



Consequences of skyrocketing fertilizer prices

By Ariel Singerman and Stephen H. Futch

Chemical input prices have increased significantly over the last year. In particular, the price of fertilizer has roughly doubled during the last 12 months (Figure 1, page 23).

Supply and demand factors help explain such an increase. Some of the factors are a result of Russia's invasion of Ukraine because those two countries are global producers and exporters of fertilizer inputs and crops. On the demand side, historical fertilizer use in the U.S. — particularly that of nitrogen — has increased steadily since the 1960s (Figure 2, page 23).

In addition, current high commodity prices (partly because of the invasion) incentivize growers to apply more fertilizer on a per-acre basis or by increasing planted acreage. From mid-2020 to the end of 2021 (when planting decisions typically start to be made), corn, soybean and wheat prices increased by approximately 60, 40 and 55%, respectively. On the supply side, the price of natural gas, which is a major input in nitrogen production and of which Russia is a major global exporter, almost tripled between the summer of 2020 and February 2022 (Figure 3, page 23).

According to the survey data collected annually by University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) on the cost of production of processed oranges in Southwest Florida, last season growers spent (on average) \$215 and \$144 per acre on dry and liquid fertilizer, respectively. Thus, the total amount spent on fertilizer adds up to \$359 per acre, which represented 24% of the total cultural cost of production. The share of fertilizer as a percent of the annual budget has been increasing in recent seasons as growers started reducing some of their expenses in other cultural programs in response to lower prices, decreasing

yield and lower fruit quality.

To obtain an estimate of the increase in the cost of fertilizer over the last year, we contacted suppliers to obtain quotes on different fertilizer blends. Based on their feedback, the average price increase was approximately 90%. Applying this percentage increase to last year's expense on fertilizer means that growers would need to incur an additional expense of \$323 per acre to provide trees with the same nutritional input level. However, the annual survey data only reports the total expense of each cultural program. Therefore, there is no way to discern price from quantity.

We estimate a grower would need to increase spending by \$245 to keep nitrogen at 200 pounds per acre.

Consequently, while the calculations above are a good starting point to estimate the impact of the price increase on the grower budget, they might be overestimating or underestimating it. Therefore, we used the quotes provided by input suppliers to obtain a more accurate estimate of the price increase's impact on the cost of production, as explained below.

Assuming that Florida citrus growers use an amount of fertilizer that corresponds to an application of 200 pounds of nitrogen per acre (which is the maximum recommended best management practices rate for most groves), we used a common dry fertilizer blend of nitrogen-phosphorus-potassium containing 15% nitrogen to illustrate our calculations. Based on the price increase for such a blend, we estimate a grower would need to increase spending by \$245 to keep nitrogen at 200 pounds per acre. Therefore, without making changes to any of the other cultural programs, the (average) total cultural cost of production per acre for

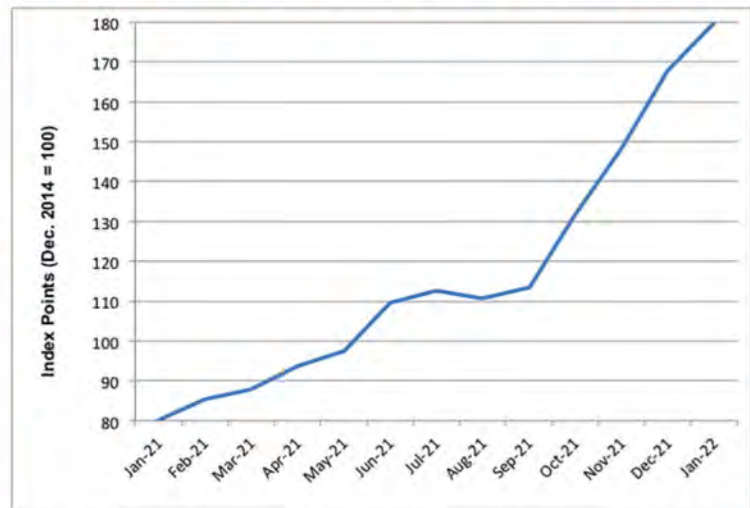


Figure 1. Producer Price Index of Nitrogenous Fertilizer Manufacturing
Source: Federal Reserve Bank of St. Louis

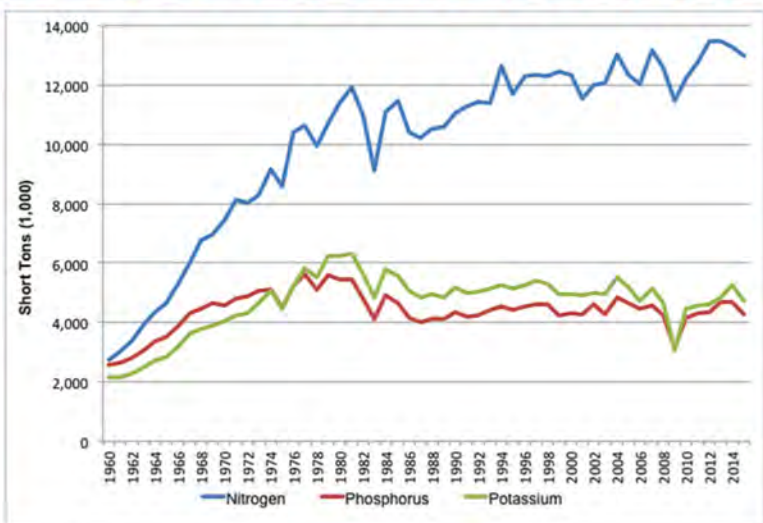


Figure 2. Plant Nutrient Use in the United States
Note: One short ton is equal to 2,000 pounds
Source: USDA-NASS

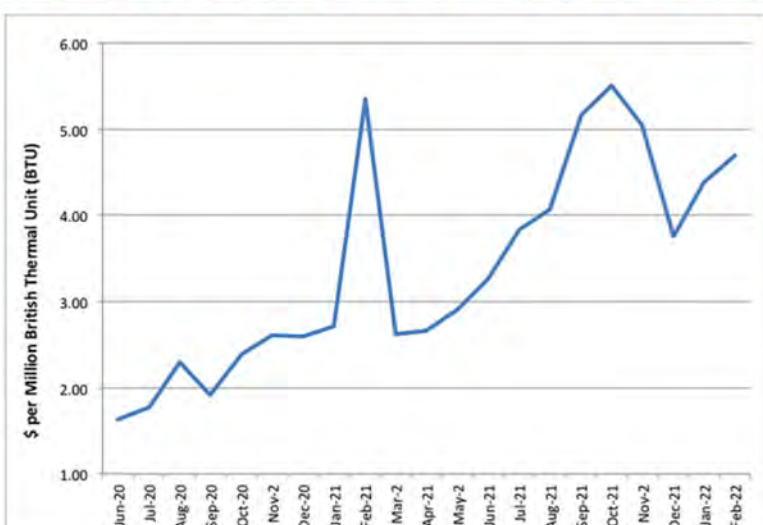


Figure 3. Henry Hub Natural Gas Spot Price
Source: U.S. Energy Information Administration

processed oranges would be \$1,753, up from \$1,508 last season.

To offset the additional spending described above, prices, pound solids and/or yield would need to increase. Thus, we estimate how much each of these variables would need to change to offset the fertilizer price increase for early-season, mid-season and Valencia oranges.

For early- and mid-season oranges, their price would need to increase by \$0.31 per pound solids based on last season's average delivered-in price of \$1.70 per pound solids. Alternatively, pound solids per acre would need to increase by 236, or yield go up by 47 boxes per acre. For Valencia oranges, their price would need to increase by \$0.29 per pound solids based on last season's average delivered-in price of \$2.51 per pound solids. Alternatively, pound solids per acre would need to increase by 129, or the yield per acre would need to increase by 23 boxes.

The problem that growers face, however, is that prices, pound solids and yield are not under their control.

Growers are unlikely to reduce their fertilizer use proportionally to the price increase of fertilizer.

Given that yield and quality have been decreasing since HLB was first found — a trend that has worsened in recent seasons — most growers are unlikely to reap the benefits of such additional spending. Growers are then likely to reduce their spending on fertilizer because they would want to choose the optimal amount of input so that the cost of one additional unit equals its additional benefit.

However, growers are unlikely to reduce their fertilizer use proportionally to the price increase of fertilizer.

We believe that it is more likely that they would offset the increase in the price of fertilizer by also decreasing their spending in other cultural programs to avoid decreasing fertilizer application rates too much, which would compromise not only current but also future tree health and yield. 🍊

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