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Fertilizer Guide

Irrigated Spring-Planted Small Grains
Peat and Muck Soils
(Klamath and Lake Counties)

Soil management practices and fertilizer recommendations for peat and muck soils in Klamath and Lake Counties are distinctly different than for mineral soils.

High levels of salts and boron have been a problem on many lower Klamath Lake soils and organic soils in Lake and Harney counties. Surface application of water, by flooding or sprinklers, followed by pumping water out of drain ditches, has reduced salt problems on most fields. However, growers who irrigate by filling drain ditches and letting water "sub" to the surface move the salts back to the soil surface.

CONTROL OF SOIL WATER

Water control is the most critical management practice affecting the availability of plant nutrients in these soils for stand establishment and successful yields. The following steps are recommended:

1. * Establish deep drain ditches to remove winter water.
   * Ditches should be 6+ feet deep and spaced about 1200 ft apart.
   * Perforated plastic tile drains can supplement surface drain ditches.

2. Pump winter water out about Feb. 1 to allow timely seed bed preparation.

3. * Surface irrigation after planting is essential to establish optimum seed bed soil water for uniform stand establishment and availability of fertilizer applied.
   * Spring applied fertilizers will not benefit that year's crop if seed bed soil moisture is not optimum after planting.
   * A moist surface soil also provides some frost protection during seedling stages.

Sprinkler irrigation is the most expensive irrigation method but provides the best control of soil water. One to 1.5 inches of water should re-establish seedbed soil water.

Surface flooding is the second choice after sprinkler irrigation if good drainage is available and fields have been leveled so that water is uniformly distributed. Water runs should be no more than 1000 feet. Scald may result if water ponds, especially during warm or hot weather.

Filling drain ditches and subbing is the last irrigation choice as optimum seed bed moisture is difficult to establish and salts are moved to the soil surface.

SOIL PROPERTIES

Peat and muck soils weigh less per cubic foot than mineral soils and have different nutrient availability. Therefore, the interpretation of soil test values differs between muck and mineral soils.

An average mineral soil weighs about 84 lb per cubic ft. (ft^3), while lower Klamath Lake muck soils with about 20% organic matter weigh about 40 to 45 lb/ft^3. Upper Klamath Lake peat soils with 50 to 75% organic matter might weigh 15 to 30 lb/ft^3.

NITROGEN (N)

Nitrogen recommendations are based on percent organic matter (OM) and years the field has been in crop production.

* Nitrate nitrogen soils tests have little value on these soils.

Upper Klamath Lake (probably 50%+ OM)

Years Crop Production	N application lb/A
0 - 6	none
6 - 12	40
12+	80

Lower Klamath Lake (probably 12-25% OM)

	N application lb/A
Oats	60
Barley	60 - 100
Wheat	80 - 120

* Band 20 to 30 lb N/A with the seed at planting where manganese or zinc deficiency is expected or might be a problem. Ammonium sulfate or ammonium phosphate-sulfate (16-20-0) or N,P,K fertilizers containing these materials are recommended for application with the seed.

* The remaining nitrogen can be applied as any of the standard materials used in the area, such as anhydrous ammonia, urea, Soln-32, ammonium sulfate, or ammonium nitrate.

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* Adjust N rates to for yield potential. Yields of 5500 to 6000 lb/A have been produced on Lower Klamath Lake muck soils with 30 to 40 lbs N/A banded at planting if planting dates, stand, soil moisture, and weed control are optimum.

  Where yield potential for the variety and soil are higher, each 30 to 40 lb N/A added should add 1000 lb grain yield/A.

PHOSPHORUS (P)

Best results are obtained when P is banded with the seed at planting.

Plowing down or discing into the seedbed before planting is better than surface broadcasting at planting.

There is good residual (carryover) value for previous P applications on peat and muck soils if seed bed soil moisture is optimum.

* Do not band diammonium phosphorus or urea phosphorus mixtures on Lower Klamath Lake muck soils where the pH is 6.5 or higher.

If the OSU soil test for P reads (ppm):	Apply this amount of phosphorus (P_2O_5), lb/A)
Lower Klamath Lake -- soils 40 lb/ft³	
0 - 20	40 - 60
20 - 45	30 - 40
Over 45	None
Upper Klamath Lake -- soils 20-30 lb/ft³	
0 - 30	40 - 60
30 - 60	30 - 40
Over 60	None

When broadcasting P use double the rate recommended above and work into the soil prior to seeding.

POTASSIUM (K)

On peat and muck soils in Klamath County, small grains have responded to K application where the OSU soil test for K was below 300 ppm.

If the OSU soil test for K reads (ppm):	Apply this amount of potassium (K_2O), lb/A:
0 - 300	60 - 100
300 - 400	30 - 60
Over 400	None

K should be applied before seeding and worked into the seedbed. Banding K has reduced yields under some conditions.

SULFUR (S)

10 to 15 lbs S/A should be included with the spring applied fertilizer.

MICRO-NUTRIENTS

Micro-nutrients can be blended with other fertilizers. Foliar analyses and visual deficiency symptoms are the best ways to identify deficiencies of these nutrients.

Copper deficiency has been widespread, especially on peat soils with 50+% organic matter.

Manganese deficiency is the major micro-nutrient deficiency on lower Klamath Lake and is the most difficult micro-nutrient to correct. Soil pH and organic matter are the two major factors affecting manganese availability. Manganese deficiency has been observed on muck soils with pH 6.5+ and on a few fields near Williamson River with pH 6.0+.

Manganese deficiency would not be expected where the soil pH is 5.5 or less. Manganese deficiency is more widespread with oats than with barley.

Zinc deficiency has been observed on a number of locations. Zinc soil test values of 1.0 ppm Zn should indicate adequate Zn.

Methods of Application:

* Banding acid forming N-P fertilizers with the seed at planting followed by good seed bed soil moisture is the best way to supply these micro-nutrients.
* Spray applications of micronutrients for foliar uptake can be made after spring grain plants are about 6" high and visual deficiency symptoms have been identified.

Ammonium sulfate, ammonium phosphate sulfate (16-20-0), and mono-ammonium phosphate (11-48-0) are the best dry materials to band at planting.

Plant samples for chemical analyses:

Ask the OSU Extension Service agent in your county or Experiment Station personnel for specific instructions on collecting plant samples for chemical analyses.

Collect leaf blade material at early tillering (plants will generally have 6 to 7 leaves at this growth stage). The following levels are generally associated with deficiency symptoms:

Copper -- 3.5 ppm or less
Manganese -- 20 ppm or less
Zinc -- 15 ppm or less

The following levels are generally associated with good growth and high yields, if other management practices are optimum:

Copper -- 5.0 ppm or higher
Manganese -- 25.0 ppm or higher
Zinc -- 20 ppm or higher

BORON TOXICITY

Boron toxicity can be a problem on lower Klamath muck soils where B soil tests are above 10 ppm and/or where toxicity symptoms have been identified.

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