



Date

Name
Address

Soil Analysis Report and Recommendations

Sample 1 – Pasture

The soil test results for **Sample 1 – Pasture** shows that you have 6.3.0% **total organic matter (OM)** in your soil. This is in the normal range for the native soils in our area. The optimal level of organic matter in our region is at least 5.0%.

Phosphate-Phosphorus (P₂O₅) is 74 ppm or 340 lbs. actual phosphate-phosphorus per acre and is in the optimal range for your low pH. The desired level of phosphate is 20 ppm for forage crops when your pH is 6.5 or higher. At a pH of 5.7, 50% of phosphate-phosphorus is available for plant uptake. Phosphate-phosphorus stimulates early growth and root formation. There is no need for additional phosphorus in this field this year. If you are grazing this field and harrowing to evenly spread out nutrients, then future phosphorus needs will likely through grazing.

Potash-Potassium (K₂O) is at 59 ppm or 140 lbs. actual potash-potassium per acre and is in the very low range. The desired level of potassium for forage crops is 200-250 ppm when your pH is 6.0 or higher. At a pH of 5.7, 75% of potash-potassium is available for plant uptake. Potassium is vital for optimal plant growth. Potash-potassium is vital for optimal plant growth. There is a need for potassium in this field this spring and fall.

The **Calcium (Ca) to Magnesium (Mg) ratio** is close to optimal range. The current ratio in your soil is 11:1. The perfect ratio is 7:1, and we want to be as close to that as possible for optimizing plant nutrient uptake. Adjusting the pH will improve this ratio.

The **Percent Cation Saturation** shows us that calcium, magnesium, and potassium are within acceptable ranges. The ideal range for calcium is 65-75%, the ideal range for magnesium is 10-15%, and the ideal range for potassium is 2-7%. This affects nutrient uptake.

The **soil pH** is 5.7, with a buffer index of 6.0. This soil pH has a moderate acidic rating and is lower than optimal for most preferred forage grasses. Since it is highly acidic, there may be certain grasses and forbs that do not prefer to grow in this field. The optimal range for preferred pasture grass species is 6.0-6.5, but certain grasses, especially native grasses will tolerate a pH as low as 5.5. The soil pH affects nutrient availability and crop performance.

The **Nitrate-Nitrogen (NO₃⁻)** is 1 ppm or 2 lbs. actual nitrate-nitrogen per acre, which is in the very low range, but what we expect to see this time of year. For perennial and annual grasses, you will need 20-30 ppm of actual nitrate-nitrogen to not limit plant growth. At a pH of 5.7, 75% of nitrate-nitrogen is available for plant uptake. Depending on your management goals, an application of additional nitrate-nitrogen can be applied this spring, but only if the grass is above 3 inches in height. Otherwise, only some of your nitrogen needs can be met through grazing and regularly harrowing the manure in the fields.

Nitrate is a real snap shot in time, so it is difficult to determine the normal range of your nitrate levels in your soil during the entire growing season. Most of the current levels of nitrate-nitrogen will move down the soil profile through leaching or move with the soil as runoff, making spring applications necessary for optimal growth and yields. Some additional nitrate-nitrogen will be available through soil microbial activity based on the availability of active organic matter, but in most production systems, additional nitrate-nitrogen is needed during the growing season for plant vigor and optimal yields.

The **Sulfate-Sulfur (SO₄⁻)** is 7 ppm or 14 lbs. actual sulfate-sulfur per acre and is in the low range. The preferred range of sulfate-sulfur for forage grasses and orchard crops is 12-20 ppm. Sulfate-sulfur is needed for efficient utilization of nitrogen used by plants and increases protein yields. To ensure good growth this year, I recommend an application of sulfate-sulfur this spring to not limit plant growth.





Management Recommendations

Based on your soil test results, the pasture field is low in nitrogen, sulfur, and potassium. The pH in your pasture field is below optimal range and I recommend applying an application of limestone this year and next year to increase the pH. Please see my recommendations below. These fertilizers can be mixed together for an easier application in each field, except for limestone which needs to be applied separately.

Nitrogen and Sulfur

For pastures, nitrogen applications are applied 2 times per growing season. Based on Oregon State University recommendations, fertilizer application rates should be split into 2 applications for optimal plant growth. It is recommended to make 2 nitrogen fertilizer or manure applications at a rate of 50-60 lbs. actual nitrate-nitrogen for each application. These application rates should be timed appropriately. The chart below indicates the timing for each application. Please refer to the attached pasture calendar for most information on pasture and grazing management planning.

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| First Application | April – May | Late spring when the grass is still growing rapidly and is at least 3-4 inches in height |
| Second Application | September | When the grass starts growing again after dormant period and is at least 3-4 inches in height |

To increase nitrogen, I recommend applying 2 applications of ammonium sulfate 21-0-0-24s at a rate of 300 lbs. per acre for each application. This will meet your nitrogen and sulfur needs.

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| Ammonium sulfate | 300 lbs. per acre |
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Alternatively, I recommend applying 2 applications of urea nitrogen 46-0-0 at a rate of 125-150 lbs. per acre for each application. This will meet your nitrogen needs during the actively growing season.

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| Urea Nitrogen | 125-150 lbs. per acre |
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I recommend **only** applying these fertilizer applications if the grass is at least 3-4 inches tall. I encourage you to avoid applying fertilizer during rainfall events to minimize potential run-off as much as possible. When the grass is overgrazed and not actively growing, it is unable to take up fertilizer applications. For best results, apply fertilizer at recommended rates to moist, warm soil during the coolest part of the day at times of the year when grass is actively growing.

Since you are grazing this pasture, the rest of your nitrogen applications can be met through grazing. For the grass to best utilize the nutrients in the manure, I recommend setting up paddocks, rotationally grazing, taking the horses off when the grass is 3-4 inches, and then harrowing over the surface to break up manure piles.

As you being your pasture renovation process this year, it may be the most beneficial to you to take one section of the pasture and focus on doing every single best practice. That way, you are giving yourself a low risk option for trying out new management techniques. I recommend that we work for this year on correcting deficiencies and then this fall or next fall focusing on a small area to reseed to see what establishes well with your site conditions. Please see my attached pasture calendar for more information on pasture planning.

Potassium

Potassium is an important nutrient for optimal grass growth and is often applied in large quantities, since soils in our region tend to be low in potassium. Potassium can be applied at the same time as nitrogen applications during the growing season, in either the spring or





fall. These rates can be reduced if your management goals do not align with the economics of high fertilizer applications. If you are deciding what the best economic situation is for your farm, I recommend prioritizing nitrogen and sulfur fertilizer applications above potassium fertilizer applications in order of the most needed crop nutrients.

To increase potassium in your pasture, I recommend applying 2 applications potassium sulfate 0-0-50-18s at a rate of 250 lbs. per acre this spring and then an **additional** 250 lbs. per acre in the fall. This will meet your potassium and sulfur needs this season.

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| Potassium sulfate | 250 lbs. per acre this spring and 250 lbs. per acre this fall |
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Alternatively, to increase potassium in your pasture, I recommend applying 2 applications of potassium chloride or murate of potash 0-0-60 at a rate of 150-200 lbs. per acre. To increase potassium in your hay field, I recommend applying 1 application of potassium chloride or murate of potash 0-0-60 at a rate of 200 lbs. per acre this spring and an **additional** application of 200 lbs. per acre this fall. This will meet your potassium needs this season.

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| Potassium chloride | 200 lbs. per acre this spring and 200 lbs. per acre this fall |
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If two applications of either fertilizer is not feasible this year, then I recommend prioritizing at least 1 application when you're able to get equipment on the field in the fall.

I recommend **only** applying these fertilizer applications if the grass is at least 3-4 inches tall. I encourage you to avoid applying fertilizer during rainfall events to minimize potential run-off as much as possible. When the grass is dormant and not actively growing, it is unable to take up fertilizer applications. For best results, apply fertilizer at recommended rates to moist, warm soil during the coolest part of the day at times of the year when grass is actively growing.

Liming

For your pasture, I recommend applying ground agricultural limestone (calcium carbonate) at a rate of a 1-2 tons per acre. It should take 1 application every 3-5 years to maintain the desired pH range.

Limestone takes a while to incorporate into the soil profile, and moving the pH is dependent on several factors. Typically we start to see a change in 6 months and then the pH continues to improve for about another year after that. In sandy soil types, it may take higher application rates and a longer period of time to see a change in pH.

The best time to apply limestone is either in September before the rains get heavy and when you are still able to get equipment on your field, or in March when the rains slow down and the field is firm enough to get equipment on it without causing soil compaction or mud. Limestone takes a while to incorporate into the soil profile, and moving the pH is dependent on several factors. I recommend using overhead sprinklers to water in the limestone after an application if rain is not expected for some time.

I recommend waiting 1-2 weeks between your limestone application and after a good rain or watering in of the limestone application before adding any other nitrogen fertilizers, sulfur fertilizers, or manures. When limestone and certain fertilizers come in contact with each other, a chemical reaction occurs that causes volatilization. This will cause a significant loss of any nitrogen and sulfur that is applied and should be avoided if possible.

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| Agricultural Limestone | 1-2 tons per acre |
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General Recommendations

These recommendations will improve the establishment and growth of your crops for the upcoming season. I recommend using this soil test as a guideline and it is useful to consider your priority goals and your site-specific conditions.

For most cropping systems, I recommend soil testing every year for 5 years to see trends and correct deficiencies, and then testing your soil every 3 years to make sure you are on the right track. If you are a production operation, I recommend getting a post-harvest soil test for 2-3 years to optimum crop management. If applicable to your management system, this is the best way to determine how much





of each nutrient your plants are utilizing is to do a post-harvest soil test this fall in September. With that information, we can determine the specific crop needs and aim to apply a targeted amount for next year's crop. This will help to avoid over fertilizing, which will improve crop production and save you money. For most specialty crops, I recommend getting a micronutrient analysis done every few years to determine levels of zinc, manganese, iron, copper, and boron.

The Eastside Farm & Garden and Kipert's Korner Feed have small quantities of fertilizer available. You can bring your soil test results and write up into the store to receive the best assistance. The Farm Store in Chehalis, Valley Agronomics, and Columbia River Carbonates has larger quantities of fertilizer and limestone. For larger quantities of organic fertilizer, I recommend Concentrates in Portland and Steubers in Snohomish, both of which deliver.

Thurston Conservation District has equipment available that may be useful for your fertilizer applications. For applying ground limestone, we have a drop spreader for rent. For applying granular or pelleted limestone or fertilizer, we have a spin spreader. For applying manure, we have a ground driven manure spreader for rent. This equipment is available to rent from the Thurston Conservation District.

WSU AgWeatherNet is a great resource for viewing soil temperatures, precipitation, growing degree days and is available at: weather.wsu.edu/

If you are interested, I am available to help discuss what the best options are for your site and answer any more questions that you have. Thurston Conservation District provides this free service through assistance, site visits, and farm planning.

Please feel free to call or email if you have any further questions.

Thank you,

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