

Table 1. Effect of ferrous sulfate and various plant materials on DTPA-soluble Fe in an alkaline soil. Experiment 1.

Ferrous sulfate mg Fe/kg	Plant material †	----- Length of incubation, weeks -----		
		1	2	4
0	None	4.4	4.7	3.7
0	Alfalfa	4.5	4.5	4
0	Pigweed	4.4	4.7	3.9
0	Soybean meal	4.9	5.4	4.5
200	None	7.7	7.2	6.2
200	Alfalfa	27.2	20.3	14.3
200	Pigweed	24.2	21.1	14.6
200	Soybean meal	23.8	15.7	12.1
SE ‡		1.1	0.6	0.8

† Rate of plant materials was 10 g/kg; ‡ SE=Standard error

Table 2. Effect of ferrous sulfate and various rates of different plant materials on DTPA-soluble Fe in an alkaline soil. Experiment 2.

Ferrous sulfate mg Fe/kg	----- Plant material -----		----- Length of incubation, weeks -----			
	Rate g/kg	Source	1	2	4	8
0	--	None	4.7	4.2	3.7	3.1
100	--	None	10.9	8.7	7.3	5.1
100	5	Wheat straw	12.5	12.5	8.1	7.0
100	10	Wheat straw	13.7	11.4	9.0	8.0
100	20	Wheat straw	14.6	11.7	8.6	8.8
100	5	Sunflower hulls	11.0	9.6	7.8	6.7
100	10	Sunflower hulls	14.3	12.4	9.5	8.7
100	20	Sunflower hulls	17.3	14.4	11.1	9.5
100	5	Beet pulp	10.9	8.1	6.5	4.3
100	10	Beet pulp	12.8	10.3	8.4	5.6
100	20	Beet pulp	16.9	13.6	10.8	7.1
100	5	Beet molasses	28.1	20.8	14.8	8.6
100	10	Beet molasses	31.6	24.6	17.6	9.9
100	20	Beet molasses	35.8	27.4	19.4	11.0
SE †			1.3	1.1	0.8	0.8

† SE=Standard error

Table 3. Effect of different plant materials, ferrous sulfate, and ammonium sulfate on DTPA-soluble Fe in an alkaline soil. Experiment 3.

Plant material	Ferrous sulfate	Ammonium sulfate	----- Length of incubation, weeks -----			
			1	2	4	8
			----- mg Fe/kg -----			
None	Minus	Minus	4.8	3.8	3.4	3.1
None	Minus	Plus	4.9	3.8	3.1	2.9
None	Plus	Minus	9.2	7.6	5.9	5.4
None	Plus	Plus	10.8	7.3	6.3	5.3
Straw	Minus	Minus	3.4	2.5	2.2	2.0
Straw	Minus	Plus	4.4	3.0	3.0	2.2
Straw	Plus	Minus	13.5	9.6	8.1	7.1
Straw	Plus	Plus	13.4	8.6	7.6	7.5
Molasses	Minus	Minus	4.7	3.4	3.2	3.4
Molasses	Minus	Plus	5.4	3.7	3.2	3.4
Molasses	Plus	Minus	23.4	13.2	10.6	9.8
Molasses	Plus	Plus	21.6	13.0	10.5	9.9
SE †			0.4	0.4	0.3	0.1

Straw was applied at 10 g/kg, molasses at 5 g/kg, and ammonium sulfate at 200 mg N/kg.

† SE=Standard error

Table 4. Effect of ferrous sulfate, plant material, and method of application on DTPA-soluble Fe in an alkaline soil. Experiment 4.

Ferrous sulfate mg Fe/kg	Plant material †	Applic. method	----- Length of incubation, weeks -----				
			1	2	4	6	8
			----- mg Fe/kg -----				
0	None	--	5.2	4.2	3.7	3.1	3.1
100	None	Mixed	13.7	11.8	9.0	7.9	6.7
100	Mol	Mixed	25.4	20.3	15.1	12.0	11.1
100	SM	Mixed	26.4	21.1	13.7	12.2	7.8
100	None	Spot	9.7	8.0	6.2	5.4	5.2
100	Mol	Spot	26.7	18.9	13.7	10.1	9.6
100	SM	Spot	30.6	23.1	16.1	11.9	11.0
SE ‡			1.0	0.7	0.9	0.4	0.4

† Mol=beet molasses, SM=spent molasses, applied at 5 g/kg; ‡ SE=Standard error

Table 5. Effect of ferrous sulfate and beet molasses applied to wheat stubble in October, 1999, on DTPA-soluble Fe in November, 1999 and May, 2000. Four sites, eastern ND.

Ferrous sulfate†	Molasses	Site			
		Argusville	Arthur	Ayr	Casselton
lb/A	lb/A	mg Fe/kg			
<b>Fall samples</b>					
0	0	7.9	6.7	7.2	8.5
40	0	8.8	7.2	8.5	9.6
40	250	9.0	8.2	9.3	11.3
Significance of F					
Treatment		**	**	**	**
SE ‡		0.2	0.1	0.2	0.2
<b>Spring samples</b>					
0	0	4.3	3.6	3.4	6.0
40	0	3.0	4.0	5.1	6.6
40	250	4.7	6.3	5.3	6.9
Significance of F					
Treatment		**	**	**	**
SE		0.2	0.1	0.2	0.1

† Ferrous sulfate monohydrate, 30% Fe, 12 lb Fe/A; ‡ SE=Standard error

Table 6. Effect of ferrous sulfate and molasses applied to wheat stubble in October, 1999, on chlorophyll content of soybean leaves in the greenhouse. Average of first and second trifoliolate leaves.

Ferrous sulfate†	Molasses	Soil water	Site			
			Argusville	Arthur	Ayr	Casselton
lb/A	lb/A	%	Relative chlorophyll content ‡			
0	0	15	29.0	24.3	24.9	30.0
		20	27.4	9.1	17.4	28.8
40	0	15	27.6	20.9	28.1	31.1
		20	23.3	15.0	23.3	28.6
40	250	15	26.8	24.3	26.7	30.5
		20	25.8	15.3	23.2	28.3
Significance of F						
Treatment			NS	NS	*	NS
Water			NS	**	**	**
Treatment x Water			NS	NS	NS	NS
SE §			2.7	2.4	1.5	0.5

† Ferrous sulfate monohydrate, 30% Fe, 12 lb Fe/A; ‡ Relative chlorophyll content, as indicated by a Minolta SPAD meter; § Standard error

Table 7. Effect of fall-applied ferrous sulfate and molasses on the severity of iron deficiency chlorosis in soybean the following year, 2-3 and 5-6 trifoliolate stages.

Ferrous sulfate†	Molasses	Site -----			
		Argusville	Ayr	Casselton	Galesburg
lb/A	lb/A	----- Chlorosis score † -----			
<b>2-3 trifoliolate stage</b>					
0	0	3.2	3.3	3.3	3.2
40	0	3.0	2.8	3.2	3.3
40	250	3.2	2.8	3.2	3.3
Significance of F					
Treatment		NS	NS	NS	NS
SE ‡		0.2	0.2	0.1	0.2
<b>5-6 trifoliolate stage</b>					
0	0	2.7	2.8	2.7	2.7
40	0	2.5	2.5	2.7	2.7
40	250	2.7	2.3	2.8	2.7
Significance of F					
Treatment		NS	NS	NS	NS
SE		0.2	0.2	0.1	0.2

† Ferrous sulfate monohydrate, 30% Fe, 12 lb Fe/A; ‡ 1=no chlorosis, 5=severe chlorosis  
§ Standard error

Table 8. Effect of fall-applied ferrous sulfate and molasses on seed yield of soybean the following year.

Ferrous sulfate†	Molasses	Site -----			
		Argusville	Ayr	Casselton	Galesburg
lb/A	lb/A	----- bu/A -----			
0	0	46.3	23.2	53.1	44.4
40	0	49.4	27.7	58.0	41.0
40	250	47.8	25.1	55.7	41.7
Significance of F					
Treatment		NS	NS	NS	NS
SE ‡		1.2	2.5	1.5	3.5

† Ferrous sulfate monohydrate, 30% Fe, 12 lb Fe/A; ‡ SE=Standard error