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University of Tennessee Fertilizer Recommendations are the Most Profitable Tested.

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INTRODUCTION

Several soil testing laboratories serve clients in Tennessee. Generally, soil-testing results are very similar among laboratories. Most laboratories participate in quality control programs that ensure accuracy of results. Fertilizer recommendations made from those results can, however, vary widely among laboratories. University laboratories historically have followed a "feed the crop" approach to making fertilizer recommendations where as many commercial laboratories tend to try and rapidly build soil test levels (maintenance approach) and add on many micronutrient recommendations. In many comparisons of fertilizer recommendations among laboratories (Lessman, 1986, Murdock, 1992, Williams, 1999), university recommendations have always proven to be the most profitable.

Farm trials were established at four sites (Lawrence, Lincoln, Smith and Washington counties) during 2002 to demonstrate the economic advantage of University of Tennessee Soil Testing Laboratory recommendations over those given by commercial laboratories. The three treatments tested were (1) University of Tennessee fertilizer recommendations (2) fertilizer recommendations from a commercial lab operating within Tennessee, Lab A (3) fertilizer recommendations from a commercial lab operating in an adjacent state Lab B. Each treatment was replicated three times at each. Data was not obtained or presented here from Washington County due to tobacco crop failure.

SOIL SAMPLING AND ANALYSIS

Soil samples were pulled from the three production fields in Lincoln, Lawrence and Smith counties in early 2002. For each field, the sample was thoroughly mixed, processed and then divided into three identical samples for submission to three different soil-testing laboratories. One laboratory was the University of Tennessee Laboratory (U. T. Lab) located in Nashville, Tennessee, one was a commercial laboratory that operates within the state (Lab A) and the other a commercial laboratory in an adjacent state that has many clients from Tennessee (Lab B).

Soil test results returned by the laboratories are shown in table 1. In general, results are very similar. Lab B rated phosphorus (P) lower than the other two labs in 2 out of the 3 comparisons. Potassium (K) is rated lower by Lab A and B than by the U. T. Lab in 2 out of 3 comparisons. At the higher end of the pH scale, both lab A and B reported somewhat lower pH values than did the University of Tennessee. This may be due to the practice by some commercial labs of taking a pH reading after a certain specified time interval instead of letting the sample fully stabilize.

Table 1. Soil Test Results by Three Different Labs Based Upon Analysis of the Same Soil Sample.

County	Soil Test	Lab A	Lab B	U. T. Lab
Lawrence	pH	6.4	6.7	6.8
	P	Medium	Low	Medium
	K	Medium	Adequate	High
Lincoln	pH	5.2	5.3	5.3
	P	Very High	Medium	High
	K	Very High	Very High	Very High
Smith	pH	6.0	6.1	6.3
	P	Very High	Very High	Very High
	K	Medium	Medium	High

LIME RECOMMENDATIONS

Lime recommendations (Table 2) varied somewhat among the laboratories. In the Lincoln county corn field, Lab B recommended a ton less lime per acre than the other two laboratories. Both Lab A and B recommended a ton more lime per acre than the U. T. lab in the Smith county tobacco field. Over a three-year period, costs would have been about $5.00 per acre higher for the U. T. and Lab A recommendations in Lincoln county and about $5.00 per acre lower for the U. T. lab recommendation in Smith county. This assumes agricultural limestone costs of about $15.00 per ton.

Table 2. Lime Recommended by Three Different Labs Based Upon Analyses of the Same Soil Samples.

County		Lab A	Lab B	U. T. Lab
Lawrence	pH	6.4	6.7	6.8
	Tons/acre	None	None	None
Lincoln	pH	5.2	5.3	5.3
	Tons/acre	2.5	1.5	2.5
Smith	pH	6.0	6.1	6.3
	Tons/acre	1.0	1.0	None

FERTILIZER RECOMMENDATIONS

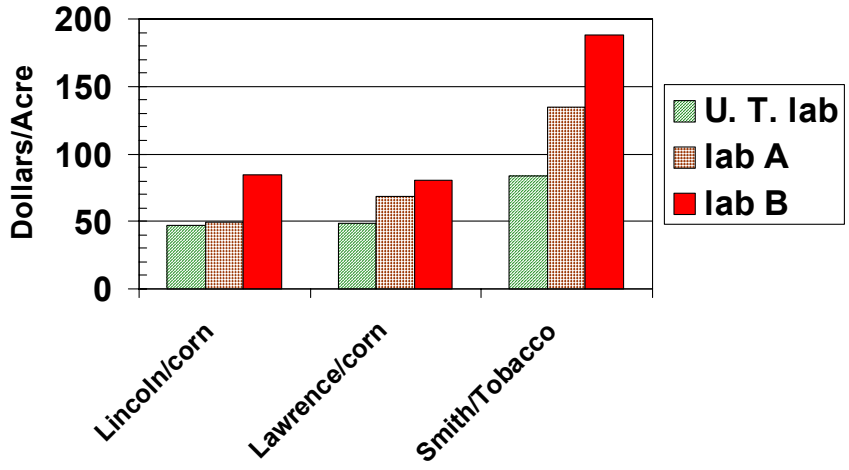
There were significant variations in fertilizer recommendations received from the three laboratories (Table 3). Commercial laboratories recommended more primary nutrients and more micronutrients than did the University of Tennessee. Lab A was closer to the University of Tennessee recommendations than Lab B. Lab B recommendations for both the primary and micronutrients were exceptionally high relative to the University of Tennessee recommendations.

FERTILIZER COSTS

Quotations from three different fertilizer dealers were averaged to obtain the fertilizer costs shown in figure 1 for each of the three production fields. In every case, average fertilizer costs resulting from the commercial laboratories were higher than those from the University of Tennessee. This is especially true for the tobacco recommendations. Lab B always provided the most costly recommendations

Table 3. Fertilizer Recommended Three Different Labs Based Upon Analyses of the Same Soil Samples (lbs/acre).				
County	**Nutrient**	**Lab A**	**Lab B**	**U. T. Lab**
Lawrence (corn)	**N**	**180**	**190**	**150**
	P	**70**	**105**	**60**
	K	**70**	**80**	**30**
	Micronutrients	**13 S + 1 B + 2.1 Zn**	**32 S + 5 Zn +0.5 Cu**	**0**
Lincoln (corn)	**N**	**180**	**210**	**180**
	P	**30**	**75**	**35**
	K	**0**	**90**	**0**
	Micronutrients	**9 S + 0.8 B**	**35 S +0.3 B + 5 Zn + 0.1 Cu**	**0**
Smith (tobacco)	**N**	**300**	**275**	**200**
	P	**0**	**0**	**0**
	K	**120**	**270**	**120**
	Micronutrients	**10 S + 0.5 B**	**24 S + 0.1 B + 1 Zn + 0.5 Cu**	**0**

Fig. 1. Average Fertilizer Costs in Three Production Fields As Obtained From Three Different Laboratory Recommendations, 2002



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Most of the differences in cost of fertilizer recommendations were due to differences in amount and type of primary nutrients recommended (Tables 3 and 4). Minor nutrient

costs ran between 2 and 15 percent of the total fertilizer costs (table 4). Minor nutrient costs were always a higher percentage of the total fertilizer costs for Lab B than for Lab A. The U. T. Lab made no recommendations for minor nutrient application to these production fields.

Table 4. Average Lime, Major and Micronutrient Fertilizer Cost Comparisons Among Laboratories (dollars per acre).

County	Nutrient	Lab A	Lab B	U. T. Lab
Lawrence	Lime	0.00	0.00	0.00
	Primary	61.52	70.43	48.39
	Micronutrient	6.77 (10%)*	9.93 (12%)	0.00
	Total	68.29	80.36	48.39
Lincoln	Lime	12.50	7.50	12.50
	Primary	46.44	71.74	46.68
	Micronutrient	2.90 (6%)	12.50 (15%)	0.00
	Total	61.84	91.74	59.18
Smith	Lime	5.00	5.00	0.00
	Primary	131.50	178.23	83.93
	Micronutrient	2.95 (2%)	9.47 (5%)	0.00
	Total	139.45	192.70	83.93

* Percent of total nutrient costs (excluding lime)

CROP YIELDS AND SUMMARY

There were no differences in crop yields (Figures 2 and 3, averages of 3 replications) that could be attributed to the fertilizer recommendations with any degree of certainty. University of Tennessee recommendations provided yields that were as good as yields resulting from the more costly commercial laboratory recommendations. There was evidently no crop yield response to extra primary nutrients added or to minor elements in these three production fields.

Figure 4 illustrates that fertilizer costs (not including lime) from commercial laboratories, in corn production systems, were as much as 1.75 greater than what was needed to maximize yield. In the tobacco production system, commercial laboratory fertilizer costs were as much as 2.25 times that needed to maximize production. Cost differences are due to both type and amount of nutrient recommended.

The University of Tennessee Soil Testing Laboratory provided producers in these county demonstrations with the most return on their fertilizer dollars spent.

Fig. 2. Corn Yields in Two Production Fields As Obtained From Three Different Laboratory Recommendations, 2002

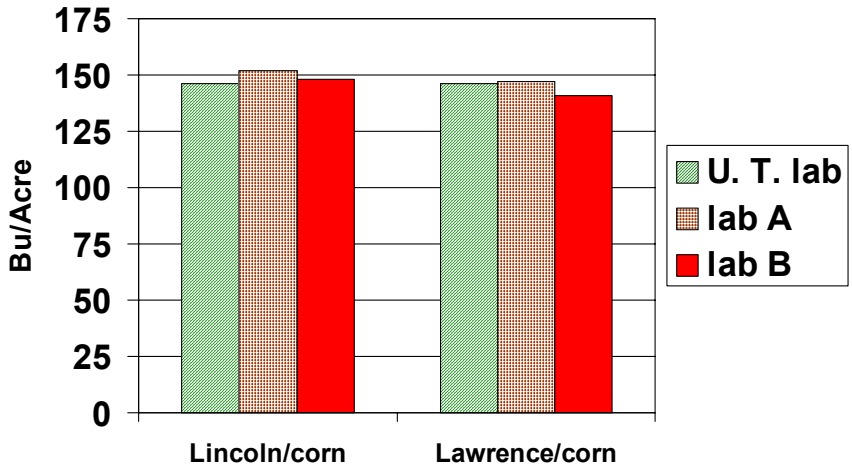


Fig. 3. Tobacco Yield in A Production Field As Obtained From Three Different Laboratory Recommendations, 2002

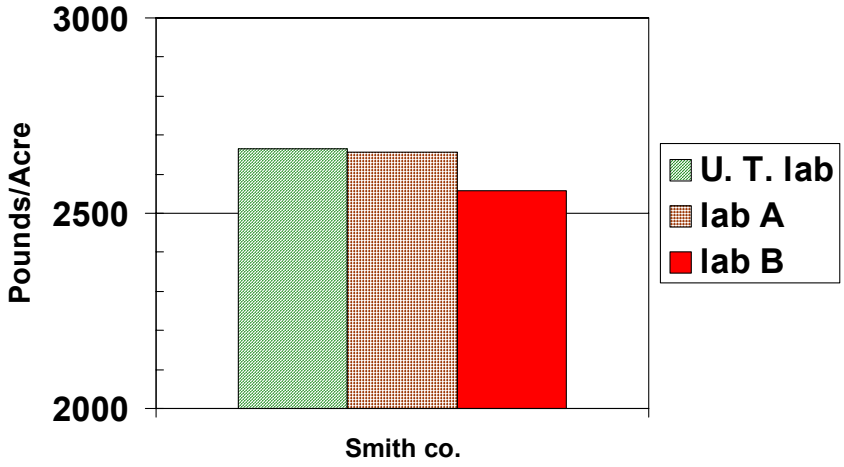
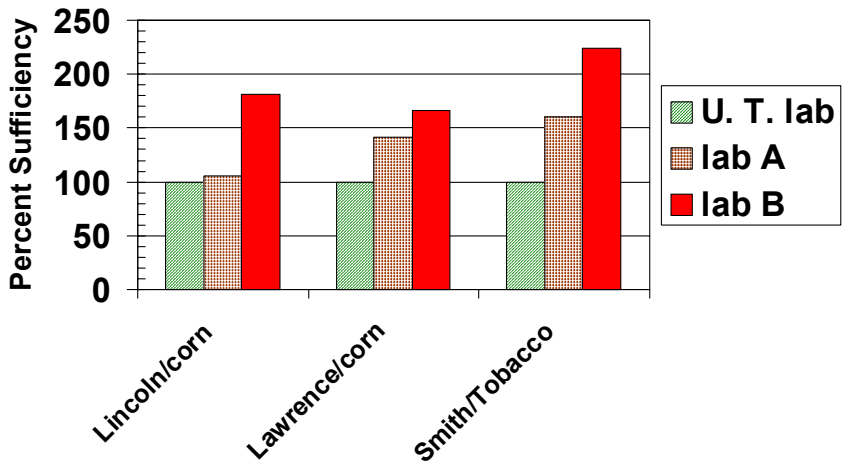


Fig. 4. Fertilizer Cost Comparisons in Three Production Fields As Obtained From Three Different Laboratory Recommendations, 2002



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