Is Raptor to Blame for the Yellow Soybeans?

On August 5, a consultant visited several farm fields about 60 miles northeast of Fargo, North Dakota. The fields were planted to soybeans that had been treated with the herbicide Raptor™ [agproducts.basf.us/products/raptor-herbicide.html]. The farmers noticed that their soybeans turned yellow after Raptor was applied and inquired to the manufacturer if Raptor could have caused the yellowing. The consultant was asked to visit the fields to determine the cause of the chlorosis.

Photo A. Soybeans exhibiting chlorosis in the middle of a 55 acre field. In general, these symptoms appeared somewhat sporadically throughout several fields in the area, and on several different soybean cultivars.

Photo B. The chlorosis appeared sporadically throughout many fields in this area of North Dakota, as shown above, which is the southeast corner of a 78-acre field. Raptor was applied to this field, and the weed control is good compared to an untreated area.

Photo C. Some soil compaction shown in a sample collected from an area with chlorotic plants.

Photo D. Soil compaction was not evident in this sample collected from an area with green plants.

Photo E. Raptor was applied to this plot of soybeans.

Photo F. Chlorotic soybeans from the plot in Photo E that were treated with Raptor.

Photo G. Roundup™ [www.monsanto.com/monsanto/ag_products/crop_protection/default.asp] was applied to this plot of soybeans; chlorosis occurred in this field, as well.

Photo H. Close-up of chlorotic soybeans from the plot in Photo G that were treated with Roundup.

Photo I. Chlorotic soybeans showing good nodule formation.

Photo J. Chlorotic plant (bottom) and green plant (top). A potential disease problem is shown in the stem of the chlorotic plant.

Other observations found in the consultant's notebook from their Aug. 5 visit:

"The fields have recovered considerably since the chlorosis was initially reported."

"June and early July were very wet; weather patterns have become more 'normal' since then."

"The pattern of damage does not match the 90 foot spray applicator boom width; there are no visible patterns of damage where overlap application occurred [from turning the applicator around]."

"Soil compaction was found in some areas of the fields [See Photos C and D], but not in other areas. The compaction was not severe enough to cause rooting problems but may have affected air exchange in the soil; samples collected for texture analysis [below]."

Tissue Analyses (Soybean; Growth Stage R-3/4, Flower)
Soybean leaf samples from Boor [received Raptor] and Lipton [did not receive Raptor] fields

Sample	N (%)	P (%)	K (%)	S (%)	Ca (%)	Mg (%)	Zn (ppm)	Fe (ppm)	Mn (ppm)	Cu (ppm)	HCl-soluble Fe (ppm)	HCl-soluble Mn (ppm)
Boor Chlorotic	6.01	0.64	2.85	0.23	1.85	0.81	24	279	347	11.8	56	345
Boor Green	5.39	0.56	2.48	0.23	1.89	0.81	26	134	253	11.0	72	210
Lipton Chlorotic	6.92	0.71	2.59	0.3	1.99	0.92	31	253	516	12.4	44	446
Lipton Green	6.29	0.51	2.4	0.36	1.80	0.72	26	78	272	9.4	60	234

Soil Texture Analyses
Samples from Geller, Polson, and Lipton fields and from soil around chlorotic and green soybean areas, as indicated.

Sample	Sand (%)	Silt (%)	Clay (%)	Texture
Geller, Chlorotic	21	63	16	sil
Geller, Green	21	69	10	sil
Polson, Untreated	23	51	26	sil
Lipton, Chlorotic	31	55	14	sil
Lipton, Green	33	43	24	l

Soil Nutrient Analyses

Soil samples from several fields in the affected area, including Boor, Lipton, Geller, and Polson [*untreated = no Raptor application].

Sample	1:1 Soil pH	S Salts 1:1 mmho/cm	Excess Lime Rating	Organic Matter LOI-%	NO_3-N inches	NO_3-N ppm N	NO_3-N lbsN/A	P ppm M-2	K OAc ppm	S ppm	Zn ppm	Fe ppm	Mn ppm	Cu ppm	Ca OAc ppm	Mg OAc ppm	Na OAc ppm	B ppm
Geller Chlorotic	7.9	0.75	High	3.8	0-8	50.2	120	75	467	10	0.79	1.8	2.4	1.36	4728	1337	104	0.81
Geller Green	8.1	0.47	High	4.8	0-8	7.3	18	70	458	9	0.77	2.8	4.1	1.75	4984	1515	116	0.60
Polson Untreated*	8.2	0.51	High	2.6	0-8	2.9	7	47	264	5	0.26	1.8	3.2	1.01	5565	884	35	0.53
Polson Chlorotic S End	8.2	0.61	High	3.2	0-8	28.3	68	40	149	7	0.23	1.2	1.8	0.66	4828	1012	74	0.75
Polson Chlorotic N End	8.2	0.66	High	3.1	0-8	31.9	76	67	243	6	0.35	1.6	2.4	0.82	5075	1065	83	0.74
Polson Green	8.3	0.55	High	2.9	0-8	7.1	17	44	155	7	0.24	1.4	2.2	0.79	5659	1087	79	0.67
Boor Chlorotic	8.1	1.04	High	2.7	0-8	53.6	129	67	409	125	0.57	2.5	3.6	0.98	5686	1067	69	0.51
Boor Green	8.1	0.78	High	2.5	0-8	5.4	13	66	356	76	0.65	4.0	5.7	1.05	5626	1047	62	0.58
Lipton* Chlorotic	8.1	0.99	High	4.2	0-8	63.1	151	60	211	105	0.48	2.5	3.3	0.79	6135	1334	133	0.98
Lipton* Green	8.1	0.64	High	4.3	0-8	15.7	38	58	193	11	0.52	3.1	3.9	0.82	6304	964	163	1.03

Assignment: You assume the role of the consultant.

Evaluate the data above and answer the questions: What is the problem? What caused it? Is Raptor™'s manufacturer responsible for the chlorosis on the soybeans? Detail your conclusions in letter form 'To Whom It May Concern'. Support your statements by pointing to specifics in the analyses and/or noted observations.