

## **Greens Production in High Tunnels**

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There are several lettuce types and several hundred lettuce varieties that are commercially available for growers and differ by color, texture, maturity and head size. They include the following; Romaine - green and red, Bibb – green, Oakleaf - green and red, Butterhead - green and red, Summer Crisp (Batavia) - green and red and Baby lettuce mixtures - mild mesclun mix, spicy greens mix, braising mix. Depending on the location of the high tunnel, maturity of the lettuce variety is very important for scheduling production and implementing marketing plans. Lettuce types range in maturity from 42 to 58 days for full size heads. Baby lettuce types are ready from seeding to harvest in 28 to 30 days. Cooler air temperatures, below 40°F will slow growth of lettuce plants and increase time to maturity 7 to 10 days.

There are several types of Leafy Greens that are commercially available and differ by color, texture, maturity and head size. Types of Leafy Greens that can be grown in high tunnels include; Asian greens - Hon Tsai Tai, Chinese kale, Komatsuna, Mibuna, Mizuna and Tatsoi, Arugula, Pac Choi, Corn Salad/Mache, Cress and Mustard Greens. Leafy green types range in maturity from 35 to 55 days for full size heads. Baby greens types are ready from seeding to harvest in 21 days. Cress will mature in 10 to 12 days from seeding. Cooler air temperatures, below 32°F will slow growth of leafy green plants and increase time to maturity 10 to 15 days.

### **Environmental Requirements for Seeding Lettuce**

Lettuce types are a hardy, cool season crop that can be grown in high tunnels 12 months of the year. Optimum growth occurs at temperatures between 60°F to 65°F. Seeds will germinate at soil temperatures as low as 40°F, but germinate very poorly at soil temperatures above 75°F. Successful and vigorous lettuce seed germination requires a firm seedbed and continuous soil moisture for germination.

### **Environmental Requirements for Lettuce Transplants**

Seed lettuce in 128 or 200 cell trays with shallow placement in the soil (an optimum seeding depth of 0.25" deep) and cover with fine vermiculite. If temperature in the greenhouse or high tunnel exceeds 75°F during the day, place a shade cloth above trays to keep the soil cool and maintain active germination of the lettuce seeds. Prior to transplanting the lettuce transplants in the high tunnel, harden the transplants for 2 or 3 days by reducing water application to the transplants (but don't let the soil cube dry out) or reduce the air temperature for 2 to 3 days before planting in high tunnel. Hardened transplants can survive air temperatures as low as 20°F in high tunnels after transplanting in the spring or fall.

### Production of Lettuce in Summer

Many varieties of lettuce grown under high summer temperatures (85°F or higher) for 5 to 7 consecutive days are susceptible to bolting. Choose lettuce varieties when growing in the summer in high tunnels that are resistant to bolting. Plant spacing of seeded lettuce, especially salad mixes, approximately 60 seeds/ft. in 4" to 6" wide band. Minimum spacing between bands will develop continuous plant canopy and help reduce weed seed germination. Spacing of transplants in raised beds should be dense enough to reduce weed growth in beds. Recommended spacing for lettuce transplants is 6" to 8" between transplants in-the-row and 12" to 18" between rows.

### Establishing Leafy Greens in High Tunnels

Seeding especially of baby lettuce mixtures from mid-May through late August.

Vigorous seed germination and emergence critical for maximum yields and quality.

Transplant production for late winter and late fall production.

Use of 128 or 200 cell trays will produce ideal transplant in 14 to 20 days.

Many producers in the Mid-Atlantic and Northeast regions are growing lettuce in their high tunnels either as a major crop or mixed in with other vegetable crops. The majority of high tunnel producers are growing lettuce in soil either on raised beds or as flat culture. Recently on the [HIGHTUNNELS@LISTSERV.KSU.EDU](mailto:HIGHTUNNELS@LISTSERV.KSU.EDU), many growers have reported problems of gray mold on lettuce because of the cool, wet soil conditions. The organism causing the Gray Mold, *Botrytis cinerea*, can remain in the soil for many years. Since June 1, 2007, Dr. Bernie Kratky from the University of Hawaii has been on sabbatical leave here at the Penn State Center for Plasticulture. One of Bernie's objectives here at Penn State was the production of lettuce in a non-circulating hydroponic system. The two tanks for the hydroponic system were constructed in the high tunnel and lined with 6 mil greenhouse-grade plastic. Each tank was 4' x 24' and 5" deep. When filled with water, each tank held 300 gallons of water. Blue, Styrofoam insulation board floats on top of the water and comes to rest on 2 plastic pipes supported by the tank floor when the nutrient solution level decreases as the crop grows. Holes are cut into the insulation board such that lettuce plants are spaced 8" x 12" – each tank will then grow 144 lettuce plants. Plastic net pots are filled with the lettuce transplants grown in soilless media and then placed into the holes cut into the Styrofoam board. Fertilizer is added to the water before the lettuce plants are placed into the Styrofoam boards and no additional water or fertilizer is added to the crop. To date, Dr. Kratky has grown 4 lettuce crops which required 28 to 39 days from transplanting. Bibb, romaine and leafy lettuce types have been grown successfully in this hydroponic system without any disease problems and a minor insect problem – grasshoppers. At the High Tunnel Research and Education Center at Rock Springs, there must have been 100 grasshoppers per square yard at the peak of their population this summer, but screening the sides of the tunnel moderated the problem. This large grasshopper population ate everything from lettuce to cucumber and broccoli transplants. When harvested, the lettuce heads have averaged about 0.5 pounds in weight and were of excellent quality. There have been no incidence of diseases on the lettuce plants on either of the four plantings to date.