

1992 Cotton Management Economic Notes

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This issue of 1992 Cotton Management Economic Notes discusses the economic use of nitrogen fertilizer in cotton production draws heavily upon the work of Drs. Jeff Silvertooth, Extension Cotton Agronomist, and Tom Doerge, Extension Soil Scientist, on nitrogen management in cotton.

Marketing Issues Related to Nitrogen Application

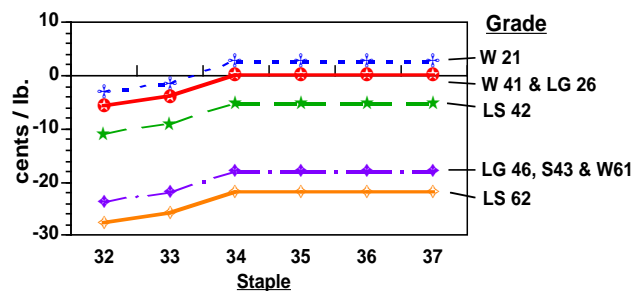
Marketing is often associated with the physical activities that a commodity will go through as the raw product leaves the farm gate and is transformed into a product desired by the end-user or consumer. In 1991, 78 cents of every dollar spent on food and fiber can be attributed to this component of marketing, so the quality aspect of marketing is not inconsequential. However, marketing begins when inputs enter the farm gate rather than when the raw product or cotton leaves the farm gate. Marketing encompasses five basic questions: 1) what to produce, 2) how much to produce, 3) timing of sale, 4) method of selling product, and 5) where production should occur.

What to produce generally focuses on crop selection, but quality of production is becoming a more dominant factor. The benefits from adding fertilizer, pesticide, and water should be thought about in terms of additional yield and any improvement in quality resulting from these inputs. An extra dose of nitrogen as a risk management strategy has the potential for ad-

verse quality consequences. Too much nitrogen leads to excessive vegetative growth with a tendency for a reduction in grade (an increase in trash and yellowness), decrease in micronaire and lint yield, plus higher costs. As shown in the figure below, the price discount for poorer grades is quite substantial. Soil testing in conjunction with petiole analysis is economically more attractive when the adverse consequences of cotton quality are considered with over fertilization.



1990-91 Premium/Discount for Staple and Grade in the SW Desert



Economics of Nitrogen Management Strategies

The single most important economic factor of any farming activity is that in order for the activity to improve profits the **“added benefits of the activity must exceed the added costs.”** While this idea seems obvious to most, it is a concept that is easily and frequently violated.

A simple example is the application of fertilizer to cotton fields. The amount of nitrogen required for growing cotton is agreed to be between 50 and 60 lbs per bale of cotton produced. Using this amount of nitrogen over the growing season would set the stage for cotton yields (of course, a lot of other good things have to happen also). If fertilizer is cheap, the tendency is to use as much as needed (or more) to maximize yields. Given the uncertainty of the growing conditions

Recent Prices May 29, 1992

	<i>Upland (c/lb)</i>	<i>Pima (ELS) (c/lb)</i>
Spot	58.39	87.50
Target Price	72.90	105.80
Loan Rate	51.15	88.15
December Futures	59.92	

Note: Upland Spot for Desert SW grade 31, staple 35; Pima Spot for grade 03, staple 46 (5/15/92); Phoenix Loan Rates.

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which will follow, using more fertilizer than research shows is needed is thought of as a kind of risk reduction strategy. If one has a lot of "sunk" costs into a cotton crop, applying additional nitrogen fertilizer may appear to be cheap insurance. However, if quality or yield are adversely effected, profits can be reduced.

Another problem that farmers face is society's concern about the potential impacts on public health of nitrates in groundwater. The cost of nitrogen fertilizer is effectively increased to include the non-monetary costs of potential water pollution by increasing required monitoring and recordkeeping. Farmers must respond.

Research has shown that the up-take of nitrogen is changed throughout the growing season and that the timing of fertilizer application is very important in reducing the total amount of nitrogen applied to a cotton crop. Sidedressing, injecting and running fertilizer in irrigation water are common ways to split fertilizer applications.

But can the concept of "**added benefits of the activity must exceed the added costs**" be applied in this seemingly complex process. Let's look at some costs of adding nitrogen fertilizer.

The table below shows the results of some 1991 fertilizer application comparisons. Three strategies of split application were compared with a "check" on which no additional nitrogen fertilizer was added. All plots were tested for preplant nitrogen levels. For the alternatives, a preplant application was supplemented by 1 sidedress application. Alternatives excluded the preplant

application but included 2 in-season sidedress applications; one at 1 times (1X) the rate recommended by petiole tissue analysis and another at 2 times (2X) the recommended rate.

The table examines the added costs and added values for each strategy. Preseason soil tests were priced at \$3.50/Acre and in-season petiole analysis at \$5.00/Acre. All applications were sidedressed in the experiment at the Maricopa Agricultural Center with DPL90.

Since all of the yields increased above the "check" yields, all three strategies increase the value more than their costs. The preplant strategy is the highest cost strategy and gives the lowest added value while the other two strategies give similar increases in yields but at lower costs. The 2X treatment shows highest level of added value but some uncertainty exists since **standard statistical tests show no significant difference between the three yields.**

A 2¢ /lb. difference in price due to quality change can remove the advantages of increase yields if quality is reduced at higher nitrogen levels.

Some Conclusions

- **The highest cost strategy may not give the highest yields.**
- **Use preplant application only when soil tests indicate a significant nitrogen depletion (NO₃-N below 10 ppm).**
- **Petiole tests can reduce unnecessary in-season nitrogen applications and enhance clean harvesting.**

Comparative Costs of Nitrogen Applications Strategies, 1991 MAC, DPL 90

	Date	Check	Preplant Plus 1	2 Applications @ 1X	2 Applications @ 2X
Experiment Parameters					
Preplant Sidedress (21-0-0), lbs/Acre	17-Apr		50.0		
In season Sidedress (46-0-0), lbs/Acre	19-Jun		35.0	35.0	70.0
In season Sidedress (46-0-0), lbs/Acre	22-Jul			23.0	46.0
Total Applied N, lbs/Acre		0	85	58	116
Estimated Cost of Strategy, \$/Acre		\$4	\$45	\$31	\$44
Revenues					
Yield, lint lbs/Acre		1,158	1,402	1,411	1,479
Value of Lint Production/Acre @ \$.65/lint lb		\$753	\$911	\$917	\$961
Increased Value/Acre above "Check"			\$158	\$164	\$208
Net Increase in Value/Acre above "Check"			\$113	\$133	\$164

Sources: Silvertooth and Doerge, "Nitrogen Management in Arizona Cotton Production", Bulletin 9024, Arizona Cooperative Extension; Silvertooth, et al., "Nitrogen Management Experiments for Upland and Pima Cotton, 1991," **Cotton Report**, Series p-91, College of Agriculture, The University of Arizona., February 1992, p.185ff.

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