

SITE SELECTION AND PREPARATION IN VERMONT APPLE ORCHARDS

SITE SELECTION

Selection of the orchard planting site is the most important decision an apple grower will face in maintaining the profitability and sustainability of the operation. Somewhat poor soils can be amended or drained, but a truly bad site, especially if waterlogged or frost prone, will plague the grower until the orchard eventually is abandoned or pulled out. *Remember that the best site for your future orchard may not be the land you presently own!*

Important site considerations include:

- **Soil drainage.** The ability for the soil to drain excess moisture is the most important consideration in selecting an orchard site. Trees planted on wet sites will have problems with root and trunk rots, nutrient imbalance, poor vigor, and anchorage issues causing them to tip or fall over under a wind or crop load. Wet soils can be tile drained to remove excess water but a truly hydric (wetland) soil will never be a good base for an orchard. Use a backhoe to dig holes 5 to 7 feet deep so that the soil profile can be examined. Poorly drained soils often have horizontal layers of light colored material that indicate oxidation of minerals due to excess moisture.
- **Air and frost drainage.** Orchards tend to be located on gentle upland slopes or plateaus, or very close to large bodies of water such as Lake Champlain. Relative elevation allows cold or moist air to drain away from the planting in a frost event, while large water bodies moderate temperature by releasing stored heat or cold to the surrounding environment. A 4% to 8% slope is ideal, while a slope steeper than 10% may make it difficult to operate machinery. Avoid areas at the bottom of the hill where cold air settles and frost pockets form.
- **Soil depth.** Orchards require deep soils with at least 30 inches to a restrictive feature such as bedrock, hardpan, or water table. This soil depth is required to provide good tree anchorage and an adequate aerated zone for root function.
- **Soil pH.** Apples prefer a slightly acid soil of pH 6.0-6.5. Many soils in Vermont are naturally acidic and will respond to liming, but extensive pH adjustment (pH below 5.8) must be done prior to planting. Information on adjustment of acidic soils with lime can be found in the New England Tree Fruit Management guide, available from the Cooperative Extension Service of each New England state. Some orchard sites, especially in the Champlain Valley, are located on natural limestone bedrock, and may have naturally high pH. These soils can be acidified with granular sulfur, but the effect is more temporary than treating acid soils with lime and the grower should carefully manage micronutrient levels in the trees because many minerals become less available to the plants under basic conditions.

- Annual minimum temperatures. Apple production can be limited by the absolute minimum temperatures experienced at a particular site due to damage to or death of trees after experiencing cold damage. This explains the lack of orchards in northeastern and high elevation parts of the state. Areas that regularly experience -25°F are risky for orchard production. Cold sites should be planted to hardy varieties grafted onto hardy rootstocks including the Budagovsky series, MM.11, and seedling stock in extreme cases.
- Annual growing degree days. Apples require a certain amount of acquired heat units from bloom to harvest to ripen a crop reliably. Areas with less than 135 frost-free days and annual accumulation of growing degree days (base 50°F) below 2000 should consider shorter-season varieties, with no apple ripening after Liberty or Empire.
- Slope orientation. Within a given area, a south facing slope receives more sun, thereby warming faster in the spring, while a north facing slope will be colder, warming up late in the spring. Accumulated heat units will be very different on the two slopes, which will translate into changes in orchard performance. For example, an early-blossoming variety may be avoided on a south slope that receives spring frosts to avoid having too much tender tissue subject to damaging weather.

Of all the decisions you make in establishing your orchard, choosing the correct site and location has the greatest long-term impact. An orchard is a long-term venture; it may be productive for 30 to 75 years, and in some instances, even longer. It is necessary to make educated and well informed decisions in selecting the location and site of your future orchard.



Figure 1. Apple Orchard at UVM HREC Farm

Selected links that provide weather and soils data for Vermont locations:

- [USDA Web Soil Survey](#)
- [NOAA Burlington VT](#)
- [Searchable NOAA Online Weather Data](#)

SOIL PREPARATION

Soil preparation should be done at least by the summer before planting. This is the time to do a soil test to determine the needs of your soil and to provide time to correct any deficiencies and improve soil fertility. Correcting the soil pH is one of the most effective nutrient management practices to improve fertility in an apple orchard. Try to maintain the soil pH in the range of 6.0 for the subsoil to 6.5 for the topsoil because the pH influences the availability of the various elements to the plant. For example, as the soil pH becomes acidic (pH <5.5), the phosphorous in the soil becomes unavailable to the plant. It does not matter if there is an adequate amount of phosphorous in the soil; the roots are unable to uptake it, or some elements become toxic at high or low pH. Correcting the soil pH needs to be done before planting because once the trees are in place, it is very difficult to change it. In regions with acidic soils, lime, preferably dolomitic for apple orchards, is usually used to raise the pH.

Other ways to improve soil fertility include:

- Addition of organic matter
- Maintenance of good tilth
- Crop rotation
- Erosion control
- Addition of nutrients when needed

Specific orchard site preparation plans are included in the [New England Tree Fruit Management guide](#), available from the Cooperative Extension Service of each New England state. Further information on orchard site preparation can be found in the [Penn State Tree Fruit Production Guide](#).

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