National FFA Agronomy CDE Clinic Fertility Problem 2

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Scenario:

A county agricultural agent, Dr. Cory Whaley, was contacted in late summer by Jake Farmer asking for an explanation of what was causing stripping in his double-crop soybean field. For a history of the field, Jake Farmer provided the following information:

Four years ago, this particular field had received a dairy manure application (Jake rotates fields when applying his liquid dairy manure and is very conscientious about being sure the liquid manure is well agitated before it is applied to a field) at a rate of 8,000 gallons per acre. In the fall of last year, Mr. Farmer planted a winter oat crop which he planned to harvest for straw/hay in early- to mid-July of this year. He mowed the oat crop, allowed it to dry for two days and then raked the crop into windrows to finish drying before baling the straw/hay crop. Unfortunately for Mr. Farmer, a fast moving rain storm hit the area and dropped 0.25 inches or rain over the windrows. Mr. Farmer had to wait another three days before the straw/hay crop dried sufficiently to bale. Enough of the crop remained so that the windrows were still identifiable later that summer when the problem was noticed. Following removal of the baled straw/hay, Jake Farmer planted soybeans. The light rain storm had supplied sufficient soil moisture so that the soybeans successfully emerged and began growth. In mid-August while driving by the field, Mr. Farmer noticed stripes of yellowing beans (see photos below) as well as height differences with the yellowed beans about half the height of the greener stripes in the field. Puzzled by this, Mr. Farmer called his county agricultural Extension agent who arrived at the field and took soil samples of the good (greener) bean stripes and the bad (yellowed, shorter) bean stripes. The soil test results are reported below following the photos of the field.

In this case, the agricultural Extension agent would like your input as to what the problem is in the field, why the problem exists, and what Mr. Farmer can do about the situation. The soybean crop is just beginning to bloom and could still make a crop if you're able to supply them with the correct answers to the questions listed at the end of the problem. **Be sure to fill out your name, state, and Team and Member ID number.**

Figure 1. Soybean planted following oats harvested for oat straw raked and windrowed before baling but showing striping across the field with greener soybeans where oat straw windrows lay.

Figure 2. Close-up of deficiency symptoms exhibited by soybean plants between windrows.

University of Delaware Soil Testing Program
Troubleshooter Report for Cory Whaley

UD Bag No.: 900973
UD Lab No.: 90008

Grower: Jake Farmer
Sample ID: Good

pH: 5.8 **OM by LOI:** 1.5 **%**
Buffer pH: 7.66 **Sol. Salts:** **mmhos/cm**
Lime Recommendation: **tons/ac**

	Nutrient Analysis -- Mehlich 3				Interpretive Rating
P:	190	**FIVs =**	380.0	**lbs P/ac**	Excessive
K:	23	**FIVs =**	83.7	**lbs K/ac**	Low
Mg:	37	**FIVs =**	96.9	**lbs Mg/ac**	Medium
Ca:	50	**FIVs =**	1000.0	**lbs Ca/ac**	Medium
Mn:	20.41	**lbs/ac**			Sufficient
Zn:	6.11	**lbs/ac**			Sufficient
Cu:	4.75	**lbs/ac**			Sufficient
Fe:	240.50	**lbs/ac**			---
B:	0.85	**lbs/ac**			Medium
S:	46.85	**lbs/ac**			Sufficient

Fertility Index Value (FIVs) Interpretation

Low (0-25 FIVs):	The nutrient concentration in the soil is inadequate for good growth of most plants and will likely limit the growth and yield of most plants. There is a high probability of a favorable economic response to applications of the nutrient.
Medium (26-50 FIVs):	The nutrient concentration in the soil may be adequate for plant growth but should be increased to the optimum range to ensure that plant growth and yield are not limited. There is a low to moderate probability of a favorable economic response to applications of the nutrient.
Optimum (51-100 FIVs):	The nutrient concentration in the soil is in the range recommended for the growth of all plants. Since there is a very low probability of a favorable economic response, nutrient application is rarely recommended.
Excessive (101+ FIVs):	The nutrient concentration in the soil is above the range recommended for the growth of all plants. Additions of the nutrient are likely to be unprofitable, may have undesirable effects on plant growth and hence, are not recommended. Erosion and runoff from soils that are excessive in phosphorus can have negative impacts on surface water quality.

University of Delaware Soil Testing Program
Troubleshooter Report for Cory Whaley

UD Bag No.: 900974
UD Lab No.: 90009

Grower: Jake Farmer
Sample ID: Bad

pH: 5.8 **OM by LOI:** 1.6 **%**
Buffer pH: 7.70 **Sol. Salts:** **mmhos/cm**
Lime Recommendation: **tons/ac**

		Nutrient Analysis -- Mehlich 3			Interpretive Rating
P:	152	**FIVs =**	304.0	**lbs P/ac**	Excessive
K:	17	**FIVs =**	61.9	**lbs K/ac**	Low
Mg:	39	**FIVs =**	102.2	**lbs Mg/ac**	Medium
Ca:	53	**FIVs =**	1060.0	**lbs Ca/ac**	Optimum
Mn:	22.92	**lbs/ac**			Sufficient
Zn:	7.21	**lbs/ac**			Sufficient
Cu:	4.67	**lbs/ac**			Sufficient
Fe:	205.80	**lbs/ac**			---
B:	1.00	**lbs/ac**			Medium
S:	48.80	**lbs/ac**			Sufficient

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Agronomy CDE

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Name: _____ Team No: _____

State: _____ Member No: _____

Please answer the following questions (5 points apiece):

1. Could this also be a result of uneven dairy manure application **4 years ago**?

2. Based on the soil test reports and the visual symptoms, what is the likely **cause of the symptoms** [shorter plant height and marginal chlorosis of the lower (older) leaves]?

3. Based on the information provided in the scenario, what is the **most likely explanation** of the difference between the good and bad soil samples?

4. Based on the soil test results and the Weekly Crop Update article, **what nutrient source** should the producer apply to improve the chance that the crop will produce a harvestable soybean crop?

5. Based on the Weekly Crop Update article, what **application rate and method** should the producer choose to improve the chance that the crop will produce a harvestable soybean crop?