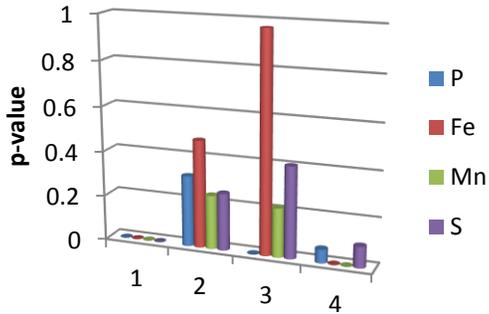


## Fertility Correlations with Elevation Before and After a Saturation



1=May 3, 2012: after snowmelt  
 2=Oct 18, 2012: before Saturation  
 3=April 5, 2013: before saturation  
 4=July 4, 2013: after saturation

\*The closer the value is to zero, the closer the relationship is for that particular element and elevation.

Notes:

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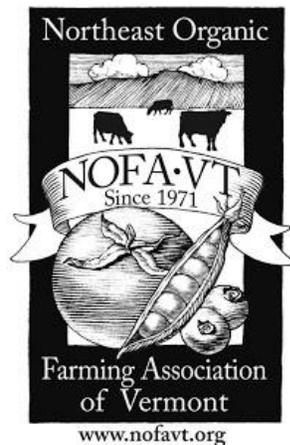


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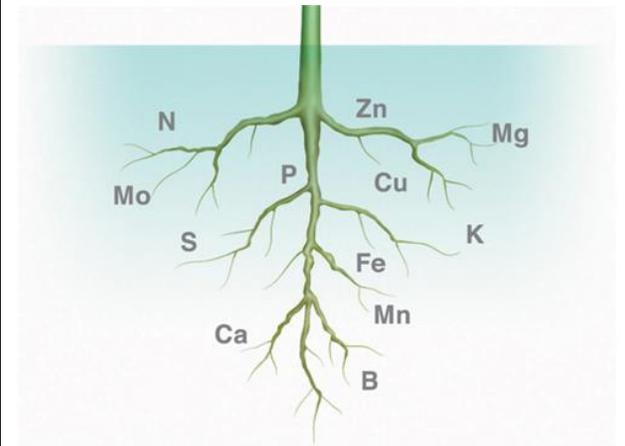
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This Research and Field Day  
 Made Possible by:



Questions or Comments? Please feel free to e-mail Lindsey Ruhl at [lruhl@uvm.edu](mailto:lruhl@uvm.edu) or visit [www.floodedsoils.wordpress.com](http://www.floodedsoils.wordpress.com)

## Cover Crops to Cope with the Effects of Flooding on Soil Fertility



## Two Ways Flooding Affects Soils

### Soil Fertility Loss

#### Nitrogen (N)

N becomes mobilized during flooding and is lost to the atmosphere as  $N_2$ , or leached as nitrite ( $NO_2$ ) and nitrate ( $NO_3$ )

#### Phosphorus (P)

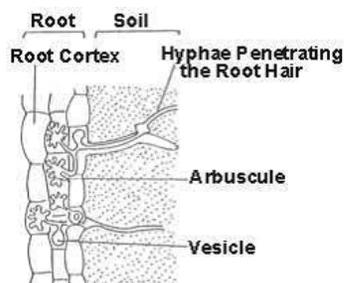
Phosphorus is one of the slowest geochemical processes. Phosphorus forms a strong bond with iron. In anaerobic soils, the iron is reduced and releases P. The P may then be leached.

#### Potassium (K)

Potassium is water soluble. The amount of potassium in the soil solution is in equilibrium with exchangeable pools of K ions bound to the soil.

### Mycorrhizae Loss

Mycorrhiza is a fungus that has a symbiotic relationship with plants. If the amount of active roots decrease, as they can under flooded conditions, the mycorrhiza loses abundance. In flooded soils, a combination of decreased available P and lowered mycorrhizae colonization can cause noticeable P deficiency.



## Known Cover Crop Remediation

### Super-Hero Powers!

*Hairy Vetch* is the most cold tolerant of all the vetch species. It's nodules are able to convert atmospheric nitrogen to ammonium ( $NH_4$ ).

*White Lupine* acidifies the rhizosphere, and mobilizes phosphorus with its proteoid roots. Phosphorus deficiency can result in a 10-15% yield reduction.

#### Mixes

Weed Suppression: rye, crimson clover, and hairy vetch  
Mycorrhizal Colonization and P Uptake: rye and oats

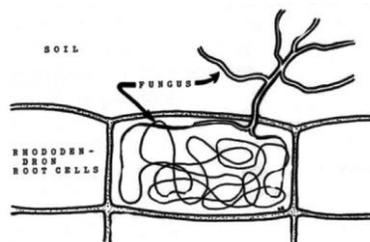
### Mycorrhizae Colonization

#### Winter Rye

This hardy grain is an excellent host for mycorrhizae because it is able to provide living root matter during the winter.

#### Mycorrhizae

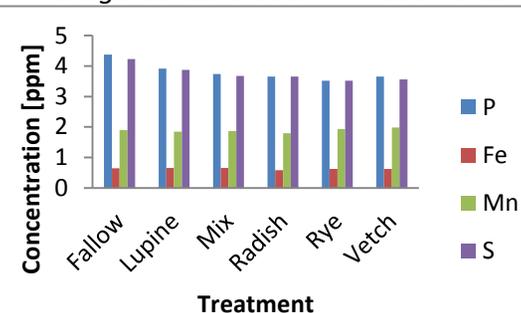
The fungus increases the ability of roots to uptake nutrients. One study shows that cassava plants without mycorrhizae depleted phosphorus in the soil 1-2 mm and with mycorrhizae 20-40 mm from root surfaces.



## Experimental Cover Crops

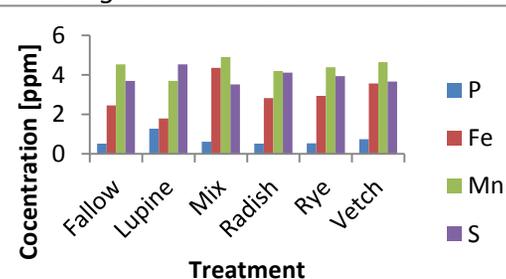
### Arethusa Farm: May 10, 2013

#### Average Concentration in Treatments



### Adam's Berry Farm: May 3, 2013

#### Average Concentration in Treatments



#### Average Concentration and Plot Placement

