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NASAP
Cultivating Community
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March, 29 2013
Soil Management

Crop Rotation
Cover Crop
Mulching
Fertility Plans
Irrigation
Crop Rotation

A balance between the health of the farmer’s income and the health of farmer’s soil

Farmers try to keep their soil covered with either a cash crop or a cover crop at all times for the health of the farm
Farmers use crop rotation to address

Insects
Weeds
Disease

Soil Fertility
Nutrient Cycles
Organic Matter

Crop residue breakdown
Soil Moisture
Compaction
Farmers plan Rotations around Vegetable Groupings

Harvesting Time (save time and space)

- Spinach
- Broccoli
- Leek
- Red Radish

Family (Pests/Disease)

- Tomato
- Okra
- Bell Pepper

Planting Time
(Early, Mid or Late Season)

- Brussels Sprouts
- Leek
- Shallot

Nutrient Needs
(Heavy Feeders, Light Feeders, Soil Builders)

- Corn
- Potato
Rules for Crop Rotation

• Balance Cash Crops with Soil Building Crops
• Do Not Plant Crop in same place as last year
• Follow Heavy Feeders with Soil Builders
• Group Crops for ease of Rotation
• Use Cover Crops in Rotation as much as POSSIBLE
Crop Rotation
Cover Crops
Cover Crops at PLF

Winter Rye or Oats - Fall

Rye Grass and Clover – Spring
Factors to include when thinking about which Cover Crop to Use

Biomass
Factors to include when thinking about which Cover Crop to choose

Nitrogen Fixer?
Other Factors to include when thinking about cover crops

* Weed Suppression levels
  - how fast does it grow in, does it out compete weeds?

* Erosion controls
  – does it grow in wet soil, does it hold underground

* Will it attract other pests?

* What time in the season is it best suited for?

* Rates –#/acre suggested – Cost

* Does it over winter or die in the snow?
Different Ways to use Cover Crops

After Crop is Finished

Under Sowing during Crop Life
So if we look at the Parking Lot Field,

**What is the 1st goal of cover cropping this field?**

History of the field – was tilled in 2006. Mixed vegetables with corn for at least 6 years.

Heavy Weed pressure.... Soil Tests still show good OGM.

Soil type Sandy Loam, with wet spots in middle.

1st goal – address weed pressure. 2nd goal – add OGM

Look at best CC for weed pressure problems, then look at biomass,

Other factors to consider – pests/winter kill...will it reseed quickly and become another weed?
<table>
<thead>
<tr>
<th>Crop</th>
<th>Time</th>
<th>Rate</th>
<th>Best Use</th>
<th>Biomass</th>
<th>Cost</th>
<th>5 Acre Field</th>
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</thead>
<tbody>
<tr>
<td>Annual Rye</td>
<td>E Spring</td>
<td>14-35#/acre</td>
<td>Soil builder, weed control</td>
<td>3,300-4,000#/acre</td>
<td>50# - $75</td>
<td>Need 175# 4 bags = $300</td>
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<td>Per acre</td>
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<td>Pasture</td>
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<tr>
<td>Sudan Grass</td>
<td>E Summer</td>
<td>10-36#/acre</td>
<td>Soil builder, weed control</td>
<td>4,000- 5,000#/acre</td>
<td>50# - $150</td>
<td>Need 180# 4 bags = $600</td>
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<td></td>
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<td>Pasture</td>
<td></td>
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<tr>
<td>Barley</td>
<td>Spring</td>
<td>110-140#/acre</td>
<td>Weed Control edible, N trap, hay</td>
<td>8,800#/acre</td>
<td>48# - $58</td>
<td>Need 700# 15 bags = $870</td>
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<td>J Buckwheat</td>
<td>L Spring</td>
<td>35-134#/acre</td>
<td>Weed control, P and Ca trap, edible</td>
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<td>50# - $85</td>
<td>Need 500# 10 bags = $850</td>
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<tr>
<td>J Millet</td>
<td>Spring</td>
<td>30#/acre</td>
<td>Weed Control, Soil Builder, hay</td>
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<td>50# - $75</td>
<td>Need 150# 3 bags = $225</td>
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<tr>
<td>Jerry Oats</td>
<td>E Spring</td>
<td>110#/acre</td>
<td>Soil Builder, grain, Weed Control, Erosion Control</td>
<td>7,000-9,000#/acre</td>
<td>50# - $32.50</td>
<td>Need 550# 11 Bags = $357.50</td>
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<tr>
<td>Field Pea</td>
<td>E Spring</td>
<td>100-220#/acre</td>
<td>Hay, pasture, N-fixer, Soil builder, Weed Control</td>
<td>5,100#/acre</td>
<td>50# - $62.50</td>
<td>Need 750# 15 Bags = $937.50</td>
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Mulching
How does this help with Soil Fertility?

Mulch with Organic Matter

Mulch with Plastic
What is Soil like at Packard Littlefield Farm?

Sandy  Loam  Clay
Sandy Loam

Great Drainage
Dries out FAST

Warmer soil,
better for
Heat loving crops

Low natural
Organic Matter
Needs to be fed
With compost
close to planting
20-30% Air
20-30% Water
45% Minerals
5% Organic Matter
Healthy Soil = Healthy Plants
Fertilizer

Fertilizers provide nitrogen and other nutrients in a form that is readily available to plants. Fertilizers should be used as a supplement to, not a replacement for, the nutrients provided by a healthy soil.
N-Nitrogen P-Phosphorus K- Potassium

Nitrogen is a part of chlorophyll, the green pigment of the plant that is responsible for photosynthesis. Helps plants with rapid growth, increasing seed and fruit production and improving the quality of leaf and forage crops.

Involved in the formation of all oils, sugars, starches, etc. Helps make energy from the sun useful for plants; proper plant growth; withstanding stress. Effects rapid growth. Encourages blooming and root growth.

Helps in the building of protein, photosynthesis, fruit quality and reduction of diseases.
N – P – K
Where do you find these numbers?

Nitrogen (N)
Available Phosphate (P)
Soluble Potash (K)
Soil Amendments and Rock Powders are the minerals needed in the soil. Soil tests are needed to determine what amendments your soil needs. Amendments address immediate fertility needs as well as long term requirements of sustainable growth.
Organic Sul-Po-Mag (0-0-22) also known as K-Mag NATURAL Contains 22% soluble potash, 22% sulfur and 11% magnesium.

**Potassium** - It improves the *flavor* and *color* of fruits and vegetables, and promotes drought tolerance, winter hardiness, and disease and insect resistance.

**Magnesium** – Important to make chlorophyll – the way plants turn sunlight into food. As rates of photosynthesis decline, so do quality and yield.

**Sulfur** – It is important for the development of vitamins in vegetables. It is needed for nitrogen fixation in legumes. No sulfur- onions, garlic and mustard would not have their flavors.
What does PLF Need Now?

• Organic Matter
• Compost
• Amendments
How are we hurting the Soil
Drip Irrigation!

How do we use it best?
Plants are 90% water
What are good watering techniques?
Deep Watering, Proper timing, Proper amounts
Water at the beginning or end of the day, when the sun is low
How to best set up your Irrigation
Plants have different water needs at different maturity levels.
Water Needs of Vegetables in Lewiston in May
Water Needs of Mature Vegetables in Lewiston

![Bar graph showing water needs of mature vegetables in Lewiston]

- **April**: Rain 4, Needs 5
- **May**: Rain 3, Needs 6
- **June**: Rain 4, Needs 6
- **July**: Rain 4, Needs 6
- **August**: Rain 3, Needs 6
- **Sept**: Rain 3, Needs 6

Legend:
- Blue: Rain
- Orange: Needs
If it rains, Plants need 2 inches of Irrigation Water a month

That is \( \frac{1}{2} \) inch a week
Rain Gauge
How Water works with the Soil

Clay
Loam
Sandy
Clay  Loam  Sandy
Sandy Loam

Great Drainage
Dries out FAST

Warmer soil,
better for
Heat loving crops

Low natural
Organic Matter
Needs to be fed
With compost
close to planting
We have 30 GPM or 1,800 GPH

We need 130,000 GPH for everyone to use water at same time
Schedule

- Water: What we have
- Water Divided: Farmer, Farmer, Farmer
Important times to Water
Germination
Flowering
Too much water
Too much water during fruiting