



 North Pacific

# Building Healthy Soils

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# Topics

- **Soil First**
  - Testing
- **Basic Soil Inputs**
  - Calcium | Sulfur | Compost
- **Fertilizer Market Today**
- **Fertilizers**
  - Natural Fertilizer Basics (N-P-K)
  - Complete Fertilizer Blends
  - Micronutrients | Minerals | Rock Products
  - Mycorrhizal Fungi
- **Natural Pest & Disease Controls**



# Soil First

- Healthy, balanced soils facilitate healthy plant growth
- Focus on soil needs
  - Soil or tissue samples
  - Test for:
    - pH and nutrient levels
    - Organic matter level
    - Microbial population testing optional



## Soil First cont'd

### Testing Labs

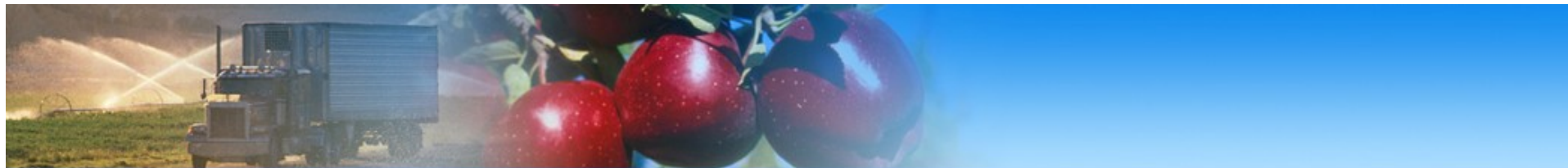
- Soil Foodweb ([www.soilfoodweb.com](http://www.soilfoodweb.com))
- A&L Labs ([www.al-labs.com](http://www.al-labs.com))
- Kuo Testing Labs ([www.kuotesting.com](http://www.kuotesting.com))
- Mukang Labs ([www.mukang.com](http://www.mukang.com))
- OSU and WSU



## Soil First cont'd

- Soil Management Recommendations
  - Many labs will provide recommendations
  - Neal Kinsey – Albrecht Method
    - [www.kinseyag.com](http://www.kinseyag.com)
  - Gary Zimmer of Midwestern Bio-Ag
    - [www.midwesternbioag.com](http://www.midwesternbioag.com)

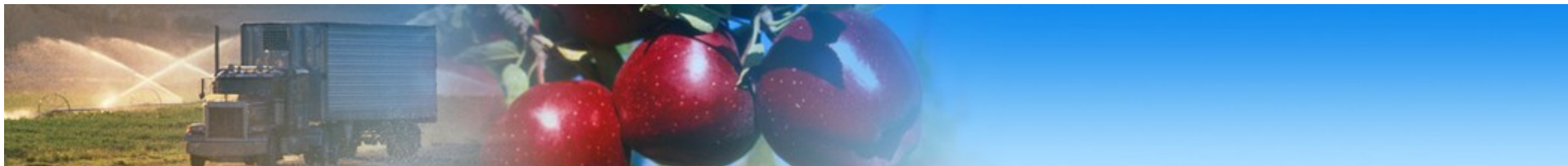
**Goal:** Do not spend money on inputs  
your soil doesn't need



# Basic Soil Inputs

## Calcium

- Buffers soil pH to move pH from acidic to neutral
- Breaks bonds holding soil nutrients not available to plant
- Calcium sources:
  - Calcitic limestone (calcium carbonate)
  - Dolomitic limestone (calcium magnesium carbonate)
  - Gypsum (calcium sulfate) – doesn't impact soil pH
- Oyster shell flour – highly available form of calcium



## Basic Soil Inputs cont'd

### Sulfur

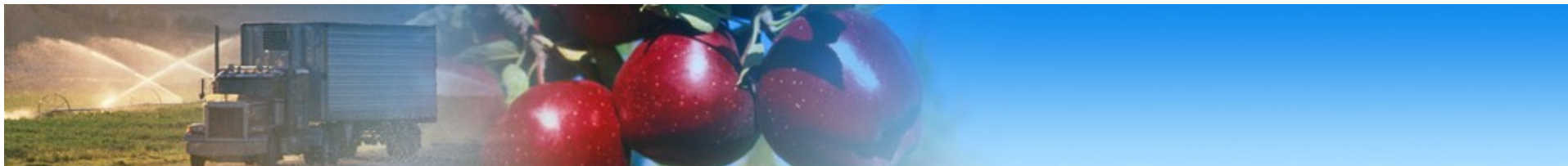
- Moves high pH toward neutral
- Fourth major nutrient after nitrogen, phosphorous and potassium
- Helps plants form protein
- Integral component of certain vitamins and enzymes
- Use brand on the OMRI Products List



# Basic Soil Inputs cont'd

## Compost

- Adds organic matter & carbon to soil
- Feeds microbes in soil
- Easy to obtain in Northwest
- How to Use:
  - Ensure compost has been properly composted
  - Work into top 4-6 inches of soil
- Can be used as a delivery system



# Basic Soil Inputs cont'd

## Compost Types

- Food waste:
  - Yard debris | vegetable | fruit matter
- Manure
  - Poultry manure – 3-3-3
  - Dairy & feed lot – carbon and organic matter
- Customize compost
  - Supplement compost with limestone, gypsum, rock phosphate and other mined minerals containing trace elements



# Fertilizer Market Update

- Conventional fertilizer prices skyrocketed
  - Nitrogen products (urea, phosphate, potash)
  - Commodities (wheat, corn, soy beans)
- Organic fertilizers also increased
  - Feather meal – nitrogen source for organic fertilizers
  - Feather meal mirrors soy meal pricing
  - Organic Potash – originates in Ogden, Utah



# Natural Fertilizer Basics

- Nitrogen (N)
- Phosphate (P)
- Potash (K)
- Available in various forms
  - Meals
  - Liquids
  - Granules
  - Powders



# Nitrogen (N) Fertilizer Sources

<b>Blood Meal</b>	<ul style="list-style-type: none"><li>•13-0-0</li><li>•Available in meal form, difficult to granulate</li><li>•Can add to compost</li></ul>
<b>Feather Meal</b>	<ul style="list-style-type: none"><li>•13-0-0</li><li>•Available as meal or granules</li><li>•Can be blended into horticultural soil mixes</li></ul>



# Nitrogen (N) Fertilizer Sources

Fish Meal	•9-4-0
Cottonseed Meal	•5-2-1
Alfalfa Meal	•2-0-2

These ingredients can be incorporated into complete fertilizer blends



# Nitrogen (N) Fertilizer Sources

## Kelp Meal

- 1-1.5-2
- Meal or liquid forms
- Good source of trace elements

## Chilean Nitrate / Sodium Nitrate

- 16-0-0
- Restricted use in organic growing to max of 20% of crop's total nitrogen requirement



# Natural Phosphate (P) Sources

## Rock Phosphate

- Soft rock phosphate
- Calphos
  - lowest in heavy metals
  - Only available from Florida
- ID & MT sources higher in heavy metals

## Bone Meal

- Different bone sources
  - Cattle, swine, fish, poultry
- Typical analyses: 2-14-0, 3-15-0, 4-20-0
- Meal and granular forms



# Natural Phosphate (P) Sources

## Bat Guano

- Aged guano has highest P content
- Be wary of too high P content
- Good for home and market gardener
  - Too expensive for large commercial growing of forage and permanent crops like orchards



# Potash (K) Sources

- Potassium sulfate
- Originating from Great Salt Lake Minerals in Ogden, UT
- Minor amount in Jersey Green Sand

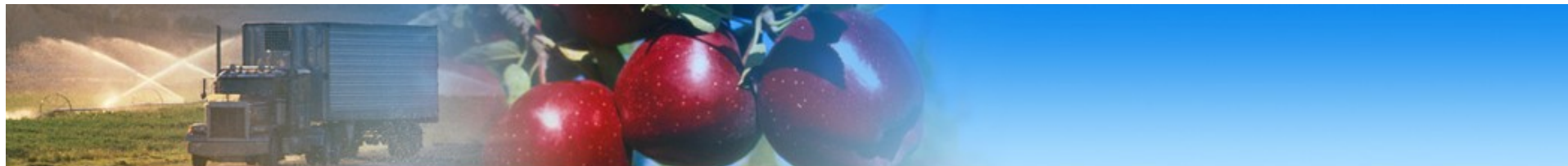


# Complete Organic Fertilizer Blends

## N-P-K

<b>Manure based</b>	<ul style="list-style-type: none"><li>• Usually poultry manure</li><li>• Enhanced by adding protein meals, rock phosphate and potash</li></ul>
<b>Protein based</b>	<ul style="list-style-type: none"><li>• Uses vegetable proteins (soy or cottonseed meal) or animal proteins (feather or bone meals)</li></ul>

- Ensure that blends are OMRI and/or WA Dept of Ag Organic Food Program Listed
- Typical Analyses: 9-3-7 or 5-5-5



# Liquid Fertilizers

- Commonly found as blend of liquid fish, humates, kelp
  - Typical analyses: 5-1-1, 3-3-3, 5-3-1
- Compost teas
  - Grower can brew tea using farm-produced compost
- Dry concentrates: just add water
- Apply through drip and conventional irrigation and tank sprayers
- Use OMRI Listed brands



# Micronutrients

- Traditional micros: zinc, copper, boron
- Use is restricted
- Need to test that soil is deficient in a specific micronutrient



# Other Minerals

## Humates

- Mined mineral from NM, UT, ND, SD
- Prehistoric compost: biodegraded and compressed remains of ancient plant and animal remains
- Used as soil conditioner and in fertilizer blends
- Good source of carbon – enhances soil microbial activity
- Contain organic acids: humic & fulvic
- Dry granular, soluble powder or liquid
- [www.humates.com](http://www.humates.com) and [www.earthgreen.com](http://www.earthgreen.com)



# Rock Products

- Azomite: [www.azomite.com](http://www.azomite.com)
- Planters 2: [www.ussoils.net](http://www.ussoils.net)
- Canadian Glacial Rock Dust: [www.gaiagreen.com](http://www.gaiagreen.com)
- Jersey Green Sand
  - 30 different trace elements
  - 7% potash, 30% iron
  - Helps soil hold moisture
- Rock products labor intensive to apply
- Mix with compost or use in soil blend for container growing
- Contribute to soil tilth and microbial growth



# Mycorrhizal Fungi

- Helps to dissolve minerals, absorb water, retard soil pathogens, glue soil particles together making a more porous soil
- Available in dry form: add to organic fertilizers
- Place in contact with roots; topical application not efficient
- Can be applied by compost teas
- Two good suppliers:
  - Mycorrhizal Applications ([www.mycorrhizae.com](http://www.mycorrhizae.com))
  - Plant Health, LLC ([www.planthealthllc.com](http://www.planthealthllc.com))

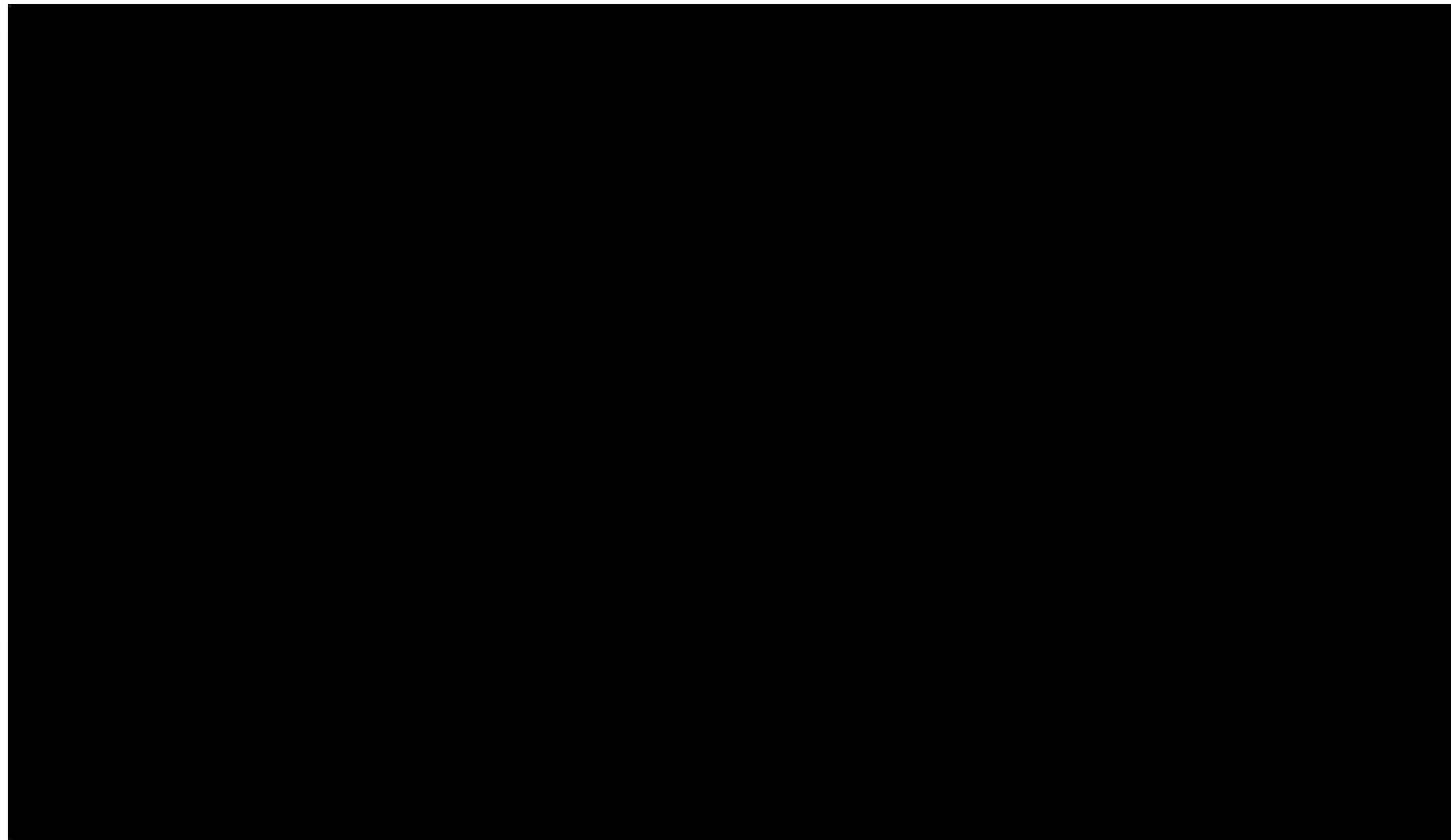


# Natural Pest and Disease Control

- Marrone
  - Developer of organic weed control products
  - [www.marroneorganicinnovations.com](http://www.marroneorganicinnovations.com)
- Pyganic
  - Organic insecticide
  - [www.pyganic.com](http://www.pyganic.com)
- Agraquest
  - Producer of organic fungicides
  - [www.agraquest.com](http://www.agraquest.com)



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