

Pasture Soil Fertility



By Mir M. Seyedbagheri
UI Elmore County Extension

Does soil fertility affect forage quality?

- Forage yield is probably more influenced by soil fertility than forage quality
- It is recommended that you get a soil test before planting.
- Soil samples for testing should represent the top 12 inches of soil



Soil Test for Fertility

- If soil tests indicate fertilizer is needed, apply and work the fertilizer 4-6 in. into the surface when preparing the seed bed.
- When a soil test indicates the need for fertilizer, topdress after first and/or last cutting. Split applications, one-half in the fall and one-half after the first cutting
- High levels of phosphorus and potassium must be maintained in the soil for high crop yields and long-lived alfalfa stands.

Potassium (K) Fertilization

- Grasses have moderate K requirements
- Idaho soils have historically been high in K
- 100 years of crop production--without manure application--have decreased levels
- Irrigation water contains K
- K movement in soil is greater than for P but less than N
- Incorporate K during seedbed preparation or broadcast in fall or spring on established stands

Alfalfa Sulfur Fertilization

- S demand for legumes > grasses
- S requirements vary with soil texture, leaching losses, S soil test level, and S content of irrigation water
- Apply 20 lbs/ac of S to soil containing less than 10 ppm sulfate-S ($\text{SO}_4\text{-S}$)
- Areas irrigated with water from the Snake River or streams fed by return flow should have adequate S
- Elemental S sources take 1 year to become available

Alfalfa N Fertilization

- Properly inoculated alfalfa will provide its own N needs through microbial fixation.
- But, this fixation does not occur immediately after germination. Generally, either with a nurse crop or on soils that test low in N at the time of planting, 30 to 40 lbs. N/acre should be used to aid in establishment of the alfalfa stand.
- Do not apply excess nitrogen as it inhibits the establishment of nitrogen-fixing bacteria!

Grass Fertilization

Grass Pastures have very different fertilization requirements than legumes, crops or lawns.

Grazing livestock return most of the nutrients back to the pasture; as much as 85-95%.

However, the nutrients are found heavily in small areas such as watering sources, shade, trails and sleeping areas. For that reason, soil testing becomes very important in any fertilization plan.

Pasture Grass N Requirement

Split applications of N Fertilizer maintain a more uniform level of production. Broadcast 30-50 lbs. per acre per application after cutting or grazing cycles. Irrigation or rainfall of 0.5 inches within 48 hours will move N to root zone.



Clover, Rye and Vetch

Pasture Grass P Requirements

Grasses have a low P requirement. Phosphorus movement in the soil is very slow so apply within the root zone when preparing the seedbed. Topdress established pastures in the fall. Soil tests will tell you the recommended amount of P to apply, ranging 60-160 lbs.



Agronomy/Water quality considerations

1. Weeds, insects, diseases, and environmental stress can influence the effectiveness of a fertilizer program and reduce yields.
2. Nitrogen, phosphorus, and sulfur are the elements most often needed for grass pasture production in Idaho.
3. In some situations applying potassium and lime will also improve plant growth.
4. Since nitrate nitrogen and sulfate sulfur are mobile in soils, make fertilizer applications of these two nutrients in the spring. Never apply N or S in the fall.
5. Since phosphorus and potassium are relatively immobile in soils, work these nutrients into the seedbed before seeding.
6. Grass tetany can occur in pure grass pastures during cool, wet springs in northern Idaho counties because of low magnesium levels in the forage.
7. Grasses grow poorly in soils with pH values less than 5.1.

GREEN MANURE

- Planting green manure crops & incorporated to improve the soil.
- Using plants from the legume family as a green manure will help to accumulate nitrogen



Green Manure



- ❖ In cooler climates, green manure crops increase soil organic matter & nitrogen.
- ❖ Can improve soil structure, which enhances aggregation, and increase the space between soil particles.

Cover Crops

- Reduces soil erosion.
- Increases the water infiltration rate & minimizes water runoff.
- Leaves & stems “catch” the rain, and roots create channels for water movement in the soil.



Living Mulch

- Interplanted with other crops
- Benefits include:
 - suppress weeds
 - reduce soil erosion
 - enhance soil fertility
 - improve water infiltration



Percent nitrogen in legume tops and roots

Organic matter	TOPS	ROOTS
SOYBEANS	93	7
VETCH	89	11
COW PEAS	84	16
RED CLOVER	68	32
ALFALFA	58	42

C:N RATIO

Organic matter	C:N RATIO
YOUNG RYE	14:1
RYE AT FLOWERING	20:1
HAIRY VETCH	10:1 to 15:1
CRIMSON CLOVER	15:1
CORN STALKS	60:1
SAWDUST	250:1

CHOOSING FORAGES

Heat-drought resistant species

- Tall fescue
- Orchardgrass
- Sheep fescue
- Perennial rye
- Wheatgrasses
- Legumes: Alfalfa, clover, sainfoin,
sweet clover, peas

SAINFOIN

It is a preferred perennial forage
for cattle & sheep



ORCHARDGRASS

Irrigated pastures



MEADOW FESCUE

- Nontoxic fungi called “endophytes” , helps it survive drought, heat & pests
- Highly adaptable & persistent
- 4%-7% more digestible than other cool-season grasses



(According to ARS)

GRASS MIXTURES

Grass mixes will have higher yields and protein

TALL FESCUE,

PERENNIAL

RYE



SHEEP FESCUE

Improved Grasses and Legumes for Idaho

By Dan Ogle, Glenn Shewmaker and Ken Sanders

For a complete list of grasses and legumes

Go to:

<http://www.extension.uidaho.edu/forage/Proceedings/2006%20PDF/Ogle%20Improved%20Grasses.pdf>

Or email us and we will send it to you.

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587-2136 Ext-509

elmore@uidaho.edu

Pasture Establishment presentations:

Forage Pests

Forage Harvest Management

Portions of this presentation were provided by:

CIS 392: Southern Idaho Fertilizer guide-Irrigated pasture

By Glenn Shewmaker, Jason Ellsworth and Scott Jensen

Improved Grasses and Legumes for Idaho

By Dan Ogle, Glenn Shewmaker and Ken Sanders

<http://www.extension.uidaho.edu/forage/Proceedings/2006%20PDF/Ogle%20Improved%20Grasses.pdf>

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