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SOYBEAN CHOICES FOR IRON-DEFICIENT SOILS

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Yellow etiolated soybeans with reduced yields caused by a shortage of available iron are increasing problems in Kansas. In the central and western portions of the state, the iron-deficient areas that often are associated with highly calcareous soils are becoming more apparent. In severe cases of iron deficiency, other crop choices should be considered rather than soybeans. However, where soybeans are grown, partial solutions to this crop problem are possible.

Yield losses from iron deficiency often can be minimized in soybeans by:

(1) Growing varieties with genetic tolerance to iron chlorosis.

(2) Making field applications of livestock manure.

(3) Making foliar applications of iron-containing materials.

Among those three alternatives, using varieties tolerant of iron-deficient soils is generally the most desirable. Livestock manure applications to a field are often effective, but drawbacks include lack of accessibility to manure, high transportation costs, and frequent presence of weed seed. Foliar iron applications often are not very effective with soybeans, and the materials also tend to be expensive, difficult to maintain in suspension, and abrasive to application equipment.

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Procedure

Sixty soybean varieties were studied in 1994 in field plots at the Southwest Research–Extension Center near Garden City, KS for their response to soils with limited available iron. Iron uptake values were recorded as chlorophyll (greenness) measurements using a Minolta SPAD-502 Chlorophyll Meter. Ratings were averaged from three plots for each entry. This soil site contained approximately 5 ppm iron (DPTA test).

Results

The reactions of some public and private soybean varieties are given in Table 1. These data cover released varieties available to the public or experimentals nearing release and of interest to producers.

The first 12 varieties listed rank significantly better than other entries in tolerance to limited available iron. The very poorest tolerance was shown by the variety Ohlde 4040.

Conclusions

Although no soybean varieties are available with complete tolerance to iron chlorosis, some show moderate levels of tolerance. Moderate tolerance allows improved soybean production in all but the most severe problem areas. Thus, variety selection is often the most practical solution to chlorosis caused by iron deficiency.

Table 1. Evaluation of soybean varieties for iron chlorosis tolerance.

Brand	Entry	Maturity Group	Iron Uptake Reading [1]
Ohlde	3214	III	33.0
Ohlde	3431A	III	30.7
DeKalb	CX458	IV	30.3
Midland	8413	IV	30.3
	Sparks	IV	29.3
Ohlde	3820	III	29.0
	K1231	IV	29.0
	K1261	IV	28.7
	KS4390	IV	28.0
Deltapine	DP 3456	IV	28.0
Deltapine	DPX 3432	IV	28.0
	K1213	IV	27.7
Pioneer	9393	III	27.3
Drussel	DSS Exp 35203	III	27.0
Midland	8355	III	27.0
Midland	8375	III	27.0
	KS4694	IV	27.0
Agripro	AP 4510	IV	27.0
	Williams 82	III	26.7
Drussel	DSS Exp 4358	III	26.7
	K1235	IV	26.7
	KS3494	III	26.3
Drussel	DSS 3880	III	26.3
Ohlde	X3660	III	26.3
Pioneer	9341	III	26.0
Hyperformer	HY 351	III	25.7
Midland	8393	III	25.3
Asgrow	A3510	III	25.0
Drussel	DSS Exp 6353	III	25.0
Golden Harvest	H-1388	III	25.0
Ohlde	3272	III	25.0
Ohlde	3750A	III	24.7
Ohlde	X3550	III	24.7
	HC89-2170	IV	24.7
Midland	Exp 372	III	24.3
Ohlde	X816	III	24.0
DeKalb	CX411	IV	24.0
	Resnik	III	23.3
	Corsica	IV	23.3
	Flyer	IV	22.7
Golden Harvest	H-1353	III	22.3
Ohlde	3570	III	22.3
	K1262	IV	22.3
	Kenwood	III	21.7
	KY88-5037	IV	21.7
Hyperformer	HY 446	IV	21.7
Agripro	AP3800	III	21.0
Pioneer	9381	III	20.3
	Edison	III	20.0
Ohlde	3870	III	20.0
Hyperformer	HSC 398	III	19.3
Asgrow	A4138	IV	19.0
	C1832	III	18.7
	Sherman	III	18.7
Pioneer	9362	III	17.3
Hyperformer	HY 498	IV	15.7
Deltapine	DP 3478	IV	14.3
Stine	3490	IV	14.3
Northrup King	542-60	IV	14.0
Ohlde	4040	IV	12.0
Test Average			24.0
L.S.D. (5%)			5.7

[1] Highest value is best.

Note: Trade names are used to identify products. No endorsement is intended, nor is any criticism implied of similar products not named.

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