Garden Soil Analysis

Study of the impact of amendments added to soil on NPK, pH, and EC

Testing Procedures - NPK

6 scoops of soil are added to a tube that has 2.5 ml of soil extraction solution.

Soil sample mixed for 1 minute and allowed to settle for 15 minutes.

Supernatant is used for testing.

Testing procedure pH & EC

1 part soil and 2 parts distilled water used to make the soil slurry.

Soil mixture is mixed for 1 minute and then allowed to settle for 10 minutes.

A pH and/or EC meter is then used to measure the supernatant or top layer.

The top layer can be decanted and filtered using a coffee filter to further remove solids.

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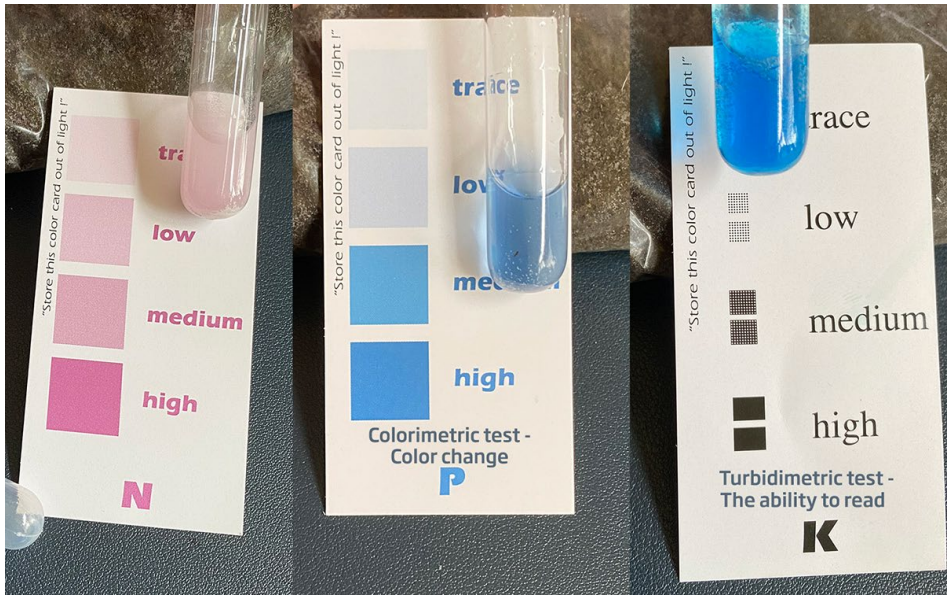
Untreated Tilled Soil



Results for untreated soil show:
Nitrogen = trace
Phosphorous = medium
Potassium = trace (could see the print through the tube)
pH = 8.0
EC = 59.0 uS/cm

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Soil with Amendments

Soil amendments added to 200 sq. ft.:

Peat moss 2.2 cubit feet x 2

Mushroom compost 0.75 cubic foot x 3

Cow manure (0.5, 0.5, 0.5) 1 cubic foot x 3

Soil with Amendments

Results for untreated soil show:
Nitrogen = low
Phosphorous = medium to high
Potassium = trace
pH = 7.9
EC = 165 uS/cm

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Soil then added with 4 lbs. Organic Fertilizer (3-5-6)

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Soil with Organic Fertilizer

Results for soil with amendments and organic fertilizer show:
Nitrogen = medium to high
Phosphorous = medium to high
Potassium = trace to low
pH = 7.6
EC = 267 uS/cm

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Soil then added with 3 lbs. Chemical Fertilizer (10-10-10)

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Soil with Chemical Fertilizer

Results for soil with amendments and organic fertilizer show:
Nitrogen = high
Phosphorous = very high
Potassium = trace
pH = 7.4
EC = 413 uS/cm

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Combined Results

Untreated soil
pH 8.0
EC 59 uS/cm

The untreated soil has no nutrients for the plant. This can be seen in the soil EC that is very low. The pH is high at 8.0. Plants grow best in acidic soils ~ pH 6.0.

Add amendments
pH 7.9
EC 165 uS/cm

The compost, manure and peat added some nutrients. Mostly in phosphorous. The EC went up by 106 uS/cm. The pH decreased by 0.1 pH

Add organic fertilizer
pH 7.6
EC 267 uS/cm

The organic fertilizer added increase nitrogen and phosphorous. The EC increased by 102 uS/cm and pH reduced to 7.6.

Add chemical fertilizer
pH 7.4
EC 413 uS/cm

Adding the chemical fertilizer increased both nitrogen and phosphorous to high levels. Potassium is still low. The EC increased by 146 uS/cm and decreased pH to 7.4, still a little high.

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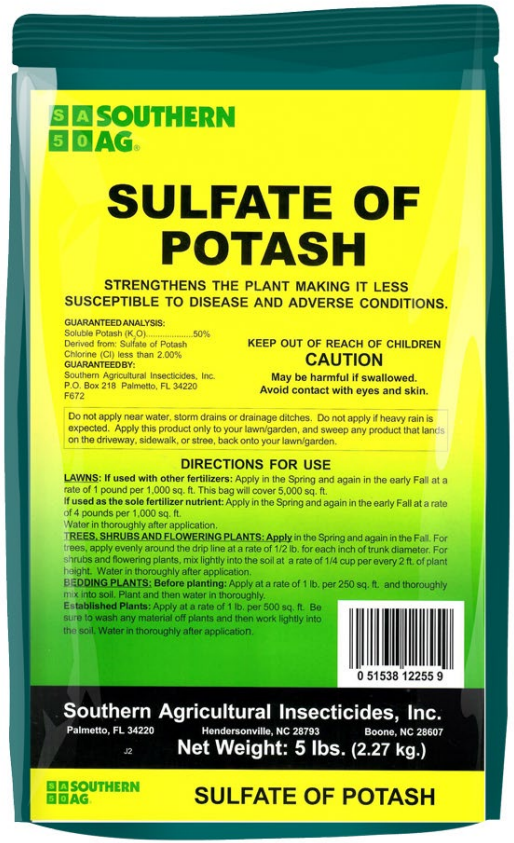
What Now?



Potash will add the potassium needed for the soil for the garden to thrive. It is a critical nutrient.

Potash is available is two forms; one with chloride and the other with sulfate.

The potassium sulfate will be added since the soil pH is 7.4. The sulfate will help in reducing the pH of the soil.

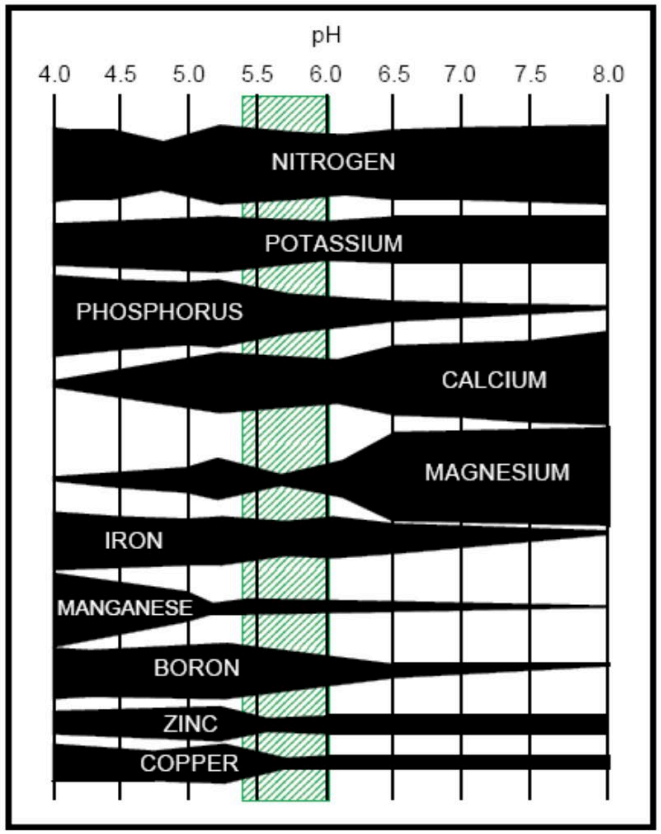
If pH was okay then muriate of potash or potassium chloride (KCl) would be used.

Sulfate of potash = 0-0-52
Muriate of potash = 0-0-60

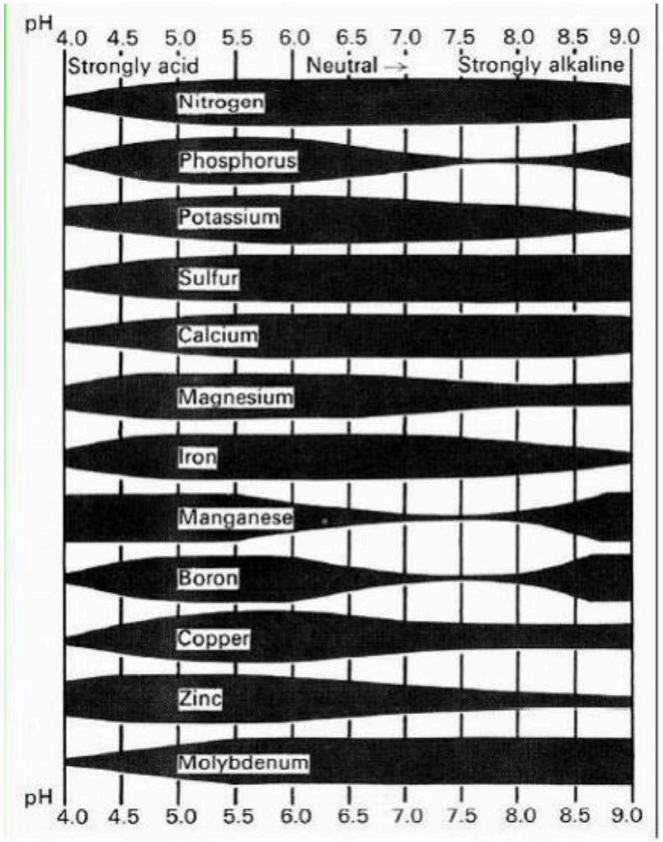
1 lb (0.44 kg)/200 square feet to be added.

pH and Nutrient solubility

Nutrient Solubility in Container Media



Nutrient Solubility in Soil



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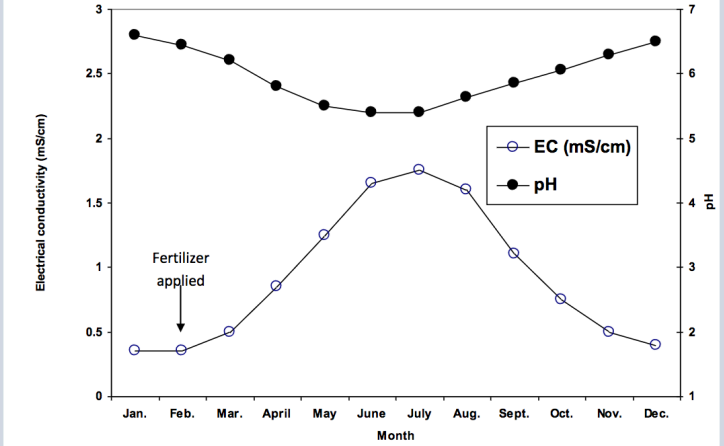
EC and Nutrient Concentration

Table 2. Common conversions among units of electrical conductivity

mS/cm dS/m mmhos/cm[Z]	Mhos/cm S/cm[Y]	 µS/cm[X]
0	0	0
0.5	50	500
1.0	100	1,000
1.5	150	1,500
2.0	200	2,000
2.5	250	2,500
3.0	300	3,000

[Z] mS/cm=MilliSiemens x 10-3/cm, dS/cm=DeciSiemens x 10-3/m, mmhos/cm=Millimhos x 10-3/cm.
[Y]Mhos/cm=Mhos x 10-5 /cm, S/cm=Siemens x 10-5/cm
[X]µS/cm=MicroSiemens x 10-6/cm.



Example graph showing the kinds of data gathered at a nursery. The optimal range for EC is 0.5 mS/cm to 2.0 mS/cm, and for pH is 5.2 to 6.3.

Pour through method which collects leachate from a container. Different than the 1:2 mixture used.

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