Drainage and Water Management on VT Farms

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UVM Extension

Vermont Tree Fruit Growers’ Association
February 18, 2016

Image: Tom Cherveny, West-Central Tribune
Precipitation in Northeastern Vermont (1983-2013)

Vermont, Climate Division 1, Precipitation, January-December

1983-2013 Trend
+2.22"/Decade
1901-2000
Avg: 41.85"
Precip

Northeastern VT: 9"
Western VT: 7"
Southeastern VT: 5"
Direct and Obvious Impacts…

Why Vermont Crops Fail (2001-10)

Since 1988, Crop Ins. provided
$213 Bil. of Protection and Paid $15 Million
in Loss Payments to VT Farmers

- Hail, 26%
- Drought, 7%
- Frost, 2%
- Cold Wet, 1%
- Wind, 1%
- All Other, 2%
- Excess Moisture, 60%

RMA, 2012
Benefits of Drainage: The Big 2

1. Improve crop production and less year-to-year variability

2. Allows earlier and later field operations

**Crop Yield Increase Measured in Bushels/Acre**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Tiled Land</th>
<th>Untiled Land</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Wheat</td>
<td>41.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>39.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>36.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Beans</td>
<td>25%</td>
<td></td>
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<tr>
<td>Soy Beans</td>
<td>22.6%</td>
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</table>

*Average of 30% yield increase in corn and soybeans due to drainage over 25 years in Ohio (Reeder et al., 2011)*

Sources: The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), and the National Crop Insurance Services (NCIS) program
Wet years, and dry years

Does not remove plant available water
Reduce Compaction

Especially tough-to-remedy deep compaction
‘The question then is not whether one can afford to drain, but whether one can afford not to drain’ – Annual Report of the Vermont Ag Experiment Station, 1912
Where is that water coming from? (and why won’t it leave me alone?!)

- Up-slope? Rising river/lake? On-site?
- True or perched water table? Compacted layer?
- Will a surface drainage approach work?
  - Fine textured soil, low permeability
  - Water originating on-site

Land Leveling

Ditching
Ag Drainage: Interceptor

- Surface water or groundwater (a.k.a. diversion drains)
- Water originating off-site in sloping terrain
Ag Drainage: Subsurface, i.e. ‘Tile’

(Source: G. Sands, UMN)
How to determine spacing?

- Vermont Drainage Guide
- Calculate based on soil
- Local knowledge
- Contractor’s advice

- Personal financials
  Degree of yield loss
  Land tenure
  Land value
  Economic analysis
Ag Drainage: Subsurface – Misc.

- Ensure adequate outlet!
- Depth: at least 2.5’
- Pipe material: double/single wall
- Slope: at least 0.2%
- Main pipe size
- Rodent guard
- Filter needed?
- Surface inlets?
Ag Drainage: Installation

Backhoe vs. Tile plow vs. Trencher

Maintaining grade line is critical

Timing matters
Ag Drainage – Precision Technology

**GPS – RTK**
- Sub-inch accuracy
- Fast
- Good for
  - Bigger jobs
  - Any length run
  - Large grade change
- Precise map produced
- Software supported

**Laser Transit**
- Slower
- Good for
  - Small jobs
  - Short runs
  - Limited grade change

[RTK Video]
Drainage: Cost? DIY?

Should I invest in drainage?

- Is drainage a problem on regular basis? Will it be in future?
- Economics very favorable for high-value crops
- Don’t forget benefit of improved trafficability on yield
- Do the worst, first.

DIY?

- Small jobs, random layouts
- For big jobs, contractors are cheap or cheaper than self-installation
- Experience and design know-how is valuable
Regulatory Issues

USDA

• Federal farm program benefits withheld from anyone who:
  • plants an agricultural commodity on a converted wetland that was converted by drainage, dredging, leveling, or any other means after December 23, 1985
  • converts a wetland for the purpose of or to make agricultural commodity production possible after November 28, 1990

EPA and USACE

• Section 404 regulates discharge of dredged or fill material in waters of US, including wetlands
  • Most routine farming activities exempt, but bringing wetlands into production may require permit

Be in touch with USDA before draining or clearing wet areas
Environmental Issues – Nutrient Loss

Ahead Of New Rules, Environmental Groups Seek To Halt New Tile Drainage System

By MELODY BODETTE • FEB 5, 2016

In-field and edge-of-field BMPs

(bee.cornell.edu)
# Drainage Contractors

<table>
<thead>
<tr>
<th>Location</th>
<th>Contractor</th>
<th>Contact Info</th>
<th>Services</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altona, NY</td>
<td>Steve Mahoney</td>
<td>518-569-6441</td>
<td>Very Experienced</td>
<td>Will travel; On-site pricing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Small farms and diversified crops</td>
<td></td>
</tr>
<tr>
<td>Medina, NY</td>
<td>BCA Ag Technologies</td>
<td>802-870-0850</td>
<td>RTK, tile plow</td>
<td>Experience with tiling in orchards</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.bcagtech.com">www.bcagtech.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Chazy, NY</td>
<td>Redline Drainage</td>
<td>518-578-2738</td>
<td>RTK, tile plow</td>
<td>Will travel; On-site pricing</td>
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</tr>
<tr>
<td>Ferrisburgh</td>
<td>Van Wyck Bros.</td>
<td>802-870-0850</td>
<td>RTK, tile plow</td>
<td>Travel for 50 acres or many farms</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="http://www.vwdrainage.com">www.vwdrainage.com</a></td>
<td></td>
<td>$1000/acre @ 40' ($1/ft)</td>
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<td></td>
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<td></td>
<td></td>
<td>Interested in serving fruit and veg</td>
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<td></td>
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<td></td>
<td>producers</td>
</tr>
<tr>
<td>Randolph</td>
<td>Larry Pickett</td>
<td>802-685-4455</td>
<td>Backhoe installation</td>
<td>Will travel; Travel 50 miles</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td>On-site pricing</td>
</tr>
</tbody>
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Van Wyck Bros. offers a competitive pricing structure: $1000/acre @ 40' ($1/ft), and is interested in serving fruit and vegetable producers.