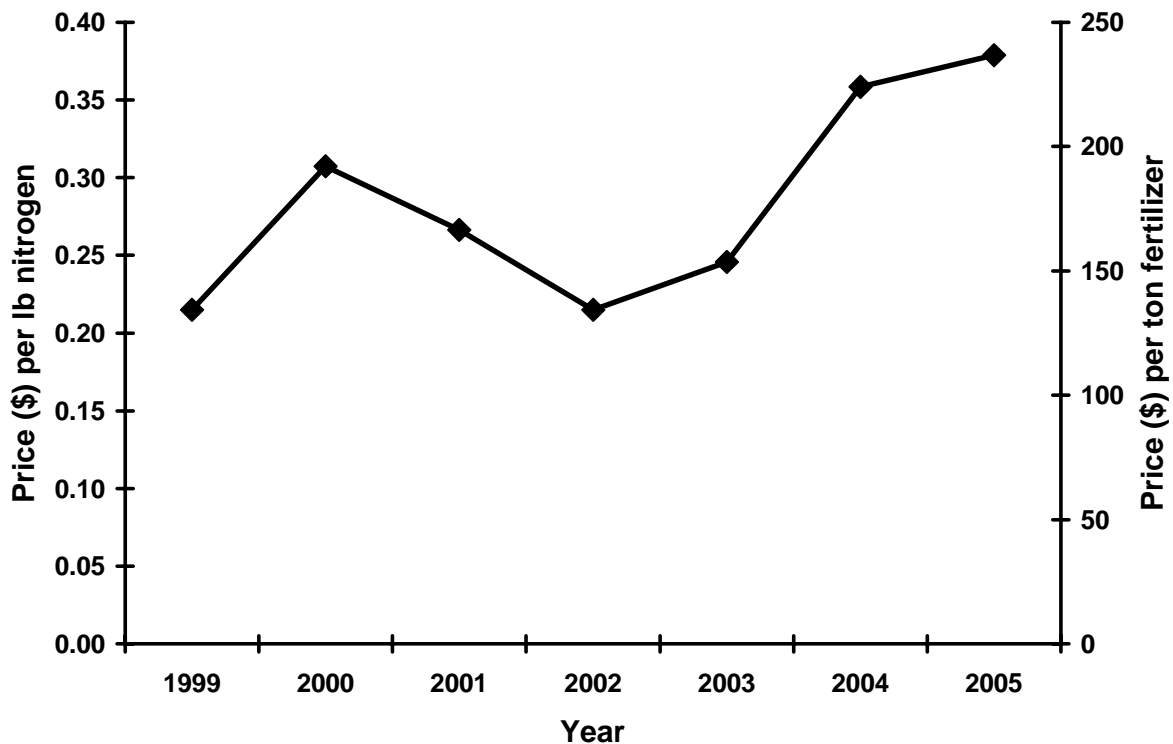


## Nitrogen Fertilization of Irrigated Cotton as Fertilizer Prices Climb

As gasoline prices at the pump continue to climb above \$ 2.00/gallon, fertilizer prices, especially Nitrogen (N) are doing the same. As of spring 2005, the price of one ton of urea ammonium nitrate was \$235, or \$0.37 per lb N. Just a few years ago we were paying \$ 0.21/lb N (Fig. 1). Other sources of N fertilizer have been increasing at the same rates. Phosphorus fertilizers have been increasing the last few years at a much slower rate. This is because N fertilizer manufacture is dependent on natural gas, while phosphorus fertilizer is derived from rock phosphate and acids.

Fig.1. Price of urea ammonium nitrate (32-0-0) in the Southern High Plains (1999-2005).



A natural question many cotton producers have these days is “Given that N fertilizer prices have risen 50 % in the last two years, should I be reducing my N application rates?”

To help answer this question we have applied simple net returns analysis to N fertilizer based on recent conservation-tillage cotton studies (Bronson et al. 2001). We conducted this analysis for various loan and N fertilizer prices.

The first issue we want to point out is that over the range of \$ 0.50 to \$ 0.54/lb lint loan price of cotton, the economic optimum rate of N fertilizer does not vary (Table 1). As the price of N fertilizer (32-0-0) increased from \$0.30 to \$ 0.35/lb N, the most profitable N rate decreased from just 90 to 80 lb N/ac (Table 1). Between \$ 0.35 and \$ 0.55/lb N the economic optimum N rate remained at 80 lb N/ac. In other words, the economic optimum N rate is not very sensitive to these wide fluctuations in N fertilizer prices we have been experiencing lately. Net returns decrease as the price of N fertilizer increases, but not the most profitable application rate. This particular study was conducted on an Acuff loam with about 30 lb nitrate-nitrogen in the top two feet of soil. We still recommend soil sampling to two feet to give full credit for residual soil nitrate. As discussed in our other bulletins the target N supply (N fertilizer plus soil nitrate) is 120, 150, and 180 lb N/ac for 2, 2 ½, and 3-bale yield goals.

Table 1. Net returns to N fertilizer for irrigated conservation-tillage cotton, Lubbock, TX

N fertilizer price	Econ. opt. N fert. rate	\$0.50/lb lint	\$0.52/lb lint	\$0.54/lb lint
\$ per lb N	lb N/ac	-----Net returns to N fertilizer (\$/ac) -----		
0.25	90	99	104	109
0.30	90	94	99	104
0.35	80	90	95	100
0.40	80	86	91	96
0.45	80	82	87	92
0.50	80	78	83	88
0.55	80	74	79	84

Notes:

- Yield increases above zero-N plots were 159, 186, 208, 225, 236, 243, and 244 lb lint/ac for the N fertilizer rates 40, 50, 60, 70, 80, 90, and 100 lb N/ac, respectively.
- Net return = (loan price X yield increase) – (N fert. price/lb N X N fertilizer rate).
- Original data can be found in Bronson, K.F., A,B, Onken, J.W. Keeling, J.D. Booker, and H.A. Torbert. 2001. Nitrogen response in cotton as affected by tillage system and irrigation level. Soil Sci. Soc. Am. J. 65: 1153-1163.

Soil testing for profile nitrate should be done every winter or spring for irrigated cotton fields. The high yields and heavy rains of 2004 probably mean depleted soil nitrate profiles. This, despite higher N fertilizer prices will probably mean that N fertilizer requirements will increase, not decrease on Southern Plains cotton fields this year.

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