

Crop Profile for Strawberries in New Hampshire

Prepared: August, 1999

General Production Information



The strawberry is an important crop for NH berry and vegetable growers, generating early season sales. NH growers produce between 1.5 and 2.0 million pounds annually on 225 acres. Crop value exceeds \$2 million annually. Yields per acre average 7,500 pounds and average planting size is less than 5 acres. Up to 85% of the crop is sold retail directly to the consumer either via U-pick or roadside stand markets. U-pick prices range from \$1.00 to \$1.30 per pound while roadside stand prices range up to \$4.25 per quart.

Strawberry production has been increasing steadily over the past 10 years as tree fruit and vegetable growers diversify into small fruits as part of a risk management plan. Most production is located in the southern 3 counties where population is highest but there is production in all counties.

The NH strawberry crop is harvested from mid-June through early-July. The principle cultivars used are northern, short-day types and include: Earliglow, Northeaster, Cavendish, Jewell, and others. Most strawberries are planted in the matted row system. Dormant crowns are planted in May. These crowns produce runners, but no fruit in the first summer. Plants are mulched with straw in mid-November to provide winter protection. This mulch is removed in early April the following spring and flowering and fruiting follows. After harvest (early to mid-July), strawberry plants are renovated (mowed, thinned, and fertilized). They will generally fruit at least 2 additional years before weed pressure forces replanting.

Most strawberry growers employ overhead irrigation as a key tool. Irrigation is used to control spring frosts, activate pre-emergence herbicides, promote growth, enhance runner rooting, and control heat stress. Most strawberry growers practice either IPM or simply follow an ultra-low pesticide program. There are, however, several key pest problems of strawberry in NH that must be controlled if profitable production of quality fruit is to occur.

The most common pests of strawberry in NH, ranked in relative order of their importance are:

1. Weeds (especially perennial grasses)
2. Red Stele (*Phytophthora fragaria*)
3. Gray mold (*Botrytis cinerea*)
4. Tarnished plant bug (*Lygus lineolaris*)
5. Strawberry clipper (*Anthonomus signatus*)
6. Verticillium wilt (*Verticillium albo-atrum*)
7. Two-spotted spider mite (*Tetranychus urticae*)
8. White grubs of Japanese beetle, rose chafer, and others

There are other pests that may be significant problems in some plantings in some years including: root weevils, strawberry rootworm, leaf hoppers, cyclamen mite, and others.

Insect Pests

The **tarnished plant bug** (*Lygus lineolaris*), is a serious pest of strawberry in New Hampshire. Both adults and nymphs feed on flowers and developing fruits. The result of feeding injury is deformed fruits that sport a hard, seedy nub or end and dramatically reduced fruit size. These fruits are not marketable. Control measures include weed management in and around the planting. Sites adjacent to alfalfa in particular are avoided. Most growers sample fields for tarnished plant bug populations, paying particular attention to the nymphs which can be counted by shaking flower clusters over a flat surface. Insecticide applications are usually required to control this pest. The principle insecticides used for tarnished plant bug control include: azinphosmethyl, endosulfan, and malathion.

The **strawberry clipper** (*Anthonomus signatus*), while occurring less frequently than the tarnished plant bug, can be a serious pest problem. Females of the species chew small holes in strawberry flower buds in which then lay eggs. She then girdles the stem just below the bud, causing the bud to wither, then fall to the ground. Growers begin scouting fields as soon as flower trusses emerge from the crowns, applying insecticides when the IPM action threshold of 1 clipped bud or 1 live adult per 2 feet of row is met.

Chlorpyrifos (Lorsban), *azinphosmethyl* (Guthion) and *methoxychlor* are the control options open to growers.

Two-spotted spider mites (*Tetranychus urticae*), can impact strawberry production when infestations are high. Feeding on the undersides of leaves causes a loss of chlorophyll and bronzing. Populations in a given field are rarely uniform - hot spots of peak population are often easily identified and spot treatment of these hot spots is the recommended course of action. Pesticide options included *fenbutatinoxide* (Vendex) and *dicofol* (Kelthane). The release of commercially available predatory mites

is becoming a popular option although its effectiveness is not yet known.

White grubs can decimate new strawberry plantings, especially when they follow sod crops in rotation. The use of rotation crops such as sweet corn, pumpkin, and sudan grass coupled with excellent weed control in established plantings generally provides adequate control.

Diseases

The root diseases red stele (*Phytophthora fragaria*) and verticillium wilt (*Verticillium albo-atrum*) are common problems, particularly in soils that are poorly or somewhat poorly drained. Excessive frost danger in the spring often increases problems with these two pests as growers irrigate to control frost, saturating soils already heavy with spring runoff and rains. Management of these diseases is especially important in situations where continuous strawberry production is necessary.

A soil disease management program includes several key elements:

- proper site selection (sandy loam soils preferred)
- the use of resistant cultivars, especially in replant situations
- soil drainage improvement (tiling, diversions)
- raised bed cultural systems
- frequent subsoiling or chisel plowing to break impervious soil layers
- crop rotations

Gray Mold (*Botrytis cinerea*), can cause epidemic losses of fruit to rot, especially in seasons with cool, wet weather. Management of this disease starts with plant population control. Weeds and excess strawberry plants reduce air circulation and drying, increasing disease risk. Fungicide use is generally restricted to the blossom period, with growers using 2 or 3 sprays at bloom to control rot during harvest. Captan has long been the backbone material for control, often applied in combination with other materials such as benomyl (Benlate) for more complete control. Benomyl cannot be used on most NH acreage due to a label restriction that eliminates use on fields used for U-Pick sales.

Weeds

Registered pre-emergence herbicides for use in the planting year include only napropamide (Devrinol). Registered post-emergence herbicides include sethoxydim (Poast) and paraquat. Glyphosate (Roundup)

may be used pre-plant

Weeds collectively represent the most significant pest problem for New Hampshire strawberry growers. Especially tough perennial grasses including quackgrass can be effectively eliminated pre-plant through the use of glyphosate. With the exception of napropamide which carries a risk of delayed runner rooting, *there are currently no registered pre-emergence herbicides for use to control annual grasses and broadleaf weeds in the planting year.* Since weed competition can reduce strawberry yields by 50% or more and a combination of mechanical cultivation and hand weed control is very expensive, the lack of registered products is a serious problem for growers.

As an alternative, many growers are experimenting with the use of black plastic mulch. Planting dormant crowns through plastic is difficult. In addition, the plastic must be removed to allow runner rooting, or runners must be removed from the plants. If plastic is left intact with runners removed, planting life is generally restricted to 2 years.

Once plants are established, growers may use napropamide (Devrinol) or terbacil (Sinbar) pre-emergence or 2,4-D, paraquat, and sethoxydim (Poast) post-emergence. Napropamide is commonly used pre-mulch in the autumn to control fall germinating weeds while terbacil is generally applied only at renovation. 2,4-D is applied at the end of harvest to control broadleaf weeds. 3-5 days after application, fields are renovated (foliage mowed, aisles tilled to narrow rows, and crowns mulched lightly with soil).

Terbacil is effective, but it can only be used on soils that have at least 2% organic matter (5% preferable). Some cultivars are sensitive to terbacil. Growers have very few options for pre-emergence weed control during the growing season.

Contacts

William G. Lord, NAPIAP SLR
UNH Cooperative Extension
137 Spaulding Hall
Durham, NH 03824
phone: (603)862-3203
fax: (603)862-2717
e-mail: william.lord@unh.edu

References

1. Schloemann, Sonia, editor. 1998. *New England Small Fruit Pest Management Guide*, 1998-1999. This grower guide is published every 2 years jointly by the Cooperative Extension programs of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
2. Pritts, Marvin and David Handley. 1998. **Strawberry Production Guide**. NRAES.

Database and web development by the [NSF Center for Integrated Pest Management](#) located at North Carolina State University. All materials may be used freely with credit to the USDA.