce must be cooled before shipment. Vacuum cooling is the primary method for cooling in the major lettuce growing areas. The most practical method for N.C. is to stack the cartons in a cold room with high humidity and force cold air through the stack with high-velocity fans. Internal head temperature should be lowered to 34 to 38°F for best shipping and holding conditions. Head lettuce can be held for *2 to 3 weeks* at 32°F and 95% relative humidity.

Leaf and butterhead types can be kept for *1 to 2 weeks* in cold storage.

**Yields** — A good head yield for lettuce is about 400 to 500 crates per acre and leaf types 800 to 1000 crates per acre.

### **Lettuce Culture Capsule**

- Optimum temperature for growth and development is 60 to 65°F.
- Optimum temperature for seed germination is 70 to 75°F.
- Varieties --
  - **Head:** Strains of Great Lakes, Pennlake, Ithaca or Salinas;
  - **Leaf:** Grand Rapids, Slobolt, Salad Bowl, Royal Green, Green Vision, Buttercrunch, Ermosa, Esmeralda, Ruby, Red Sails, Royal Red; and
  - **Romaine/Cos:** Signal, Romulus, Medallion, Parris Island.
- Soil pH should be 6.0 to 6.7.
- Row width is 30 to 42 inches or 60 inches (leaf).
- In-row spacing should be 12 inches in double rows or 9 inches in 4 rows per bed.
- Plants per acre should be 12,000 to 34,000 plants, head lettuce; 20,000 to 46,000 plants, leaf lettuce.
- Amount of seed per acre is 16 to 20 oz.
- Planting depth of seed is  $\frac{1}{4}$  to  $\frac{3}{8}$  inch.
- Irrigate to establish a stand.
- Amount of seed for transplants for 1 acre is 6 oz of seed/300 ft<sup>2</sup>.
- Days required to grow crop are 40 to 60, leaf lettuce; 70 to 80, head lettuce.
- Insects are aphids, armyworms, loopers and imported cabbage worm.
- Diseases are damping-off, mildews, and sclerotinia.
- Average yields are 400 to 500 24-head cartons, or 800 to 1000 leaf cartons per acre.
- Storage is 2 to 3 weeks at 32°F and 95% relative humidity.