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In Boundary County

Manganese Improves Oat Yields

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Manganese application has increased yields of some oat varieties grown in the Kootenai River bottom near Bonners Ferry. This is the only area of northern Idaho where oats have shown a response to manganese fertilizer.

Symptoms of Manganese Deficiency in Oats

The first symptoms of manganese deficiency in susceptible oats usually are light green to light brown spots or streaks on the leaf margins (Fig. 1). As plant development continues, the leaves show more severe symptoms until yellowish-brown streaks cover the entire leaf. Oats become stunted and yields are severely reduced.

Tolerant and Susceptible Varieties

Varieties of oats fall in two categories in relation to symptoms of manganese deficiency and yield. These categories are:

(1) Moderate to severe symptoms - Moderate to large yield increases from manganese application.

(2) Few to no symptoms - None to moderate yield increase from manganese application.

Table 1 shows some commercial oat varieties, symptom expression, and yield response to manganese application. Cayuse oats are very susceptible to manganese deficiency and exhibit the most severe symptoms of all commercial varieties tested. Cayuse oats also give the highest yield increase from manganese application. Although Park oats generally do not show many symptoms, manganese application increased yields of this oat an average of 467 pounds per acre.

Oat varieties showing severe symptoms can be expected to respond to manganese application. For example, Kelsey, Sierra, and Orbit have not been tested for response to manganese application but yield will probably increase when manganese is applied to these varieties.

The lack of symptoms does not mean that oat varieties will not respond to manganese application. For

Fig. 1. Symptoms of manganese deficiency in oats start with small spots or streaks on leaf margins as at left above. As the plant develops, the symptoms may be shown as as yellowish-brown streaks covering the entire leaf.

example, Park and Random usually show few symptoms of manganese deficiency, but consistently show an increase in yield from manganese application. The response of Glen, Sierra, and Orbit to manganese application is unknown. Test weights of oats were not significantly affected by manganese application (Table 2).

Correcting a Manganese Deficiency

Variety Choice

Where possible, Park or other tolerant varieties should be grown. These varieties may still respond to manganese application even though symptomless to manganese deficiency (Table 2).

Rate of Manganese and Volume of Carrier

For Cayuse or other varieties showing severe symptoms, make a foliar application of manganese sulfate at a rate of 3 pounds of manganese per acre. For Park, Random or other varieties showing few or no symptoms, apply 1.5 pounds actual manganese per acre. Apply the manganese with at least 25 gallons of water per acre and with a wetting agent to aid coverage on leaf surface.

Time of Application

Apply manganese when oats have 6 to 8 leaves or 2 or 3 tillers. Later applications will give some response but not as much as early applications. Manganese applied when oats are in the tillering stage will give good results if the applications are made immediately after symptoms appear. Symptoms on early leaves will not disappear when applications are made at this time, but later leaves will be healthy and green.

To Help Identify Manganese Deficiency

If a tolerant variety of oat is being raised which shows few or no symptoms, the need for manganese can be determined by hand-planting a small row of Cayuse seed and watching for appearance of symptoms on the Cayuse oat leaves. At the first appearance of symptoms, apply manganese.

Barley and Wheat Response to Manganese

Unitan and Steptoe varieties of barley have shown yield increases from manganese application but most other barley varieties show no yield response. None of the wheat varieties tested have shown an increase in yield from manganese application. Barley and wheat varieties generally show no symptoms of manganese deficiency.

Table 1. Oat varieties, symptom expression, and yield increase from manganese application.

Variety 1	Symptom expression	Yield increase from manganese lb./acre
Cayuse	Severe	977
Kelsey	Moderate	128
Fraser	Few	Unknown
Park	Trace most years	467
Random	Few	525
Markton	Few	None
Harmon	Few	None
Glen	None	Unknown
Sierra	Severe	Unknown
Orbit	Severe	Unknown

1 Based on three years' data for Cayuse and Park varieties and 1972 data for the remaining varieties.

Table 2. Yields and test weights of oat varieties with and without manganese application in 1972.

Oat variety	Yield (lb./acre)		Test weight (lb./Bu)	
	With manganese 1	Without manganese	With manganese	Without manganese
Cayuse	4792	3600	36.5	37.0
Park	4588	4219	37.0	36.5
Random	4501	3976	35.0	35.5
Markton	4303	4650	35.5	35.5
Harmon	3986	4095	37.5	36.5

1 Manganese sulfate applied at 3 pounds actual manganese per acre.

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