

PLANT & PEST ADVISORY

VEGETABLE CROPS EDITION \$1.50

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Frost Tillage: A Management Option

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New Jersey farmers are typically pressed for time when performing field operations in the spring. For many crops, it is advantageous to plant as early as possible, but soil wetness prevents timely field preparation. Wetter soils are therefore often tilled in the fall to save time in the spring and improve soil drying, while allowing for more effective freeze/thaw action. Due to wet soil conditions in summer and fall, many soils become compacted by field traffic and fall tillage is not possible. **Frost tillage** may be an attractive option which reduces the spring and fall work load and has some additional advantages. We have recently initiated experiments to evaluate the feasibility of this practice and the results appear promising.

Frost tillage involves primary tillage when the soil has a 1 to 3-inch frozen layer at the surface and is tillable below it. The frozen layer should be thick enough to provide support to the field equipment, yet is still thin enough to be readily ripped by the tillage implement. We have experimented with a chisel implement which is probably most appropriate for this practice. In general, conditions for frost tillage occur after several (dry) days and nights of considerable frost following a period of thaw (no snow cover and unfrozen soil). During this time, the freezing process draws water from the underlying soil layer into the frozen zone, often resulting in the formation of ice lenses. The frozen zone therefore stores water in ice form, while the soil layers below it dry out and become "tillable."

When planning on performing frost tillage, it is important to ensure that the frozen layer is adequate for support of equipment *and* the soil under the frozen layer is dry enough for tillage. Otherwise, compaction damage may result. It is recommended to dig through the frozen layer at several locations in the field to verify these conditions. Soil under the frozen layer should fall apart readily when rubbed. If instead the soil forms a ball when squeezed, it is unfit for tillage. Frost tillage conditions do not occur frequently during the winter season. Typically, they occur on about 3 or 4 days per year during the winter in New Jersey. Frost tillage leaves a very rough soil with plates of frozen soil randomly oriented on the surface. Upon thawing, the soil becomes

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supersaturated and will gradually mellow out, still leaving a rough surface. In many cases, only light secondary tillage is required in the spring to facilitate planting.

The following are some of the potential advantages of frost tillage:

- Shift of spring or fall workload to the winter. This may be especially advantageous for early season crops when a wet fall and/or spring delays tillage.
- Reduced soil compaction because field equipment is supported by the frozen layer.
- Improved soil drying in the spring.
- Improved water infiltration and reduced runoff potential due to greater soil roughness after tillage which increases surface storage and reduces the potential for uniform refreezing and sealing.
- Reduced need for pre-plant soil packing, because soil has already settled and mellowed naturally by spring time.
- Possibility for incorporation of winter-applied manure which reduces manure losses to streams during winter and early spring when snow melt and rainfall on frozen/saturated soil cause high runoff volumes. It may also provide for a time window to apply and incorporate stored manure when odor nuisance is reduced due to decreased volatilization potential and less outside activity of neighbors.

Some potential disadvantages of frost tillage are:

- Increased power requirements to till the frozen layer (estimated up to 20%).
- Increased erosion potential on highly erodible soil. Despite reductions in runoff, the loosened soil may be more subject to erosion if runoff still occurs during heavy spring rains. This can be reduced with appropriate crop residue management.
- Predictability of appropriate conditions for frost tillage. It is still not clearly defined which weather and climate conditions allow for frost tillage and how often such conditions occur.

Research on frost tillage is underway at Cornell.

Submitted by Joseph Heckman,
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Vegetable IPM Update

Kristian E. Holmstrom and Sally Walker, Program Associates
in Vegetable IPM

Corn Earworm

Corn earworm (CEW) adult and larval activity has dropped off significantly with the advent of consistently low evening temperatures. Spray schedules for this pest may be relaxed as long as cool weather continues. It is likely that a large population is still present, and should a period of warm weather occur, this pest could become damaging to any remaining sweet corn, snap and lima beans, and lettuce.

European Corn Borer

European corn borer (ECB) activity has been down for some time now, indicating that the last flight is most likely over. Only residual larval populations remain in host crops like sweet corn, beans and peppers. **ECB** overwinters in host crop residue in New Jersey. Host crops should be destroyed and plowed under as soon as harvest is finished to reduce the potential overwintering population of **ECB**.

Beet Armyworm

The **Beet armyworm (BAW)** population has generally decreased as a result of the cooler nights. For peppers and tomatoes, reinfestation by **BAW** should not be a significant problem as long as the cooler weather continues. In pheromone traps located in spinach and greens, however, the adult counts have decreased but are at levels (as high as 100/night) which indicate that crop scouting is still necessary to monitor **BAW** activity in the field. Egg laying and larval development will be slower as a result of the cooler weather, but infestation can still occur. Trap levels can indicate the potential for infestation, but crop scouting of the greens is still the best method for determining actual field activity of this pest.

Fall Armyworm

As with the **CEW** population, **fall armyworm (FAW)** adult activity in pheromone and blacklight traps has decreased to levels that should not be a significant concern for crops such as peppers, lettuce, beans, and sweet corn as long as cool weather continues. Some residual larvae may be still be found this week, but since egg laying and larval development rates are directly related to temperature, the continued pressure will likely be much reduced.

Cole Crop Pests

Cabbage looper (CL), **imported cabbageworm (ICW)**, and **diamondback moth (DBM)** are all still active in both leafy, and heading cole crops. It is advisable to scout fields weekly to assess infestation levels of these pests. Look on the undersides of leaves, and on or near the heads and centers of plants for larvae. Treat fields of cabbage, broccoli, and cauliflower when 20% or more plants are infested prior to heading, or when 5% or more plants are infested and heads are present. Treat collards, kale, etc. when 12% or more plants are infested with any larvae. When scouting, look for signs of **alternaria** (target shaped spots), and **downy mildew** (discolored blotches on the upper leaf surface, and cottony growth below). Begin a fungicide regimen at the first sign of either of these diseases. Check the [1998 Commercial Vegetable Production Recommendations](#) for recommended products and treatment intervals. □

Editor's Note: This is the last issue of the Vegetable Crops edition for the '98 season. Thank you for subscribing. '99 renewal forms will be mailed late winter/early spring.

Checklist for Vegetable Disease Control this Fall & Winter

- ❑ Thoroughly incorporate current crop into the soil this fall to encourage decomposition of plant debris and associated plant pathogens. This will reduce pathogen inoculum levels available for infection next season.
- ❑ Apply soil fumigation to fields where **Verticillium**, **Phytophthora**, **Pythium**, **Rhizoctonia**, and **plant parasitic nematodes** are present to reduce population levels available for infecting vegetables next season. Treat fields this fall or early spring whenever soil temperatures are 50°F or greater.
- ❑ Construct drainage ditches or waterways, etc., and use a land plane to reduce low lying areas of fields where cucurbits, eggplants, or peppers will be grown in 1999 to reduce conditions favorable for the development of **Phytophthora blight**.
- ❑ Review with seedsmen and review seed catalogs this winter for new disease-resistant vegetable varieties, and plan to grow them whenever possible.
- ❑ Attend winter vegetable meetings to learn of the latest vegetable disease management recommendations available for 1999.

'98 Direct Marketing Meeting

Rutgers Cooperative Extension and the New Jersey Farmers' Direct Marketing Association proudly announce the 1998 New Jersey Direct Marketing Conference. Direct marketing continues to be a successful method of distributing agricultural products in New Jersey as evidenced by the increasing number of farmer's markets throughout the State. The direct marketing conference provides an opportunity for practicing direct marketers to exchange ideas and marketing strategies with one another as well as a chance to interact with policy makers regarding the regulations they must conform to. This year, the conference will be held on November 9th, 1998 and again take place at the Cook Campus Center located at Cook College of Rutgers University, New Brunswick, NJ.

A wide variety of presentations have been selected which will appeal to direct market professionals, farm market operators, farm stand owners, and food marketers. The featured topics include expanding your market, market makeovers, marketing on the Internet, selling ethnic produce, insect control around the farm market,

Vegetable Crops Diseases

Stephen A. Johnston, Ph.D., Specialist in Plant Pathology

✓ **Asparagus:** Burn or mow off and thoroughly incorporate brush into the soil to destroy overwintering sources of the fungus that causes **purple spot**.

✓ **Cole Crops: Downy mildew** is present in fields at this time. Apply a fungicide on a 7- to 10-day schedule for control. For the 1999 growing season, request seed company to hot water-treat seed to be used in 1999 to reduce levels of bacteria on the seed that cause **black rot**.

✓ **Greens (Mustard, Turnip): Downy mildew** is present in fields at this time. Apply Aliette as a foliar spray and repeat every 7-10 days for control.

✓ **Potato (Sweet):** As soon as possible after harvest, cure roots at 80-85°F and 90% relative humidity for 6-8 days. After curing, temperature should be lowered to 55°F and 85% relative humidity.

✓ **Pumpkins & Squash (Winter):** Cure harvested fruit at 80-85°F and 75-80% relative humidity for 10 days. Store fruit at 55°F and 55% relative humidity to reduce incidence of **black rot**.

✓ **Spinach: Damping-off & root rot** caused by **Fusarium** is causing severe stand loss in fields planted with variety, 'Seven R'. In a spinach variety trial at the Rutgers Agricultural Research & Extension Center in Upper Deerfield Township, varieties 'Vancouver' and 'Fidalgo' are exhibiting excellent stands in a heavily **Fusarium**-infested field. Scout fields for the presence of **white rust**. Once observed, apply a copper fungicide if planting is young and apply Aliette to fields closer to harvest. When scheduling fields for spinach production in 1999, be sure not to plant near an overwintered field of spinach to reduce spread of **leaf diseases** from overwintered crop into new seedings. ❑

worker protection standards, tax code changes, Right to Farm and limited liability issues for PYO operators, marketing field-grown cut flowers, and a specific time for questions and answers. Pesticide recertification credits are also available for attending the conference. Speakers and presenters include farm owners, New Jersey Department of Agriculture and Department of Labor personnel, and Rutgers Cooperative Extension specialists. Updates of local marketing activities such as the North Jersey Council of Farmers and Communities, and the Jersey Fresh Program will also be presented. The conference is also sponsored by the New Jersey Department of Agriculture, the North Jersey Council of Farmers and Communities, and the New Jersey Farm Bureau.

Advance registration is \$29, which includes admission and lunch. Registration at the door is \$34. For more information or a registration form and program, please contact Dr. Ramu Govindasamy (732) 932-9171, extension 25. ❑

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