2009 Vermont Forage Conference

American Legion, Post 27

Middlebury, VT
March 10, 2009

Sponsored by
UVM Extension and USDA – Risk Management
Agenda

9:40 am  Welcome

9:45 am  Maximizing Forage Nutrients to Improve Revenue Over Feed Costs
          Kurt Ruppel, Regional Dairy Technology Leader, Cargill Animal Nutrition

10:45 am Understanding the Need for Improved Soil Quality
          Bob Schindelbeck, Extension Associate, Cornell University

11:45 am Alternative Strategies to Increase Cover Cropping in Vermont
          Roger Rainville, Owner and Operator, Borderview Farm, Alburgh, VT

12:15 pm  Lunch

1:10 pm  Weed Control Considerations in Corn
          Russ Hahn, Extension Weed Specialist, Cornell University

2:10 pm  Managing Risks for Crop and Dairy Production
          Jeff Carter,

2:40 pm  Northern Corn Leaf Blight and Other Maladies
          Heather Darby

3:10 pm  The Vermont Field Crop Pest Management Program
          Sid Bosworth, Extension Forage Agronomist, UVM Extension

3:25 pm  Adjourn

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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. University of Vermont Extension, and U.S. Department of Agriculture, cooperating, offer education and employment to everyone without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or familial status.
**Maximizing Forage Nutrients to Improve Revenue Over Feed Costs**

- Cows Crave Consistency
- Maximize Forage Nutrients to Enhance NET Milk Revenue
- Cows Require Nutrients, not Ingredients
- Cows Thrive on Consistent Nutrients

**S-curve**

- Start-up, Lag Phase
- Fast Growth, LOG Phase
- Finished, Death Phase

**Take Home Message**

**Feed Cost Variability - Corn**

- Corn Futures: Up $35/ton Since December Low
Feed Cost Variability - SBM

Milk Price Variability

Milk Revenue Calculator

Reduce Feed Cost – lose some Fat and Protein
Milk Revenue Calculator –
Reduce Feed Cost and Not Change Production.

Additive Cost – per cow/day

Environment and Forage Yield and Quality
P. Van Soest, Cargill Nutrition Conference, 1996

Lignification and X-Linkage
Slows Enzymatic (bacterial)
Cell Wall Degradation
Defining HQF:

Can feed more forage without compromising production.

<table>
<thead>
<tr>
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<th>Live Version</th>
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<tbody>
<tr>
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<tr>
<td>DM</td>
<td>55</td>
</tr>
<tr>
<td>47% Concentrate</td>
<td>0.15</td>
</tr>
<tr>
<td>53% Forage</td>
<td>0.08</td>
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<tr>
<td>1.05% BW</td>
<td>14.7</td>
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<tr>
<td>NDF of Forage Mix</td>
<td>45%</td>
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</table>

Why have forage in a dairy diet?

- **Physical**
  - requirement for effective fiber
- **Nutritional**
  - requirement digestible fiber
- **Economic**
  - Brings other nutrients along with required fiber

Where Digestion Occurs

- **Ruminal Digestion**
  - by Microbial Action
  - **Kp** = rate of passage
  - **Kd** = rate of digestion
  - Starch: rumen by-pass starch may be degraded in intestine
  - Fiber: rumen by-pass fiber up to 70% may be lost

- **Intestinal Digestion**
  - by Animal Enzymes

ADF, NDF and NDFD

- **Hemicellulose**
- **Cellulose**
- **Lignin**

Cell Wall NDF

ADF
Forage at the cellular level

- Empty plant cell
- Rumen bacteria associated with plant cell wall
Getting and Keeping Forage Sugar

1. Maturity at Cutting
   - Cell Wall : Cell Content Ratio

2. Wilting Time
   - Respiration of plant sugars

3. Filling Stage of Ensiling
   - Respiration of plant sugars

4. Fermentation Stage of Ensiling
   - Conversion of plant sugars to VFAs

5. Feedout Stage of Ensiling
   - Fungi consumption of plant sugars

6. Storage Management
   - Effluent washout of plant sugars

Ash and Butyric Acid

Summer, 2002 Intern Project, 50 Samples
Quesnel, Stewart and Hanehan

\[ R^2 = 0.5389 \]

Grass Hay and Silage

Figure 1: Effect of maturity stage on NDF digestibility of grass hay and silage.
Legume Hay and Silage

Figure 2: Effect of maturity stage on NDF digestibility of legume hay and silage

Plant Morphology does not predict quality

Using Alfalfa Plant Height to Trigger Cutting of Pure and Mixed Alfalfa-Grass Stands — Jerry Cherry, Cornell Univ.

| When Alfalfa near the Grass field is 15 inches tall | Start to Cut Your Pure Grass Stands |
| When alfalfa in Mixed 50% Alfalfa 50% Grass Stands is 24 inches tall | Cut Your Mixed Stands |
| When alfalfa in 30 inches tall in nearly Pure Alfalfa | Cut Your Mostly Alfalfa Stands |

15” – 24” – 30”

Optimize Milk Per Acre

Corn Silage

Figure 3: Effect of maturity stage on NDF digestibility of corn silage

Ear Fill Keeps NDF steady with Advancing Maturity

Relationship between whole plant moisture and kernel milk stage (1990 - 1999)

\[ R^2 = 0.40 \]
Agronomic Effects on Forage Yield

<table>
<thead>
<tr>
<th>Plant Pop</th>
<th>Raw Spacing - Inches</th>
<th>Within Raw Spacing - Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>30,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
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<td>8</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
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<tr>
<td>6</td>
<td>6</td>
<td>3</td>
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<td>8</td>
<td>9</td>
<td>11</td>
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<td>7</td>
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<td>6</td>
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<tr>
<td>8</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Average 6.9 6.9 6.7
Yield 18.0 16.8 14.5

“High Chop” Corn Silage

<table>
<thead>
<tr>
<th>Item</th>
<th>Low Height (8.4 in. to 12.0 in.)</th>
<th>High Height (19.3 in. to 23.8 in.)</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM %</td>
<td>36.1</td>
<td>40.3</td>
<td>5.8</td>
</tr>
<tr>
<td>CP %</td>
<td>7.0</td>
<td>11.1</td>
<td>14</td>
</tr>
<tr>
<td>ADF %</td>
<td>24.2</td>
<td>21.8</td>
<td>-1.2</td>
</tr>
<tr>
<td>NDF %</td>
<td>41.8</td>
<td>38.6</td>
<td>-3.2</td>
</tr>
<tr>
<td>Starch %</td>
<td>30.0</td>
<td>32.4</td>
<td>8</td>
</tr>
<tr>
<td>MEG, MWh</td>
<td>0.71</td>
<td>0.64</td>
<td>-4.0</td>
</tr>
<tr>
<td>NSP Index, % of NDF</td>
<td>56.6</td>
<td>54.0</td>
<td>-1.7</td>
</tr>
</tbody>
</table>

DM yield, % of DM 22.9 22.9 22.9
Yield, ton/ac, DM 8.1 7.5 -7.4
Milk Equiv., MB 2000 3614 3425 4.9
Brac 20990 20610 -1.8

1/ Amico, 2002; Cox, 2003; Conn and Piasch, 1999; Cusumano, 1988; Domínguez, 2002, 2003; Nejati and Kung, 2003; Potvin, 2000; Saxen, 1999; Shih, 2001; Wu, 2001; not all studies reported all measurements.

How do we get the most out of BMR Corn Silage?

- Grow and store it separate from other corn silage.
- Feed heaviest to Transition Cows, then high producers.
- Work % Forage up quickly.
- Support rumen fermentation with rumen available CHO and protein.
- Fermentation Challenge – acts wetter than it is.
- Watch Sugar Values – may cause heating.
- Watch Starch Values – can be higher and less available than expected.

Physical Composition

<table>
<thead>
<tr>
<th>Speed-Up Chopping</th>
<th>Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance Ensiling</td>
<td>Short</td>
</tr>
<tr>
<td>Improve Rumen Health</td>
<td>Long</td>
</tr>
<tr>
<td>Prevent Sorting</td>
<td>Short</td>
</tr>
<tr>
<td>Increase Intake</td>
<td>Short</td>
</tr>
<tr>
<td>Slow Rate of Passage</td>
<td>Long</td>
</tr>
<tr>
<td>Improve Ration Digestibility</td>
<td>Short</td>
</tr>
</tbody>
</table>

* Trying to accomplish many things with Diet Particle Size Distribution.
### Forage particle length distribution and Chopper TLC

- **Factors**: Moisture, Species, Volume, Initial Length, Chopper Speed, Knives

  - 45% Coarse
  - 30% Coarse

### TMR Mixing Time and Effective Fiber

**Cornell University T & R Center, Batchelder and Chase, 1998**

Find the ideal mixing time and put a “watch to it” every feeding.

### TMR Particle Size Calculator

**TMR and Forage Particle Size Distribution Calculator**

- **Formula**:Total Ingredient Volume (t ons) x Moisture (%) / 100

### Bunker Silo Density

**Effect of Depth, Layer Thickness and Packing Weight**

- **Chopped at 70 tons per hour; adapted from Muck and Holmes (1999), by Ruppel.**

  - +15%
  - +34%
  - +27%
  - +12%
  - +11%
How much tractor weight transfers through the forage?

**IMPACT POINT:** Always keep six inches or less under tires.

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**Ash and Butyric Acid**

Summer, 2002 Intern Project, 50 Samples
Queens, Stewart and Hanahan

**Moisture Level by Crop Species Recommendations**

**Filling**

- Front-End
- Middle
- Back-End

**Ensiling Phases**

- Temperature
- Oxygen
- pH
- Bacteria

**Feedout**

- Front-End
- Middle
- Back-End

- O₂

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**Ash and Butyric Acid**

- Ash % DM
- Butyric Acid % DM

- **R² = 0.5389**

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**Crop**

- Alfalfa and Clover Silage
- Grass and Cereal Silage
- Corn Silage

- **Acid**

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**% Dry Matter**

- 20 - 25 - 30 - 35 - 40 - 45 - 50

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**% Moisture**

- 70 - 75 - 80

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**Clostridial**

- **Fungi**

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**Unique Solutions for Dairy Partners of Choice!**

CARGILL Animal Nutrition | K.A. Ruppel – Northeast US Region
Acid effects on initial microbes
- McDonald, et al.

<table>
<thead>
<tr>
<th>Formic acid</th>
<th>Acetic Acid</th>
<th>Propionic Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
<td>300</td>
</tr>
</tbody>
</table>

Formation of initial microbes

Good/|---------|--------|
------|--------|

Bad  |

Face Management

Depth and Width
Set for One Day Feed Out

1 - Scoop Out 1st Section
2 - Chip Down One Section at a Time

Limits O₂ Penetration 20X better than regular plastic.

<table>
<thead>
<tr>
<th>TEST</th>
<th>Silvop</th>
<th>Reg. cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness (in)</td>
<td>1.8 or 5</td>
<td>5</td>
</tr>
<tr>
<td>Permeability to oxygen (cc/m²/sec)</td>
<td>100</td>
<td>2000</td>
</tr>
</tbody>
</table>

How many rations on the farm?

1. On paper.
3. Delivered to cows.
4. Consumed by cows.
5. Digested by cows.
How many rations on the farm?

1. On paper.
3. Delivered to cows.
4. Consumed by cows.
5. Digested by cows.

How many Sets of Nutrients on the farm?
Understanding the Need for Improved Soil Quality when Transitioning to Reduced Tillage Systems

Plow till
C-C 13 years

No till
C-C 13 years

Kingsbury clay loam

Bob Schindelbeck
Extension Associate
soilhealth.cals.cornell.edu

Intensive tillage, soil erosion and insufficient added residues

Soil organic matter decreases

Surface becomes compacted, crust forms

More soil organic matter is lost

Crop yields decline

The downward spiral of soil degradation

Modified from Topp et al., 1995

Soil Compaction

Can occur at different depths

Surface crusting

Plow layer compaction

Subsoil compaction

Conceptualization of “addiction to tillage”

Soil organic matter decreases

Aggregates break down

Erosion by wind and water increases

Corn Silage Yields (Tons/A)

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
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<tbody>
<tr>
<td>Plow till</td>
<td>7.1</td>
<td>12.4</td>
</tr>
<tr>
<td>No till</td>
<td>11.1</td>
<td>17.4</td>
</tr>
</tbody>
</table>

Cost (2009) is $60 / sample

Characteristics of Healthy Soil

• Physical - good tilth for optimal root growth, good water infiltration, water storage; STRUCTURE

• Biological - low pest populations, fully functional species important in nutrient cycling and producing plant growth stimulating compounds; ACTIVITY, CYCLING

• Chemical - adequate levels of available nutrients—but not too high; optimal pH for crop rotation; low levels of toxic or disruptive substances–Al, salts, Na; NUTRITION

Soil Sampling- Early spring

6" deep

Mix and subsample

Sample size is 6 cups (about 3 pounds)
Some analyses in the Cornell Soil Health Test

**Permananate oxidation of C**

- **Some analyses in the Cornell Soil Health Test**
  - Wet aggregate stability
  - Available water capacity
  - Field penetration test
  - Active carbon test
  - Potentially Mineralizable N
  - Root Health rating

**SOIL HEALTH TEST REPORT**

4- RATING with interpretive color code (grouped by texture)
5- CONSTRAINT- affected soil function

**Linking Indicators to Management**

**LOW AGGREGATE STABILITY:**
- short-term: integrate shallow-rooted cover or sod-rotation crops, add manures
- long-term: reduce tillage intensity

**LOW AVAILABLE WATER CAPACITY:**
- short-term: add stable organic matter (e.g., compost)
- long-term: reduce tillage intensity

**HIGH SURFACE DENSITY:**
- short-term: localized physical soil loosening (e.g., strip tillage); frost tillage, cover crops and organic matter additions
- long-term: integrate shallow-rooted cover or rotation crops; avoid traffic on wet soils; use controlled traffic lanes

**HIGH SUB-SURFACE HARDNESS:**
- short-term: targeted physical soil loosening at depth (e.g., zone building, ripping, strip tillage); integrate deep-rooted cover crops
- long-term: avoid moldboard plows and disks that generate tillage pans; reduce equipment loads; avoid heavy equipment traffic on wet soils

**SOIL HEALTH Indicators**

<table>
<thead>
<tr>
<th>Soil Indicator</th>
<th>Soil Process (Function)</th>
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<tbody>
<tr>
<td>Wet aggregate stability</td>
<td>Available water capacity</td>
</tr>
<tr>
<td>Field penetration test</td>
<td>Potentially Mineralizable N</td>
</tr>
<tr>
<td>Root Health rating</td>
<td></td>
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</table>

**Linking Indicators to Management (cont’d)**

**LOW ORGANIC MATTER and LOW ACTIVE CARBON:**
- Short-term: integrate cover or sod rotation crops; add manure or compost
- Long-term: reduce tillage

**LOW POTENTIALLY MINERALIZABLE NITROGEN:**
- Short-term: add N-rich organic matter (not excessive); use leguminous cover or rotation crops
- Long-term: reduce tillage

**HIGH ROOT ROT RATING:**
- Use proper rotations, cover crops and/or appropriate chemical and biological control products

**LIMITING LEVELS OF pH OR NUTRIENTS:** see CNAL recommendations
**The Soil Health Management Toolbox**

1. Reducing or modifying Tillage
2. Crop Rotation
3. Growing cover crops
4. Organic/chemical amendments

Ex: Reduce tillage by changing tillage depth, implement used, number of passes, timing of use, use of no-till planter

Crop rotation could include a shorter-season variety to open a window for another seeding

Cover crop could be legume or grass, summer or fall establishment

Fresh manure versus composted, quality of composted debris

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**The Soil Health Report is a management guide, not a prescription**

*Flexibility* is the framework for adapting the Report information to a management strategy to fit your field/farm

- Different management approaches can solve the same problem
- A single management practice can solve several problems
- Draw on information from other sources- field days, workshops, local “success stories”, etc

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**Tips for transitioning to reduced tillage crop production**

- Soil loosening is the first step in alleviating any soil compaction **SHORT TERM**
- Reduced tillage soils are less susceptible to compaction and more resilient due to better soil aggregation **LONGER TERM**
- Soil structure is additionally improved through cover crops, rotation, and fresh organic additions **LONGER TERM**
- When severe compaction has occurred reduced tillage systems will benefit from soil loosening. i.e., the cost of tillage is outweighed by the benefits of soil loosening **SHORT TERM**
- When limited compaction has occurred, zone building or strip tillage will suffice
- Rebuild beneficial microbial communities by feeding the soil food web

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**Single-pass planting systems**

- **ECONOMIC (fuel and labor)**: Reduce energy use and number of field operations (each trip across costs about $10/A)
- **TIMING**: Avoids working up wet soil between operations- put seed in the ground when surface has dried off
These single pass planting systems rely on high levels of operator skill
Lighter soils, healthy soils respond best to these methods
Work with local ‘experts’ to gain locale-specific insights
Look for inexpensive new technologies to fine-tune systems

- No-till
- Zone-till

Multiple-pass planting systems using a Ripper unit for primary (VERTICAL) tillage

Strip-till (6” deep)
Vertical Tillage

Restricted-width tillage

Plow till

Conventional planter follows ripped strips

Costs in dollars and time for row crop field operations (2008)¹

<table>
<thead>
<tr>
<th>Tillage/planting system</th>
<th>dollars per Acre</th>
<th>hours per Acre</th>
<th>speed compared to conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip till row crop</td>
<td>20.03</td>
<td>0.27</td>
<td>2.0</td>
</tr>
<tr>
<td>Rip-till (zone-building) row crop</td>
<td>27.03</td>
<td>0.33</td>
<td>1.4</td>
</tr>
<tr>
<td>Zone-building row crop (deep rip, zone-till plant)</td>
<td>35.48</td>
<td>0.48</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Intermediate technology (to deal with compaction)
- Trash wheels on planting units and coulters on planter frame benefits seedbed prep. (zone-till), germination and seedling establishment
- Matched cultivator to clear residue (strip-till or deeper zone-building) increases seedbed loosening and soil warming for earlier planting

Soil health testing to guide management
- Soil structure can be restored through targeted compaction relief, drainage, crop rotation, organic additions, changes in management strategies
- Healthy soil structure increases soil resiliency - soil is less prone to compaction, traffic damage is less severe

Reduced Tillage Lessons Learned

Transition awareness from “tillage addicted” soils
- Lighter soils and dry springs contribute to reduced tillage success
- Successful adoption of restricted-width tillage systems requires excellent soil management skills/ability to innovate
- Degraded soils need soil compaction relief BEFORE conversion to reduced tillage (soil is addicted to tillage)
- Degraded soil problems (poor structure) are most obvious in extreme years

Intermediate technology (to deal with compaction)
- Borrow or rent new equipment to find the match for a field or farm
- Set out ‘strip trials’ to test equipment, cover crops
- Collect soil samples for Cornell Soil Health Test to highlight management targets
- Re-build soil health before trying reduced tillage “cold turkey”

Where is the compaction?

MEASURING PENETRATION RESISTANCE

Spade

Ripper unit with strip-filling coulters and rolling baskets to fit row

Liquid N tube

opening disk

* Lazarus and Seeley, Univ. of Minn Extension
The Link Between Soil Health and Reduced Tillage

In a recent article "How to Interpret and Use the Cornell Soil Health Test (CSHT) Report" in What's Cropping Up? (Vol. 18 No. 1, Jan.-Feb. 2008), we noted that modifying tillage can be part of targeting soil health constraints. Typically, reduced tillage systems are part of a ‘management transition’ that includes correction of compaction issues and establishment of cover crops and/or application of animal manures. Reduced tillage for row crops can offer advantages in terms of reduced labor and fuel costs, improved timeliness of planting, and enhanced soil health. By minimizing soil disturbance we can also reduce weed seed germination and maintain a buffered environment for soil organisms by keeping plant debris on the soil surface. Other noted advantages are protection of soil organic matter, conservation of water, and reduction of erosion. However, some growers have reported failures from ‘cold turkey’ switches to eliminating tillage in degraded soils that are in poor health. These fields lack environmental resilience due to inadequate soil structure, depressed biological activity and/or reduced nutrient availability. The success of a reduced tillage system depends on identifying limiting factors to crop growth and substituting soil-building practices that improve soil health. With that, recognize that implementing reduced-tillage soil management strategies on a healthy soil is inherently easier than on a degraded soil.

With the Cornell Soil Health Test, we can approach soil management from an integrative perspective where we measure the physical, biological and chemical properties of field soils with the Cornell Soil Health Test (What’s Cropping Up?, Vol. 17 No.1). The test identifies constraints that we link to remedial soil management practices. If multiple constraints are present, a good selection of management practices can address several issues simultaneously. A typical Cornell Soil Health Test Report from a long-term research farm trial on a clay soil is shown as Case Study A in Figure 1. This example field has high soil hardness in the surface (0-6”) and subsurface (6-18”) horizons. A low value for active carbon indicates a reduced energy supply for soil biological activity. The effects on soil health parameters from 8 years of moldboard plowing and disking to grow corn for grain have been revealed. These limitations can be targeted with our soil management planning. Our revised soil management system for this case should incorporate soil compaction relief (including the subsoil) and the integration of a rotational crop or green manure.

**Figure 1. An example of a Cornell Soil Health Test Report.**
Successful reduced-tillage crop production is part of a soil management system:

1. Identify the limiting factors (constraints) to crop growth (measure)
2. Implement soil-building practices (modify tillage, changing crop rotations, using cover crops and adding organic amendments) that improve overall soil health
3. Use enhanced tillage practices and equipment technologies (move forward)

Reduced Tillage Systems for Row Crop Production

Most reduced tillage systems are best conceptualized as restricted-width tillage systems, in contrast to full-width conventional plowing. Reduced tillage focuses the soil disturbance on a zone where the seed will be placed. Most growers report that starting small and working with local experts helped them implement inexpensive adjustments to fine-tune their system. Renting or borrowing equipment that has been used with success on similar soils can help find the match for a particular field or farm. Avoid difficult fields when learning the basics of new equipment.

Single Pass No-Till and Zone-Till Systems

No-till grain drills and coulter-equipped row crop planters (zone-till planter) are used in single-pass soil preparation and planting systems. This equipment represents the extreme in reducing soil disturbance for seed placement. Savings in fuel and operator time, as well as enhanced timeliness of planting, are maximized with these systems. Such systems are not recommended if the soil health test identifies low aggregate stability and high surface and subsurface compaction layers that restrict root growth and water movement in the soil profile. Such restrictions can limit the success of single-pass planting systems, because the soil remains hard and dense. No-till may be more successful after soil health has been improved through sod rotations, cover crops and organic matter additions, perhaps combined with gentle tillage tools like an Aerway, spader, or Smart-Till.

Multiple Pass Zone Builder and Strip Till Systems

There are several tillage options that overcome the compaction concerns, yet provide soil health benefits similar to no-till. The Zone Builder Tillage System involves the use of a sub-soiler (Figure 2a) as a primary tillage tool. It is recommended if the soil health test identified problems with surface and subsurface compaction. The straight leg shanks can 'rip' vertical slots in the soil to a depth of up to 18 inches, thereby allowing deep rooting. The appropriate depth to operate the tool is 2 inches below the bottom of the restrictive layer, and the soil at that depth should be sufficiently dry (friable). We recommend the use of a soil penetrometer or compaction tester, used when the soil is at field capacity, to identify the depth of the restrictive layer. When sampling for the Cornell Soil Health Test, the compaction layer is measured as part of the protocol. A tile probe (Figure 3) or spade-dug hole may also be used to verify the depth and thickness of the dense layer across the field.

As the sub-soiler moves across the field, the 6-8 inch wide seeding zone is built as the deep soil loosening is combined with zone-defining coulters and rolling baskets (Figure 2b).
2b). This ‘vertical tillage’ and conditioning of the loosened soil provides a fit soil strip for subsequent planting. Growers match the widths of the sub-soiler with their conventional row crop planters to plant directly on these prepared strips. Zone building may not need to be repeated every year if care is taken to prevent re-compaction of the soil. Some farmers have used the tool several years in a row, going cross ways in different years, and then decided to use it only once in awhile after that.

If the soil health test only identified problems with compaction in the surface layer, then strip tillage may be a good choice. Like the zone builder, it creates a narrow zone where the soil is ripped, but the tool only goes down to about 8 inches. Strip tillage is generally done on an annual basis in the fall or spring.

More information on the adaptability ratings of tillage systems and soil management issues is available in the 2008 Cornell Guide for Integrated Field Crop Management. Also, detailed descriptions of reduced tillage machinery are available as Fact Sheets from the Reduced Tillage website at http://www.hort.cornell.edu/reducedtillage/

### Table 1. Costs in dollars and time for row crop field planting operations. W. Lazarus (2008). University of Minnesota Extension Service.

<table>
<thead>
<tr>
<th>Tillage/planting system (row crop)</th>
<th>dollars per Acre</th>
<th>hours per Acre</th>
<th>speed compared to conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone-till (one-pass planting)</td>
<td>9</td>
<td>0.17</td>
<td>2.9</td>
</tr>
<tr>
<td>Zone Builder System (deep rip, zone-till plant)</td>
<td>27</td>
<td>0.33</td>
<td>1.4</td>
</tr>
<tr>
<td>Conventional (moldboard, disk, finish, plant)</td>
<td>35</td>
<td>0.48</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### Cost and Efficiency

The costs of field operations will vary depending on equipment, fuel and labor costs. Table 1 presents fuel and labor costs for the reduced tillage systems mentioned above versus a conventional moldboard system. One-pass zone till planting requires one-third the labor hours as a four-pass conventional system, and the total cost is only one quarter. The 2-pass zone builder system is 40% faster than the conventional system, but only realizes a 25% savings from conventional due to the higher power requirements for the deep zone building. With high energy costs, reducing fuel consumption therefore greatly benefits the bottom line.

Robert Schindelbeck, John Idowu, Harold van Es, Department of Crop & Soil Sciences, Cornell University

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**Figure 3. Soil compaction tester used to determine depth to a restrictive (dense) soil layer**
Since 2003, the Cornell Soil Health Team has been working to develop an integrative approach to soil management by measuring soil physical, biological and chemical properties. This strategy was previously discussed in 2006 in What’s Cropping Up?, Vol. 16 No. 2 & No. 3. We introduced the new Cornell Soil Health Test (CSHT) in early 2007 (What’s Cropping Up?, Vol. 17 No. 1) to the public as a fee-for-service analysis. Here, we discuss the interpretation of the Cornell Soil Health Test Report to facilitate better soil management. For many, much of this information is new, and we will discuss approaches to maximizing its utility.

The Report (Figure 1) has been optimized towards improved soil management practices. For each, color-coded results shown on the report include the measured value, a 1-10 rating (<3 red, 3 - < 8 yellow and > 8 green) scaled according to soil texture, a listing of constraints when a rating is less than 3 (low), and a percentile rating that relates the measured values to others in our database. An overall soil quality score at the bottom integrates the suite of indicators. It is important to recognize that the information presented in the report is not intended as a measure of a grower’s management skills. Instead, the report is really a tool that allows growers to target their management efforts to address specific soil constraints. Complex soil interactions prohibit extensive judgments of results between the soil indicators except in the case of controlled studies where adequate randomization and sampling intensity can allow for such hypothesis testing.

As an entry point in our understanding of soil health, we can take any identified soil constraint as management targets. When multiple constraints are considered together we can develop a best management plan to restore full functionality to the soil. Efficient users of the information will realize that implementing a single practice can affect more than one indicator and therefore multiple soil functional properties.

Figure 2 is taken from the Cornell Soil Health Assessment Training Manual (Gugino et al. 2007), which provides more extensive information on the CSHT and management practices. The Cornell Soil Health Training Manual can be downloaded at soilhealth.cals.cornell.edu. Figure 2 shows linkages between measured soil constraints and soil management practices for both the short- and long-term. Combining these with growers’ needs and abilities provides for active scenario-testing and discussion. This facilitates...
knowledge sharing between regional extension educators, consultants, and growers. Local ‘success stories’ of specific management practices that effectively address targeted soil constraints also provide for a regional knowledge base of soil management consequences. There are no specific ‘prescriptions’ for what management regimen must be followed to address the highlighted soil health constraint, yet we can recommend a number of effective practices to address specific constraints.

The Soil Health Management Toolbox (Figure 3) lists the main categories of action for soil management. These techniques can be used singly or in combination. The same constraint can be overcome through a variety of management options. The option a grower chooses may depend on farm-specific conditions such as soil type, cropping, equipment and labor availability etc. Therefore, each grower is faced with a unique situation in the choice of management options to address soil health constraints. Different land use systems afford their own sets of opportunities or limitations to soil management.

The principles outlined below can assist in interpreting the Cornell Soil Health Test Reports.

1. The report is a management guide and not a prescription: The report basically shows the aspects of the soil needing attention in order to enhance productivity and sustainability. Growers should see this report as a tool in planning the best soil management strategies for their fields. The new information provided by the test on the physical and biological aspects of the soil, together with the nutrient analysis results gives a better picture on the state of soil health.

Figure 2. Long- and short-term management strategies to address soil health indicator constraints.

Figure 3. Strategies for soil health management.
2. Different management approaches can be used to mitigate the same problem: As previously mentioned, the choice and details of management efforts to be used in overcoming soil health constrains are dependent on resources available to the farmer. For example, growers seeking to increase the soil organic matter of their fields might approach this either by using reduced tillage practices or by adding organic manure or by combining both methods, the latter generally yielding the best results.

Grain Crop Grower Issues
Fields managed for top grain crop production are well suited to reduced tillage/planting systems. No-till drilling of grain crops reduces soil disturbance and saves operator time. Heavy harvesting equipment in the field can compact surface and subsurface soil layers. Choosing shorter-season crop varieties may open planting windows for short season cover crop (green manure) establishment. Identify windows for application of off-farm sources of manure and composts.

3. In addressing some soil constraints, management practices can affect multiple indicators: Many of the soil health indicator measurements can benefit from a single management practice. For example, adding manure to the soil improves soil aggregation; increases organic matter and active carbon content; and improves soil nutrient status. However, the magnitudes of these effects are dependent on the specific management practices and soil types.

4. While certain indicators are generally related, a direct explanation of indicator relationships may lead to misleading interpretations: While the soil health indicators are generally inter-related, the degrees of interrelationships vary with soil type and previous management history. For example, a general linear relationship exists between organic matter and active carbon contents in many of our samples. However, there are some cases where this relationship is not true. Active carbon deals with relatively fresh organic carbon available for easy microbial decomposition. A soil may be high in organic matter but be lacking the fresh decomposable component, which leads to a low active carbon content.

5. Direct comparison of two fields that have been managed differently may lead to confounded interpretations: Comparing two test reports of fields from different areas or that have been managed differently are not valid ways to use the CSHT report. The absence of baseline data from such comparisons makes it impossible to judge the direction of change of the soil health indicators. However, if a field was managed the same way and then divided up into sections with different management practices, the CSHT can be used to compare these management alternatives.

Choose Management Approach from Information and Ability
When soil constraints are identified, it is important to implement soil management strategies that specifically address the issue(s) without negatively affecting the soil. Choice of the most appropriate techniques will vary with grower expertise. If multiple constraints are identified, adoption of efficient or innovative management practices can address target issues simultaneously.

6. Soil health changes slowly over time: Generally, management recommendations to address soil health constraints take time for desired effects to be shown. This is unlike what happens with chemical amendments such as fertilizers. Some changes can be seen in the short term while other management options take a longer period to effect change. For example, deep tillage to address subsurface compaction can produce an immediate effect within a season. However, planting of deep rooted cover crops or conversion to no-tillage may take up to 3-5 years before changes can become noticeable. Remember, soil health management is a long-term strategy!

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For more information
Cornell Soil Health
http://soilhealth.cals.cornell.edu/
E-mail: soilhealth@cornell.edu
2008
Alternative Strategies to Increase Cover Cropping in Vermont

Prepared by Heather Darby, heather.darby@uvm.edu and Roger Rainville, rcra@fairpoint.net

Project Summary:
Over a two year period, The Farmer’s Watershed Alliance (FWA) increased the acres of effective cover crops in the St. Albans and Missisquoi watersheds. The acreage of cover crop increased from approximately 100 acres in 2006 to more than 1500 acres in 2008. This increase in cover cropping was largely due to the demonstrations, workshops, and other local partnerships implement by the FWA.

Project Objectives:
The FWA will increase farmer awareness and adoption of a best management practice by demonstrating innovative cover crop/reduced tillage cropping systems. The following demonstration projects were initiated on-farms to meet the objective.

1. Investigate cover crops interseeded into corn before harvest.

In 2007, cover crops were interseeded into the corn crop before harvest. The cover crop seeded was winter rye with hairy vetch, red clover, white clover, or sweet clover. The interseeding was compared to other seeding methods on a farm in Highgate. The rye (100 lbs/acre) and legume (15 lbs/acre) mixes were seeded at time of nitrogen topdress and/or at last cultivation (early to mid-July). In the spring, the cover crop was measured to determine the percentage of ground cover (Table 1).

<table>
<thead>
<tr>
<th>Practice</th>
<th>Planting Date</th>
<th>Soil Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interseed</td>
<td>28-Jul</td>
<td>58</td>
</tr>
<tr>
<td>Drilled</td>
<td>27-Sep</td>
<td>78</td>
</tr>
<tr>
<td>Drilled</td>
<td>12-Oct</td>
<td>58</td>
</tr>
<tr>
<td>No cover crop</td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

The cover crop appeared to be spotty where the tractors were driven during corn harvest. Overall, in the spring the legumes were barely visible and we felt that the small amount of potential nitrogen would not justify the added cost of legume seed. The legume seed cost approximately $45 per acre. This would potentially raise the cost of seed for cover cropping from $35 to $80 per acre. In addition, the best soil coverage was found when winter rye was seeded in late September.
2. Investigate manure incorporation in corn fields with Aerway System.
Two farmers conducted a few simple comparison studies to evaluate this system. The treatments included manure broadcast & chisel plow immediately, manure broadcast & Aerway immediately, manure broadcast & chisel plow 5 days later. We evaluated nitrogen retention (pre-sidedress nitrate tests) and corn yields. We found that using an Aerway to incorporate manure provided similar results compared to chisel plowing immediately (Table 2).

Table 2. Impact of manure incorporation methods on corn silage yields.

<table>
<thead>
<tr>
<th>Method Description</th>
<th>Nitrogen need</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chisel, immediate</td>
<td>71 lbs/acre</td>
<td>20.3 tons/acre</td>
</tr>
<tr>
<td>Aerway, immediate</td>
<td>73 lbs/acre</td>
<td>21.4 tons/acre</td>
</tr>
<tr>
<td>Chisel, 5 days later</td>
<td>85 lbs/acre</td>
<td>19.8 tons/acre</td>
</tr>
</tbody>
</table>

3. Investigate cover crop seeding methods on corn silage fields.
In October of 2007, members of the Farmer’s Watershed Alliance in the Missisquoi and St. Albans Bay Watersheds initiated on-farm demonstration projects. 5 farms implemented 4 different treatments outlining various ways to apply winter rye and manure. The treatments were:
1) surface manure, no tillage, no seed
2) surface manure, conventional tillage, winter rye
3) winter rye, aerway reduced tillage, no manure
4) winter rye, manure, aerway reduced tillage

Cover crop biomass and soil coverage were evaluated on demonstration farms. The amount of soil coverage was highly dependent on the planting date. The best cover crop stands were seeded from mid-September to early October. Some of the late October planting dates did not survive the winter. Of the 5 farms that hosted demonstrations, 2 planted the cover crop at the end of October. These demonstrations did not produce sufficient growth to provide cover and died from winter kill. In the remaining on-farm demonstrations, farmers found sufficient growth and coverage from various methods of incorporation (Table 3). Some of the best stands of cover crops were achieved from fall chisel plowing or Aerway and broadcast seeding. Soil quality (active carbon, potentially mineralizable nitrogen and aggregate stability) was measured on the 3 cover cropped fields and non cover cropped fields. Cover cropping improved soil quality when compared to continuous corn silage fields (Table 4). The project also highlighted the potential for cover crops to conserve fall applied manure nitrogen. It was calculated that the cover crop biomass had approximately 200 lbs of nitrogen that could be made available to the corn crop (Table 3). We hope to explore this benefit of cover cropping in future research with UVM Extension.
Table 3. Cover crop data collected from on-farm demonstration trials.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dry matter</th>
<th>Nitrogen</th>
<th>Nitrogen</th>
<th>Soil Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tons/acre</td>
<td>%</td>
<td>lbs/acre</td>
<td>%</td>
</tr>
<tr>
<td>Plow &amp; Seed</td>
<td>0.66</td>
<td>3.22</td>
<td>43</td>
<td>54</td>
</tr>
<tr>
<td>Groom &amp; Seed</td>
<td>0.90</td>
<td>3.23</td>
<td>59</td>
<td>94</td>
</tr>
<tr>
<td>Groom &amp; Seed &amp; Aerway</td>
<td>1.10</td>
<td>3.22</td>
<td>71</td>
<td>35</td>
</tr>
<tr>
<td>Seed &amp; Aerway</td>
<td>1.44</td>
<td>3.34</td>
<td>96</td>
<td>98</td>
</tr>
<tr>
<td>Groom &amp; Aerway &amp; Seed</td>
<td>2.50</td>
<td>4.00</td>
<td>200</td>
<td>95</td>
</tr>
<tr>
<td>Aerway &amp; Seed</td>
<td>2.50</td>
<td>4.00</td>
<td>200</td>
<td>97</td>
</tr>
<tr>
<td>Chisel &amp; Seed</td>
<td>2.50</td>
<td>4.00</td>
<td>200</td>
<td>97</td>
</tr>
<tr>
<td>No Cover Crop</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

4. Investigate manure application techniques on hay fields.

An on-farm trial was conducted to evaluate various manure spreading techniques including broadcast, injection, and aerway implements. Some preliminary data is reported in table 5.

Table 4. Average impact of cover cropping on soil quality (n=3).

<table>
<thead>
<tr>
<th></th>
<th>Yield 65% moist.</th>
<th>Water stable aggregates</th>
<th>Organic matter</th>
<th>Active carbon</th>
<th>Potentially Mineralizable N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tons/acre</td>
<td>%</td>
<td>%</td>
<td>mg kg⁻¹</td>
<td>ug N g⁻¹ d soil</td>
</tr>
<tr>
<td>Continuous corn silage</td>
<td>25</td>
<td>58.9</td>
<td>3.65</td>
<td>705</td>
<td>14.8</td>
</tr>
<tr>
<td>Continuous corn silage w/ cover crop</td>
<td>27</td>
<td>61.9</td>
<td>3.78</td>
<td>703</td>
<td>17.0</td>
</tr>
</tbody>
</table>

Table 5. Manure incorporation data on hayfields from Highgate, VT.

<table>
<thead>
<tr>
<th></th>
<th>Yield</th>
<th>CP</th>
<th>ADF</th>
<th>NDF</th>
<th>TDN</th>
<th>NeL</th>
<th>IVTD</th>
<th>dNDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection</td>
<td>3.69</td>
<td>18.0</td>
<td>33.1</td>
<td>55.7</td>
<td>61.5</td>
<td>0.6</td>
<td>71.5</td>
<td>50.5</td>
</tr>
<tr>
<td>Aerway</td>
<td>4.57</td>
<td>17.8</td>
<td>36.2</td>
<td>57.2</td>
<td>64.5</td>
<td>0.6</td>
<td>75.0</td>
<td>56.0</td>
</tr>
<tr>
<td>Broadcast</td>
<td>3.54</td>
<td>16.0</td>
<td>36.7</td>
<td>58.0</td>
<td>64.5</td>
<td>0.6</td>
<td>74.5</td>
<td>56.0</td>
</tr>
<tr>
<td>No manure</td>
<td>2.03</td>
<td>15.5</td>
<td>34.2</td>
<td>55.9</td>
<td>65.0</td>
<td>0.6</td>
<td>76.0</td>
<td>57.0</td>
</tr>
</tbody>
</table>

Since there was a considerable amount of rainfall during the time period there were few differences among treatments. However, the farmer commented that injection cost twice as much compared to broadcasting. The Aerway was less expensive and more adaptable to various soil types (i.e. rocky fields).
5. Economic and Environmental Benefits to Farmers and Vermont.

Through this project we have documented farmer practices and associated costs. We have also tried to assign a value to a few of the cover cropping benefits. Every farm is unique and therefore we tried to use average values based on common cover crop practices. The average cost of cover crop seeding is $53 per acre. This includes a seed cost of $0.34, $5 per acre for seeding, and incorporation cost of $11 per acre. We documented that cover cropping could cost as little as $37 and as much as $100 per acre depending on practices. Many farmers also documented increased costs due to additional tillage needed to incorporate the cover crop in the spring. It is difficult to put a price on environmental benefits such as reduced erosion and improved soil quality. However, these benefits are sometimes indirectly related to crop yields. Some of the farmers in the project did document increased yields as a result of cover cropping. On average farmers reported a 2 ton increase per acre in corn silage yields. At the current price of corn silage that has a value of $100 per acre. In addition, we documented a potential improvement in nitrogen conservation. Although this topic needs further investigation we would very conservatively allow a 50 lb N per acre credit for a cover crop seeded in late September. At the current price of N we would project a $30 per acre saving in nitrogen costs. It is obvious from the project that cover cropping had the potential to conserve up to 200 lbs of N per acre with cost savings of $120 per acre. In addition, some farmers documented less fuel use when tilling in cover crops in the spring. They were able to plow in a higher gear than normal. Farmers predicted that this could be a $4 per acre fuel savings. It is definitely possible for cover crops to be of major economic benefit to the farmer. However, it is obvious from this project that proper cover cropping practices must be implemented to reap these benefits to the maximum potential.

**Cost of Cover Cropping: $37 - $100 per acre**
- Seed: $34 - $70 (includes legumes)
- Seeding costs: $3-$10
- Seed incorporation costs: $10 - $15
- Additional incorporation costs in spring: $10 - $20

**Benefit of Cover Cropping: $0 - $234 per acre**
- Yields: 2 tons of feed per acre = $0 to $100
- Fuel Savings = -$14 to $4 per acre
- Nitrogen Fertilizer Savings = $0 to $120
FORAGE CONFERENCE
MIDDLEBURY, VT
March 10, 2009
Russ Hahn
Crop and Soil Sciences

FORAGE CONFERENCE
- Effectiveness of PRE and POST weed control programs for corn
- Annual grass burndown in corn
- Herbicide resistant weeds
- Halex GT for RR or GR corn
- Lambsquarters control in GR corn
- New safened DuPont products

FORAGE CONFERENCE
- Effectiveness of PRE and POST weed control programs for corn

PRE PROGRAMS
ADVANTAGE - Control is up front and easy.

DISADVANTAGE - Depends on rainfall for activation.
   From 0.5 – 1 inch within 7 to 10 days.

PRE PROGRAMS
Bicep Lite II Mag - Dual II Mag + Atrazine
Cinch ATZ Lite - Cinch + Atrazine
Bullet - Mico-Tech + Atrazine
G-Max Lite - Outlook + Atrazine
Lumax - Dual II Magnum + Atrazine + Callisto
Harness Xtra - Harness + Atrazine
Prowl H2O + Atrazine
TOTAL POST PROGRAMS

ADVANTAGE - Allows scouting to identify weeds and choose herbicides

DISADVANTAGE - Timing is critical, must be done before crop losses.

TIMING OF ROUNDUP AFFECTS CORN YIELD

Location - Aurora Farm
2002, 2003, and 2004

Hybrids - DKC42-70RR, 92-day
DKC53-33RR, 103-day

AVERRANGE WEEDE HEIGHT

<table>
<thead>
<tr>
<th>Time</th>
<th>RAG</th>
<th>LAMB</th>
<th>FOX</th>
<th>MUST</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPO</td>
<td>2-3”</td>
<td>1-3”</td>
<td>1-4”</td>
<td>2-4”</td>
</tr>
<tr>
<td>MPO</td>
<td>3-6”</td>
<td>3-8”</td>
<td>4-6”</td>
<td>9-14”</td>
</tr>
<tr>
<td>LPO</td>
<td>8-12”</td>
<td>4-10”</td>
<td>6-14”</td>
<td>12-24”</td>
</tr>
</tbody>
</table>

CORN GRAIN YIELD

BUA

ROUNDUP TIMINGS

CORN SILAGE YIELD

SILAGE TONS/A

ROUNDUP TIMINGS
TOTAL POST TIMING
- Roundup Ready hybrids
  target 2-4 inch weeds.
- Conventional hybrids
  target 1-2 inch weeds.

FORAGE CONFERENCE
- Effectiveness of PRE and POST weed control programs for corn
- Annual grass burndown in corn

ANNUAL GRASS BURNDOWN PRODUCTS

<table>
<thead>
<tr>
<th>Product Names</th>
<th>Group</th>
<th>Chemical Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact</td>
<td>Group 27</td>
<td>AMVAC</td>
</tr>
<tr>
<td>Callisto</td>
<td>Group 27</td>
<td>Syngenta</td>
</tr>
<tr>
<td>Steadfast</td>
<td>Group 2</td>
<td>DuPont</td>
</tr>
</tbody>
</table>

HOW DO BURNDOWN PRODUCTS FIT?
- Have value for burndown when “PRE” herbicides are applied EPOST or MPOST
- Have potential for use in planned total POST programs

POST GIANT FOXTAIL

<table>
<thead>
<tr>
<th>Aurora</th>
<th>Valatie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid</td>
<td>Pioneer 38P05</td>
</tr>
<tr>
<td>Planted</td>
<td>May 24, 2007</td>
</tr>
<tr>
<td>Sprayed</td>
<td>EPO – June 13</td>
</tr>
<tr>
<td>Giant Foxtail</td>
<td>2.5 inches</td>
</tr>
</tbody>
</table>
**POST GIANT FOXTAIL**
ACOR1007 & VCOR1107

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate Amt/A</th>
<th>Control (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual</td>
<td>Full Rate</td>
<td>~3 WAT 12 WAT</td>
</tr>
<tr>
<td>+ Impact</td>
<td>0.75 fl oz</td>
<td>95 95</td>
</tr>
<tr>
<td>+ Steadfast</td>
<td>0.75 oz</td>
<td>95 93</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>-</td>
<td>6 6</td>
</tr>
</tbody>
</table>

*With 1% (v/v) MSO and 2.5% (v/v) 28% UAN.

**UNTREATED CHECK**

**.33 PT DUAL II MAG + 1 QT AATREX +**
1% MSO + 2.5% UAN 28%

33 PT DUAL II MAG + 1 QT AATREX +
1% MSO + 2.5% UAN 28%

0.75 FL OZ IMPACT

.33 PT DUAL II MAG + 1 QT AATREX +
1% MSO + 2.5% UAN 28%

0.75 OZ STEADFAST
**POST GIANT FOXTAIL**

ACOR1007 & VCOR1897

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual</td>
<td>Full Rate</td>
<td>105</td>
</tr>
<tr>
<td>+ Impact</td>
<td>0.75 fl oz</td>
<td>142</td>
</tr>
<tr>
<td>+ Steadfast</td>
<td>0.75 oz</td>
<td>137</td>
</tr>
<tr>
<td>Untreated</td>
<td>-</td>
<td>53</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

*With 1% (v/v) MSO and 2.5% (v/v) 28% UAN.

---

**EPO LARGE CRABGRASS**

ACOR1507

- Pioneer 38K46 - May 4, 2007
- EPO treatments - May 22
  - Crabgrass ~ 0.5 inch
- Rainfall 0.47” in 1st week
  - 0.24” in 2nd week

---

**EPO LARGE CRABGRASS**

VCOR1507

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>Control (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual</td>
<td>Full Rate</td>
<td>3 WAT 6 WAT</td>
</tr>
<tr>
<td>+ Callisto</td>
<td>3 fl oz</td>
<td>99 98</td>
</tr>
<tr>
<td>+ Impact</td>
<td>0.75 fl oz</td>
<td>97 95</td>
</tr>
<tr>
<td>+ Steadfast</td>
<td>0.75 oz</td>
<td>97 94</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td></td>
<td>6 6</td>
</tr>
</tbody>
</table>

*With 1% (v/v) COC and 2.5% (v/v) 28% UAN.

---

**EPO LARGE CRABGRASS**

VCOR1507

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual</td>
<td>Full Rate</td>
<td>120</td>
</tr>
<tr>
<td>+ Callisto</td>
<td>3 fl oz</td>
<td>149</td>
</tr>
<tr>
<td>+ Impact</td>
<td>0.75 fl oz</td>
<td>145</td>
</tr>
<tr>
<td>+ Steadfast</td>
<td>0.75 oz</td>
<td>139</td>
</tr>
<tr>
<td>Untreated</td>
<td>-</td>
<td>49</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

*With 1% (v/v) COC and 2.5% (v/v) 28% UAN.

---

**2007 RESULTS**

- Results showed value of burndown when applying “PRE” herbicides EPO or MPO
- 32 Bu/A advantage with foxtail
- 23 Bu/A advantage with crabgrass
**POST GIANT FOXTAIL**
ACOR1008

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>DKC 38-46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted</td>
<td>May 21, 2008</td>
</tr>
<tr>
<td>Sprayed</td>
<td>EPO – June 19</td>
</tr>
<tr>
<td>Giant Foxtail</td>
<td>6 inches</td>
</tr>
</tbody>
</table>

---

**POST LARGE CRABGRASS**
VCOR1608

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Pioneer 38K46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted</td>
<td>April 25, 2008</td>
</tr>
<tr>
<td>Sprayed</td>
<td>EPO – May 28</td>
</tr>
<tr>
<td>Large Crabgrass</td>
<td>1.25 inches</td>
</tr>
</tbody>
</table>

---

**EPOST GIANT FOXTAIL**
REDUCED RESIDUALS

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>% Control</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amt/A</td>
<td>6 WAT</td>
<td>Bu/A</td>
</tr>
<tr>
<td>Residual</td>
<td>Full Rate</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>+ Impact</td>
<td>0.73 fl oz</td>
<td>100</td>
<td>Ave.</td>
</tr>
<tr>
<td>+ Steadfast</td>
<td>0.75 oz</td>
<td>100</td>
<td>206</td>
</tr>
<tr>
<td>Residual</td>
<td>Half Rate</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>+ Impact</td>
<td>0.73 fl oz</td>
<td>98</td>
<td>Ave.</td>
</tr>
<tr>
<td>+ Steadfast</td>
<td>0.75 oz</td>
<td>99</td>
<td>219</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>10</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

*Applied with 1% MSO + 2.5% 28% UAN.

---

**EPOST LARGE CRAB - REDUCED RESIDUALS**

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>% Control</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amt/A</td>
<td>6 WAT</td>
<td>Bu/A</td>
</tr>
<tr>
<td>Residual</td>
<td>Full Rate</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>+ Impact</td>
<td>0.73 fl oz</td>
<td>95</td>
<td>Ave.</td>
</tr>
<tr>
<td>+ Calisto</td>
<td>3 fl oz</td>
<td>99</td>
<td>143</td>
</tr>
<tr>
<td>+ Steadfast</td>
<td>0.75 oz</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>Half Rate</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>+ Impact</td>
<td>0.73 fl oz</td>
<td>86</td>
<td>Ave.</td>
</tr>
<tr>
<td>+ Calisto</td>
<td>3 fl oz</td>
<td>96</td>
<td>141</td>
</tr>
<tr>
<td>+ Steadfast</td>
<td>0.75 oz</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>15</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

*Applied with 1% MSO + 2.5% 28% UAN.
ANNUAL GRASS BURNDOWN
- Now recommend half rates of residual herbicides with Impact or Steadfast for burndown
- Impact or Steadfast would be the best choice for foxtails
- Callisto or Impact would be the best choice for large crabgrass

HERBICIDE RESISTANT WEEDS SUMMARY 3/09

<table>
<thead>
<tr>
<th>Herbicide Group</th>
<th>WSSA Group</th>
<th>Example Herbicide</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALS inhibitor</td>
<td>2</td>
<td>Steadfast</td>
<td>97</td>
</tr>
<tr>
<td>Triazine</td>
<td>5</td>
<td>Atrazine</td>
<td>67</td>
</tr>
<tr>
<td>ACCase inhibitor</td>
<td>1</td>
<td>Fusilade</td>
<td>35</td>
</tr>
<tr>
<td>Synthetic Auxin</td>
<td>4</td>
<td>2,4,5</td>
<td>27</td>
</tr>
<tr>
<td>Bipyridilium</td>
<td>22</td>
<td>Gramoxone</td>
<td>24</td>
</tr>
<tr>
<td>Ureas and Amide</td>
<td>7</td>
<td>Lorox</td>
<td>21</td>
</tr>
<tr>
<td>Dinitroaniline, others</td>
<td>3</td>
<td>Prowl</td>
<td>10</td>
</tr>
<tr>
<td>Glycine</td>
<td>9</td>
<td>Roundup</td>
<td>15</td>
</tr>
</tbody>
</table>

HERBICIDE RESISTANT WEEDS SUMMARY 3/09

<table>
<thead>
<tr>
<th>Herbicide Group</th>
<th>WSSA Group</th>
<th>Example Herbicide</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiocarbamates</td>
<td>8</td>
<td>Eptam</td>
<td>8</td>
</tr>
<tr>
<td>Triazoles, Ureas</td>
<td>11</td>
<td>Amitrole</td>
<td>4</td>
</tr>
<tr>
<td>PPO Inhibitors</td>
<td>14</td>
<td>Reflex</td>
<td>3</td>
</tr>
<tr>
<td>Chloroacetamides,</td>
<td>15</td>
<td>Dual II Mag.</td>
<td>3</td>
</tr>
<tr>
<td>Carotenoid Inhibitors</td>
<td>12</td>
<td>Zorial</td>
<td>2</td>
</tr>
<tr>
<td>Nitriles and others</td>
<td>6</td>
<td>Buctril</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Herbicide Resistant Biotypes</strong></td>
<td><strong>323</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RESISTANCE MANAGEMENT
- Rotate crops
- Cultivate to control weeds that escape
- Use herbicides with little soil activity and/or short residual
- Rotate herbicide sites of action with continuous cropping
- Use tank mixtures or sequential treatments of herbicides with different sites of action

FORAGE CONFERENCE
- Effectiveness of PRE and POST weed control programs for corn
- Annual grass burndown in corn
- Herbicide resistant weeds
- Halex GT for RR or GR corn
HALEX GT

<table>
<thead>
<tr>
<th>Active Ingredients</th>
<th>Active/Gallon</th>
<th>Mode of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual II Mag</td>
<td>2.09 lb</td>
<td>GROUP 15 – inhibit long-chain fatty acids</td>
</tr>
<tr>
<td>Touchdown</td>
<td>2.09 lb</td>
<td>GROUP 9 – inhibit amino acid synthesis</td>
</tr>
<tr>
<td>Callisto</td>
<td>0.209 lb</td>
<td>GROUP 27 – inhibit pigment formation</td>
</tr>
</tbody>
</table>

HALEX GT FOR GR CORN

- 3.6 – 4 pt/A Halex GT with
  - NIS and AMS
  - EPOST - weeds 2 – 4 inches

HALEX GT CORN
ACOR0507 and ACOR0508

<table>
<thead>
<tr>
<th>Rate</th>
<th>% Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbicides</td>
<td>Rag</td>
</tr>
<tr>
<td>Halex GT</td>
<td>3.6-4 pt</td>
</tr>
<tr>
<td>Halex GT + AAtrex 4L</td>
<td>3.6-4 pt</td>
</tr>
<tr>
<td>Roundup</td>
<td>22 fl oz</td>
</tr>
</tbody>
</table>

FORAGE CONFERENCE

- Effectiveness of PRE and POST weed control programs for corn
- Annual grass burndown in corn
- Herbicide resistant weeds
- Halex GT for RR or GR corn
- Lambsquarters control in GR corn
LAMBSQUARTERS GR CORN
CCOR1208

- 1 qt AAtrex 4L – April 24, 2008
- Pioneer 38M60 – planted April 24
- Mid-POST applications – June 21
  Lambquarters – 7 inches tall
- Evaluation – 6 WAT (Aug. 2)

LAMBSQUARTERS GR CORN
CCOR1208

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>Amt/A</th>
<th>% Control</th>
<th>6 WAT</th>
<th>Cost/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundup PM</td>
<td>22 fl oz</td>
<td>83</td>
<td>$7.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roundup PM</td>
<td>33 fl oz</td>
<td>96</td>
<td>$11.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halex GT</td>
<td>3.6 pt</td>
<td>100</td>
<td>$20.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Induce</td>
<td>0.25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Applied with 1.7 lb/A AMS.

LAMBSQUARTERS GR CORN
CCOR1208

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>Amt/A</th>
<th>% Control</th>
<th>6 WAT</th>
<th>Cost/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundup PM</td>
<td>22 fl oz</td>
<td>83</td>
<td>$7.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roundup PM</td>
<td>33 fl oz</td>
<td>96</td>
<td>$11.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roundup PM</td>
<td>22 fl oz</td>
<td>98</td>
<td>$10.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ Clarity</td>
<td>4 fl oz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Applied with 1.7 lb/A AMS ($0.58/A)

QUESTIONS??
FORAGE CONFERENCE
- Effectiveness of PRE and POST weed control programs for corn
- Annual grass burndown in corn
- Herbicide resistant weeds
- Halex GT for RR or GR corn
- Lambsquarters control in GR corn
- New safened DuPont products

“NEW” DUPONT PRODUCTS YOU SHOULD KNOW ABOUT

<table>
<thead>
<tr>
<th>Products</th>
<th>Active Ingredients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolve Q*</td>
<td>Resolve + Harmony</td>
</tr>
<tr>
<td>Require Q*</td>
<td>Resolve + Dicamba (Banvel)</td>
</tr>
<tr>
<td>Steadfast Q*</td>
<td>Resolve + Accent</td>
</tr>
</tbody>
</table>

* All include a safener – isoxadifen.

NEW FROM DUPONT
- Resolve Q – Resolve + Harmony + Safener
- Nonvolatile contact plus residual glyphosate tank-mix partner.

GR CORN COMBINATIONS

- DKC 42-91 planted May 13, 2008
- EPO – June 10
  - Weeds 1 – 3 inches
- MPO – June 17
  - Weeds 4 – 6 inches
GR CORN COMBINATIONS
ACOR0708

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>When</th>
<th>% Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amt/A</td>
<td>Appl.</td>
<td></td>
</tr>
<tr>
<td>Roundup WM</td>
<td>22 fl oz</td>
<td>EPO</td>
<td>80</td>
</tr>
<tr>
<td>Roundup WM + Resolve Q</td>
<td>1.25 oz</td>
<td>EPO</td>
<td>75</td>
</tr>
<tr>
<td>Roundup WM + Resolve Q</td>
<td>1.25 oz</td>
<td>EPO</td>
<td>99</td>
</tr>
<tr>
<td>+ AAtrex Nine-O</td>
<td>8.9 oz</td>
<td>EPO</td>
<td></td>
</tr>
</tbody>
</table>

LSD (0.05) 16 10

*Applied with 2 lb/A AMS.

GR CORN COMBINATIONS
ACOR0708

<table>
<thead>
<tr>
<th>Herbicides*</th>
<th>Rate</th>
<th>When</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amt/A</td>
<td>Appl.</td>
<td>Bu/A</td>
</tr>
<tr>
<td>Roundup WM</td>
<td>22 fl oz</td>
<td>EPO</td>
<td>228</td>
</tr>
<tr>
<td>Roundup WM + Resolve Q</td>
<td>1.25 oz</td>
<td>EPO</td>
<td>245</td>
</tr>
<tr>
<td>Roundup WM + Resolve Q</td>
<td>1.25 oz</td>
<td>EPO</td>
<td>241</td>
</tr>
<tr>
<td>+ AAtrex Nine-O</td>
<td>8.9 oz</td>
<td>EPO</td>
<td>134</td>
</tr>
</tbody>
</table>

LSD (0.05) 18

*Applied with 2 lb/A AMS.

NEW FROM DUPONT
 Require Q – Resolve + Dicamba + Safener
 Tank-mix partner for glyphosate.
 Contact & systemic activity with residual control.
 Two modes of action.

GR CORN COMBINATIONS
VCOR1808

<table>
<thead>
<tr>
<th>Herbicides</th>
<th>Rate</th>
<th>When</th>
<th>% Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundup PM*</td>
<td>22 fl oz</td>
<td>EPO</td>
<td>99</td>
</tr>
<tr>
<td>+ Require Q</td>
<td>4 oz</td>
<td>EPO</td>
<td>100</td>
</tr>
<tr>
<td>+ Require Q</td>
<td>4 oz</td>
<td>EPO</td>
<td>99</td>
</tr>
<tr>
<td>+ AAtrex Nine-O</td>
<td>8.9 oz</td>
<td>EPO</td>
<td>99</td>
</tr>
<tr>
<td>Dual II Mag</td>
<td>1 pt</td>
<td>PRE</td>
<td>99</td>
</tr>
</tbody>
</table>

LSD (0.05) 1 14

*Applied with 2 % (w/w) AMS.

GR CORN COMBINATIONS
VCOR1808

<table>
<thead>
<tr>
<th>Herbicides</th>
<th>Rate</th>
<th>When</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundup PM*</td>
<td>22 fl oz</td>
<td>EPO</td>
<td>163</td>
</tr>
<tr>
<td>+ Require Q</td>
<td>4 oz</td>
<td>EPO</td>
<td>155</td>
</tr>
<tr>
<td>+ AAtrex Nine-O</td>
<td>8.9 oz</td>
<td>EPO</td>
<td>172</td>
</tr>
<tr>
<td>Dual II Mag</td>
<td>1 pt</td>
<td>PRE</td>
<td>110</td>
</tr>
</tbody>
</table>

LSD (0.05) 34

*Applied with 2 % (w/w) AMS.

QUESTIONS??
Try to Prevent Bad Luck BEFORE it Happens

CROPs

Insurance - Dates to Remember
- Corn – March 16
- AGR Lite – March 16
- AGR – January 31
- Forage Seeding – March 16
- Sweet Corn – March 16
- Spring Wheat and Barley – March 16

Crop Insurance
CAT Coverage – Minimum Coverage @ 50% loss
Buy-Up Coverage – Increase Coverage
AGR-Lite – Income Loss
Administrative Fee -
- CAT $300 per crop /county
- BU $30 per crop /county

Vermont Corn 2008 – 473 Policies

Premiums $1,185,892
Subsidy $778,401
Farmer Cost $407,491
Indemnity Paid $956,854
Net Gain to VT $549,363
Look at Your Soil Test

2008 - Phosphorus Soil Test & P-index Score

Soil Test P  P-Index Score

Results for All Farms

2008 - Average Soil Test P & Average P-index Score

30 Farms

Soil Test P  Average P-index

Avg. P-index 44
Avg. P Soil Test 7.3 ppm

30 Farms
75% Highland
35% Lowland

Farms 1 - 30

30 Farms
20% Hilly - CL Soy
40% Lowland

6,485 Acres

Average P-index all fields 44.8
Highest P-index 99.4
Lowest P-index 1.6

Average Soil Test P 7.3
Highest Soil Test P 60.7

Precision Agriculture Systems

- ArcGIS
- Pioneer FIT
- JD Office
- Ag Leader SMS
- Raven
- SST
- HGIS
- Farm Works

Field Application Maps

Avoid Confusion

GPS Manure Application Map
Milk Price Risk Management

RMS Forward Contracts - Fence Contracts
Glenn Rogers – UVM Extension

FOR MORE INFORMATION

Jeff Carter
(802) 388-4969  1-(800)-956-1125
Email: JEFF.CARTER@UVM.EDU
Northern Corn Leaf Blight
Dr. Heather Darby, Agronomic Specialist, UVM Extension

Northern leaf blight (NLB) is a fungal disease found in humid climates wherever corn is grown. The disease thrives when relatively cool summer temperatures coincide with high humidity and available moisture. The number of NLB outbreaks has increased considerably over the past 5 years. Since this disease Corn silage yield and quality losses from this disease can be significant. Therefore it is important for us to gain a better understanding of the disease cycle, symptoms, and management practices that can be employed to reduce the impact of NLB on the corn crop.

Disease Cycle

Northern corn leaf blight is caused by the fungus *Exserohilum turcicum*. It overwinters as mycelia and conidia in diseased corn stalks (Figure 1). In the spring and early summer, spores are produced on this crop residue when environmental conditions are favorable. Primary infections occur when spores are spread by rain splash and air currents to the leaves of new crop plants. Infection will occur if free water is present on the leaf surface for 6 to 18 hours and temperatures are 65 to 80°F. Secondary infections occur readily from plant to plant, and even from field to field. Infections generally begin on lower leaves first and then progress up the plant. Heavy dews, frequent light showers, high humidity, and moderate temperatures favor the spread of the disease.

Disease Symptoms

Within 2 weeks of infection grey elliptical lesions begin to develop on the leaves. Over time the cigar shaped lesions become tan as they enlarge (Figure 2). Under moist conditions, the lesions produce dark gray spores on the lower leaf surface. As many lesions enlarge and coalesce, entire leaves or leaf areas may be covered.

It is obvious that the more leaf area that becomes damaged from this disease the more yield and quality losses that maybe incurred. Generally, the damage on the plants is seen after silking, however, there have been earlier infections reported in the moist valley regions.
Disease Management

One of the most effective means of managing NLB is selecting resistant corn hybrids (Figure 3). Since we have not recognized this disease as a major threat focus on resistant hybrid selection has not been a priority. Hybrids with above average resistance to NLB should be planted. Work with your corn seed representative to select hybrids that meet these criteria.

Since corn residues harbor the disease, all fields that are grown for grain may be at the greatest risk for disease infection. In areas where NLB problems have occurred in recent years, reducing any previous corn residue is important to minimize disease inoculum and its effects. Corn residue can be reduced through several practices including crop rotation and moldboard plowing. Remember that this disease has been seen primarily in continuous corn silage fields in Vermont. Therefore any amount of residue will build increase the risk of this disease.

Although there are fungicides available to protect the corn from this disease they are generally not considered cost effective in corn silage systems.

If you suspect that your corn has Northern Corn Leaf Blight please report the incidence to UVM Extension Agronomists Heather Darby & Sid Bosworth. For more information please contact Heather Darby at (802) 524-6501 or heather.darby@uvm.edu.
Corn Rootworms

Scouting for Corn Rootworms

Vermont Corn Rootworm Project

2000: Less than 15% of the fields monitored were above threshold (40 fields in two counties)

2001: Three to five fields (out of 27) were above threshold (five counties)

2003: Only 3 out of 23 fields (13% of the total) were clearly above the critical threshold (Addison County)

Generally, less than 20% of total corn rootworms were Western.
Vermont Corn Rootworm Project

2008: So far, 13 out of 35 (37%) fields we monitored were found to be above threshold in Addison, Chittenden, Franklin and Orange Counties.

Scouting for Corn Rootworms

Be ready to go by early tassel/silk.

Armyworm

Soybean Aphid

Emerging weeds?

Leafhopper injury produces "V" shaped necrosis.
Horsenettle

Giant Ragweed

Snout Beetle in Vermont?

Vermont Field Crop Pest Monitoring Program

In 2009, UVM Extension is initiating a field and forage crops monitoring program to improve communications amongst farmers, extension, agricultural business, crop consultants and government agencies concerning emerging new pests, pest outbreaks and other crop related issues. If you see a crop problem, please report it to one of the following folks. Please indicate the date, location, and a brief description of the problem. If you have digital photos, please email them as well.

<table>
<thead>
<tr>
<th>Name</th>
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Reports coming in from around the state will be posted on the UVM Vermont Crops and Soils website (vcs.uvm.edu/vxweb) on a weekly basis during the growing season.