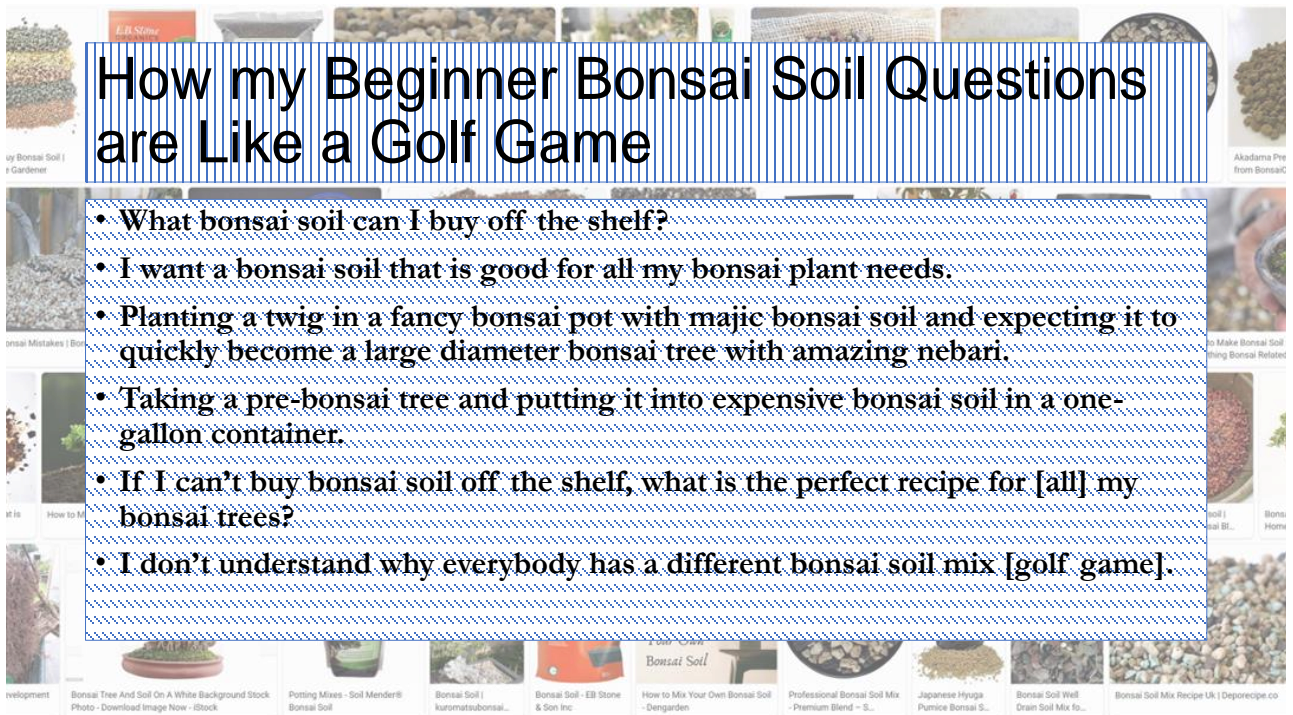


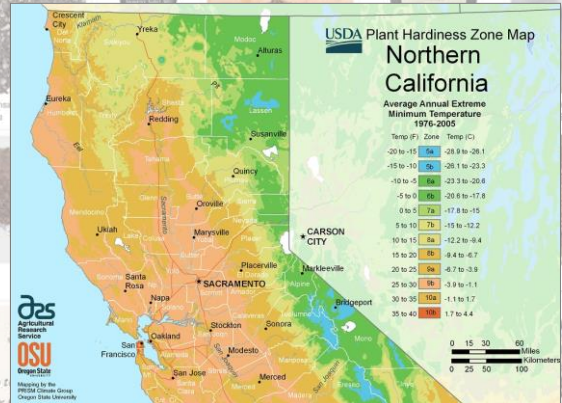
1



2

# External Factors

- **Climate Zone**
  - First Frost [Chico] 10 Nov
  - Last Frost [Chico] 31 Mar
- **Unpredictable Rainfall**
- **Excessive Heat in Summer**
- **Cold and Freezing Winter**
- **Routines**
  - Watering
  - Fertilization
  - Pesticide
- **Plant material you are using**



3

# Plant Factors

- **Climate Zone and Plant Material**
  - Able to leave outside in winter?
  - Any special needs? Water in winter
- **Best pH for Cation Exchange?**
  - Acidic or Basic soil? [Rhododendrons and Azaleas]
- **Does it like to get its feet wet?**
  - Fast or slower draining soil? [Bald Cypress]
- **What soil does its feet like?**
  - More organic or more inorganic components?



4

# Soil Mix Considerations?

## Soil Specifics

- pH and Cation exchange
- Particle Size
- Water retention
- Pore Space for O<sub>2</sub> exchange
  - Aeration
  - Drainage
- Soil Compaction

## Bonsai Pot

- Bonsai Slow Growth
- ▼ Organic Substrate
- ▲ Inorganic Substrate

## Nursery Pot

- Nursery Fast Growth
- ▲ Organic Substrate
- ▼ Inorganic Substrate

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# Preferred pH Range for Optimal Nutrient Uptake [cation exchange] (1-5)

## Optimal pH Range for Nutrient Uptake

Plant Type	Optimal pH Range for Nutrient Uptake
Deciduous	6.0 - 7.5
Evergreen	5.5 - 6.5
Cactus	6.0 - 7.5
Succulent	6.0 - 7.5

## All plant material has unique pH range

- Rhododendrons and Azaleas: pH range of 4.5-6.0
- Pines and Conifers: pH range of 4.5-6.5
- Bald Cypress: pH range of 5.5-6.5 [like to have their feet wet]

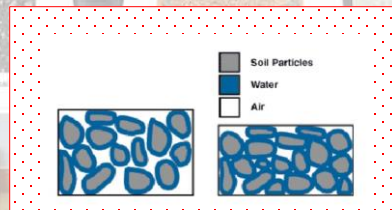
6

# Water retention, Particle and Pore Size [6-12]

## Particle Size: Evergreen and Deciduous

Tree Size	Minimum Particle Size	Maximum Particle Size
Large	3 mm (0.12 inches)	12 mm (0.47 inches)
Medium	1.5 mm (0.06 inches)	6 mm (0.24 inches)
Small	1 mm (0.04 inches)	4 mm (0.16 inches)

## Water Retention & O<sub>2</sub>



## Particle Size: Cactus & Succulents

Plant Size	Minimum Particle Size	Maximum Particle Size
Large	2 mm (0.08 inches)	10 mm (0.39 inches)
Medium	1 mm (0.04 inches)	6 mm (0.24 inches)
Small	0.5 mm (0.02 inches)	4 mm (0.16 inches)

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# Understanding Soil Components

## Inorganic Substrate

- Acadama
- Pumice
- Lava [aka scoria]
- Other
  - Perlite
  - Sand/Grit
  - Vermiculite
  - Rice hulls

## Organic Substrate

- Compost [Commercial]
  - AB Stone [Cactus/Succulent]
  - Fox Farm [Ocean Forest]
- [Pine or Fir] Bark
- Coconut Coir / Peat Moss
- Fertilizers Nitrogen, Phosphorus, Kpotassium
  - Bio Gold
  - Happy Frog
- Other
  - Leaf Mold
  - Green Sand
  - Azomite
  - Kanuma [azaleas more acidic soil]

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# Acadama



## Characteristics

- pH: 6.5-7.5
- Longevity: Slow [compared to Organic]
- Cation Exchange: Good [potassium, calcium, and magnesium]
- Drainage: Excellent
- Aeration: Good
- Moisture Retention: Moderate

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# Pumice



## Characteristics

- pH: 6.8-8.0
- Longevity: Slow [compared to Organic]
- Cation Ex: Fair [less than Acadama]
- Drainage: Excellent
- Aeration: Good
- Moisture Retention: Low

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## Lava/Scoria



### Characteristics

- pH: 7-8.5
- Longevity: Slow [compared to Organic]
- Cation Ex: Varies on mineral content and weathering[less than Acadama]
- Drainage: Excellent
- Aeration: Good
- Moisture Retention: low

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## Perlite

### Characteristics

- pH: 6.5-7.5
- Longevity: Slow [compared to Organic]
- Cation Exchange: Low
- Drainage: Excellent
- Aeration: Excellent
- Water Retention: Low
- Very light [floats] and compaction over time.

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# Coarse Sand

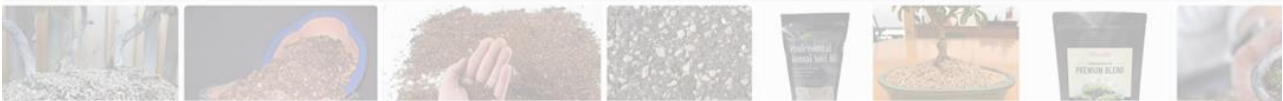
## Charateristics

- pH: 7.0
- Longevity: Very Slow
- Cation Exchange: Low
- Drainage: Good
- Aeration: Good
- Water Retention: Low
- Heavy, no compaction .

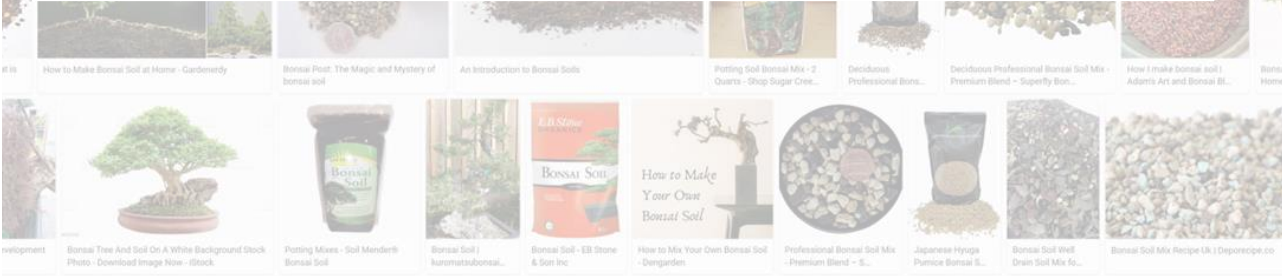
# Peat Moss / Pine or Fir Bark / Coconut Coir

	pH	H2O Retention	Compaction	
Peat Moss	4.4-4.8%	20x weight 60-70% h2o	+	Can be hydrophobic
Coconut Coir	5.5-6.8%	8-10x weight 50-60% h2o	++	
Pine/Fir Bark	4.0-5.0%	2-3x weight 20-30% h2o	+++	

# Kanuma/ Green Sand / Azomite

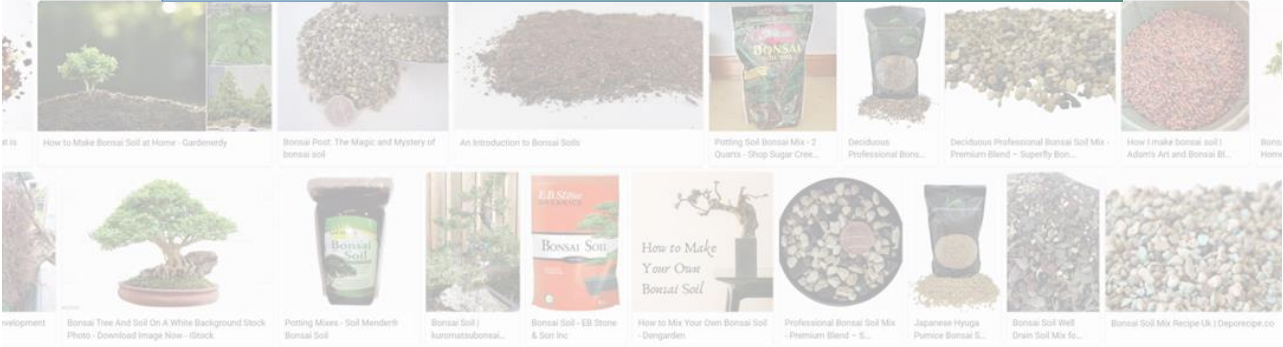


	pH	Mineral Composition
<b>Kanuma</b>	4.5-5.5%	Silica, Alumina and other minerals are responsible for the acidic pH
<b>Green Sand</b>	6.0-7.5%	Magnesium, Silca, Aluminum, Phosphorus and rare trace elements for some plants
<b>Azomite</b>	7-8.0%	Silica, Calcium, Magnesium, Potassium, Sodium, Copper, Zinc, Manganese, trace elements



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# Pre-Bonsai Soil Mix



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## Pre-Bonsai Mixes

### Western Tree Nursery Inc

- De-Composted Fir Bark
- Pumice
- Rice Hulls
- Peat Moss

- De-Composted Fir Bark
- Pumice
- White Sand
- Red Lava
- Peat Moss

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## Pre-Bonsai Mixes (4,5,6)

### Mix 1

- 30% Composted Bark
- 30% Perlite
- 20% Sand
- 10% Peat Moss
- 10% Grit or Coarse Sand

### Mix 2

- 40% Composted Bark or Organic Compost
- 30% Perlite or Pumice
- 20% Sharp Sand or Grit or [Lava]
- 10% Peat Moss or Coir

### Mix 3

- 25-50% Perlite
- 50-75% Good Commercial Compost

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# Bonsai Soil Mix

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## Bonsai Mix - Maruyama Bonsai Nursery

Deciduous	Evergreen
<ul style="list-style-type: none"> <li>1/2 % Acadama</li> <li>1/4 % Pumice</li> <li>1/4 % Lava</li> </ul>	<ul style="list-style-type: none"> <li>1/3% Acadama</li> <li>1/3 % Pumice</li> <li>1/3 % Lava</li> </ul>
<ul style="list-style-type: none"> <li>Acadama</li> <li>Pumice</li> <li>Lava</li> <li>Organic Compost or Component</li> </ul>	

20



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# Happy Mixing

Adios

