



Soil Prescription - Sample 1

Hay Meadow In Eastern Kansas

The following soil prescription was prepared for a five acre hay meadow in production for over three decades. The hay is sold to a livestock farmer each year. The soil was found to be deficient in base cations along with Sulfur and Phosphorous being severely depleted. The minor elements of Boron, Copper, and Zinc were also limiting factors in yield and the nutrient density of the hay. Weed problems developed, especially with Hemp Dogbane due to low pH, poor fertility, mineral imbalance, and decreased competition from desirable plants.

Special notice must be given to the large quantity of phosphate rock required to bring elemental Phosphorous up to an optimum level. 3200#/acre at first glance seems quite substantial. However, Tennessee Brown Phosphate is only 3% available phosphate so we are only adding 96#/acre. Initially it may be a shock but the soil will adapt quickly. It is slow release providing all the reserves required for many seasons to come. There is no problem adding the phosphate rock all at once, or it can be split into two applications a few months apart.



Soil Report and Comments By William C. Smith

Date: April 2, 2015
Mehlich 3 Soil Test by Logan Labs

Client: Name **Location:** Eastern Kansas **Soil Test:** Hay Meadow (Ridge) **Test Date:** 03/16/15

Element		Result	Desired	Comments
Cation Exchange Capacity CEC meq		14.46		
pH of Soil Sample		5.8		
Organic Matter %		5.15		
Anions				Amendments in #/Acre
Sulfur S (parts per million ppm)		18	85	Add 100# Agricultural Sulfur
Phosphorus as P ppm		7	169	Add 3240# Tennessee Brown Phosphate
Cations				
Calcium Ca++ ppm	Desired	1769	1967	Add 1015# Calcitic Ag Lime
	Found Deficit		-198	
Ca Base Saturation 60-70 %		61.17%	68%	
Magnesium Mg++ ppm	Desired	173	208	Add 140# Magnesium Oxide
	Found Deficit		-35	
Mg Base Saturation 10-20 %		9.94%	12%	
Potassium K+ ppm	Desired	86	169	Add 392# Sulfate of Potash K ₂ SO ₄ (Also contributes 17.5% Sulfur)
	Found Deficit		-83	
K Base Saturation 2-5 %		1.53%	3%	
Sodium Na+ppm		19	67	Add 240# Redmond Mineral Salt
Na Base Saturation 1-3%		0.57%	2%	
Other Bases		5.80		
H+ Exch Hydrogen 10-15%		21.00		
Minor Elements ppm				
Boron		0.31	2.0	Add 16# Solubor 10% Boron
Iron Fe		139	85	Okay
Manganese Mn		56	56.5	Okay
Copper Cu		0.8	7	Add 50# Cu Sulfate 25% Cu 12.5%Sulfur
Zinc Zn		2.89	17	Add 127# Zn Sulfate Heptahydrate
Aluminum		684		Okay



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Notes: Bringing these minerals up to optimum levels and balance will totally transform this hay meadow. Based on past experience, I would expect forage production to at least double, and forage nutrient quality to triple. The soil biology will rebound very quickly as soon as it has nutrients to work with.

I would not recommend adding nitrogen, as that does not grow quality forage. There is plenty of organic matter to supply N, and the soil N-fixers will soon get to work. I'm adding enough K to bring the K saturation to 3%, not 4%, and raising the Na from 0.57% to 2% rather than 1.5%. This is a precautionary measure as high levels of K (along with high N and low Na) are associated with metabolic disease in horses and grass tetany and milk fever in cattle.

The amendments should be chisel plowed in to the top six inches of soil anytime after the fall cutting and allowed to settle in with the fall rains and winter snow. Wait at least two weeks after application before seeding.

Nutrients Recommended in Pounds Per Acre:

Add 1015# Calcitic Ag Lime

Add 140# Magnesium Oxide

Add 392# Sulfate of Potash K_2SO_4 (Also contributes 17.5% Sulfur)

Add 240# Redmond Mineral Salt

Add 16# Solubor 10% Boron

Add 50# Cu Sulfate 25% Cu 12.5% Sulfur

Add 127# Zn Sulfate Heptahydrate $7H_2O$ 22% Zn 11% Sulfur

Add 100# Agricultural Sulfur 90%

Add 3240# Tennessee Brown Phosphate 23% P_2O_5



Soil Prescription - Sample 2

Organic Market Demonstration Garden

The following soil prescription was written for a demonstration produce garden that had very good yields from a good friable soil for the 2015 growing season. However, the flavor of the produce was poor to average due to the mineral imbalance and deficiencies in Phosphorous, Calcium, Boron, Zinc, and a severe deficiency in Copper. This was confirmed with a refractometer showing poor to average brix readings. Bringing the soil into optimum mineral balance will vastly improve flavor and nutrient content. The garden should also show even better yields in 2016 with little if any pest activity.



Soil Report and Comments By William C. Smith

Date: May 25, 2015
Mehlich 3 Soil Test by Logan Labs

Client: Name **Location:** Western Missouri **Soil Test:** East Raised Bed Demonstration Garden **Test Date:** 05/11/15

Element		Result	Desired	Comments
Cation Exchange Capacity CEC meq		14.16		
pH of Soil Sample		6.3		
Organic Matter %		15.38		
Anions				Amendments in #/acre
Sulfur S (parts per million ppm)		167	123	Okay
Phosphorus as P ppm		108	246	Add 2779# Tennessee Brown Phosphate
Calcium Ca++ ppm	Desired Found Deficit	1885	1926 -41	Add 227# Oyster Shell Flower
Ca Base Saturation 60-70 %		66.57%	68%	
Magnesium Mg++ ppm	Desired Found Deficit	213	204	Okay
Mg Base Saturation 10-20 %		12.57%	12%	
Potassium K+ ppm	Desired Found Deficit	246	221	Okay
K Base Saturation 2-5 %		4.46%	4%	
Sodium Na+ppm		28	49	Add 96# Redmond Mineral Salt
Na Base Saturation 1-3%		0.86%	1.5%	
Other Bases		5.10%		
H+ Exch Hydrogen 10-15%		10.50%		
Minor Elements ppm				
Boron		0.5	1.93	Add 15# Solubor 20% B
Iron Fe		155	106	Okay
Manganese Mn		64	53	Okay
Copper Cu		1.05	12.3	Add 91# Copper sulfate
Zinc Zn		20.08	24.6	Add 39# Zinc sulfate
Aluminum		74		Okay



Soil Report and Comments By William C. Smith

Date: May 25, 2015

Mehlich 3 Soil Test by Logan Labs

Client:	Location:	Soil Test:	Test Date:
Name	Western Missouri	East Raised Bed Demonstration Garden	05/11/15

Notes: This is good soil. It has very good structure, and is very friable. It is low on Phosphorous, just a tad low on Calcium, and low on Sodium. Bringing those up will put the anions (Sulfur and Phosphorous) and base cations (Calcium, Magnesium, Potassium, and Sodium) in optimum balance. This will maximize water infiltration and retention, help the soil perform better during drought conditions, (Less watering on your part) and reduce the possibility of any weed problems. The plants will have every element they need free choice.

Bringing the minor elements of Boron, Copper, and Zinc up to ideal level will mobilize all other elements and result in the highest nutrient density possible. You can expect improvement in flavor and even greater reduction in pest problems over the 2016 growing season.

Even though the percent organic matter is more than adequate, I recommend the addition of Nitrogen. Adding trace minerals will further insure the long-term nutrient density of your crops.

I am also recommending the addition of beneficial soil organisms. The microbial life and mycorrhizal fungi will make the nutrients continually more available to the plants. Finally, humic acid will help to break down organic matter into stable humus, increasing exchange capacity. A soil test in the spring will reveal minor adjustments needed, if any.

Nutrients Recommended in Pounds per Acre:

Add 2779# Tennessee Brown Phosphate

Add 227# Oyster Shell Flour

Add 96# Redmond Mineral Salt

Add 15# Solubor 10% B

Add 91# Copper sulfate pentahydrate $\text{CuSO}_4 \cdot 5 \text{H}_2\text{O}$

Add 39# Zinc sulfate monohydrate $\text{ZnSO}_4 \cdot 1 \text{H}_2\text{O}$

Add 96# Azomite trace minerals

Add 48# MycoApply All Purpose Granular

Add 767# Feather meal

Add 97# Humate ore 75% humic acid