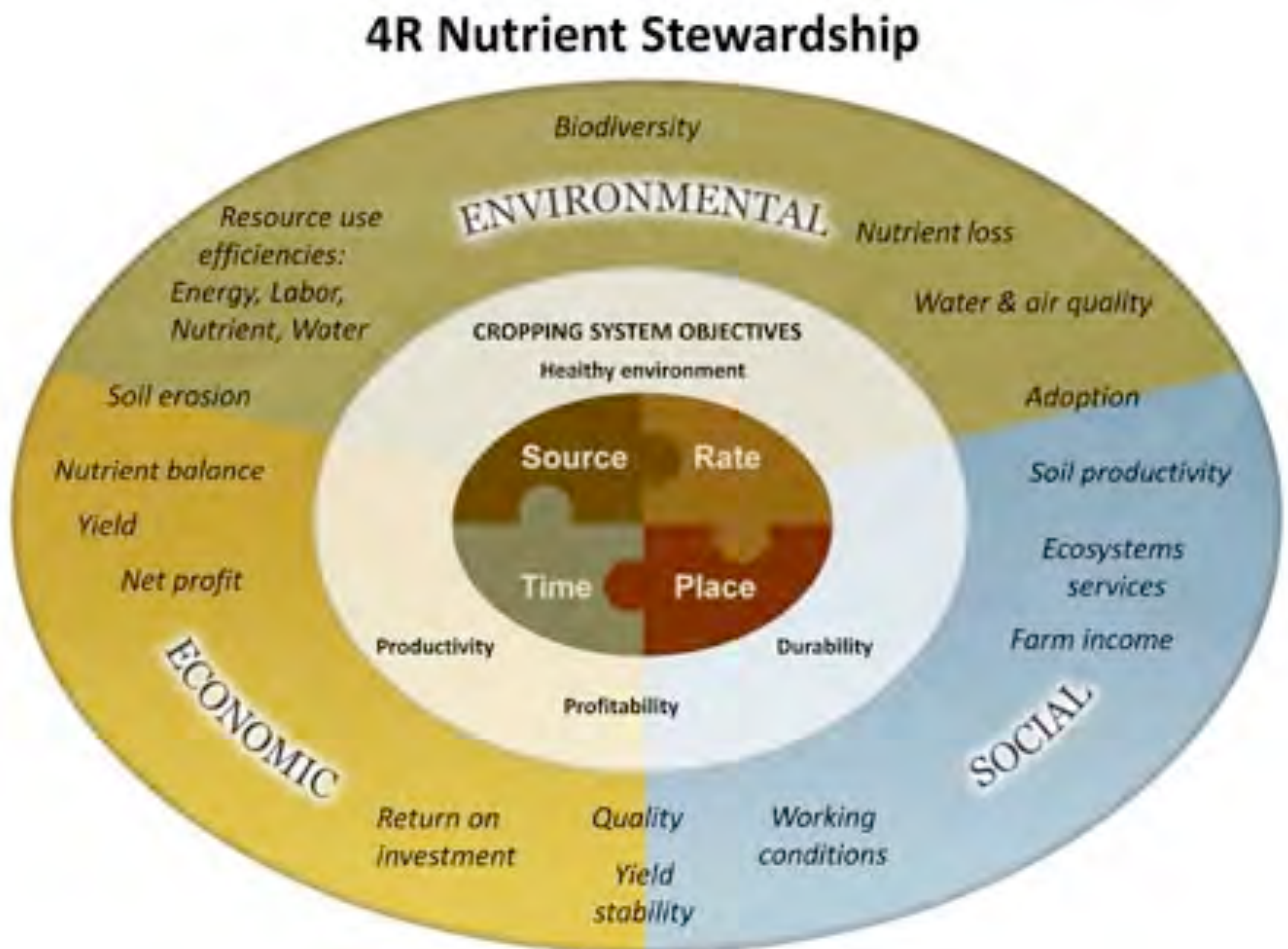


## Improving Nitrogen Fertilizer Use in Corn Glen Harris – UGA Tifton

Corn silage and corn for grain need a lot of nitrogen (N), but how much? While we have a tendency to focus on the total N rate, there are other factors that affect the N use efficiency of corn. The fertilizer industry has recently stressed that you also need to consider source, timing and placement of fertilizers in order to get the most out of your fertilizer dollars.



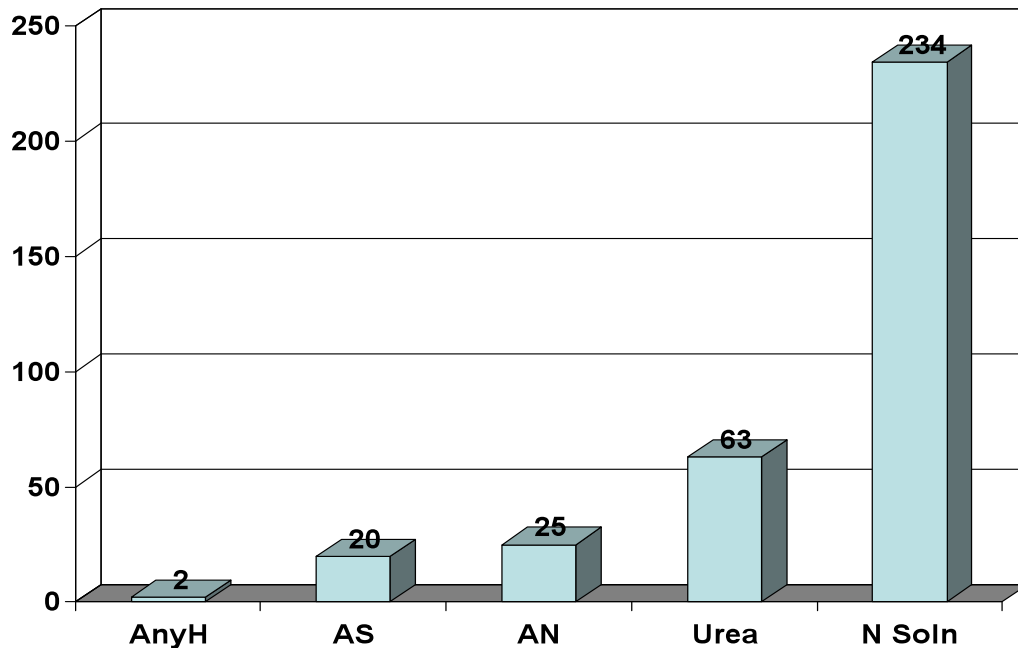
### Source

In Georgia, the primary N source for corn is nitrogen solutions, namely “32%” or “UAN” (urea ammonium nitrate) – see graph below. There is a small amount of

anhydrous ammonia being used, but even though it is the cheapest form of N, handling issues, our soil conditions and some other factors deter its use in the southeast. Use of ammonium nitrate has gone down significantly in recent years due to safety and handling issues and associated regulation. This caused a shift to use of more granular urea. One issue with granular urea is volatilization losses if the urea is surface applied (not incorporated with tillage or rain or irrigation). There are a number of products currently on the market claiming urease inhibition. Many of these products have been tested in the southeast and one product called “Agrotain” appears to be the most consistent and effective at urease inhibition. Ammonium sulfate is used more for the addition of sulfur. Ten pounds per acre of sulfur is recommended on corn and higher rates up to 30-40 lb/a with higher N rates. Sulfur is often added to “32 UAN” liquid making a 28-0-0-5(S) which is very popular sidedress source for corn.

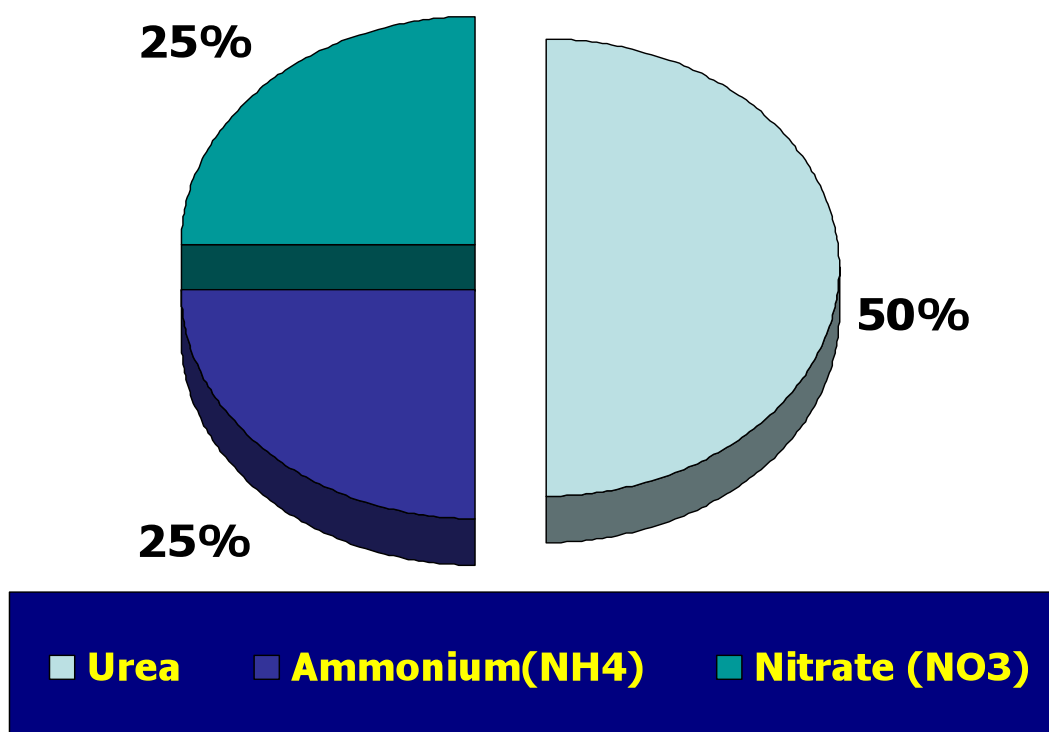
## Nitrogen Fertilizers Sold in Georgia - 2010

X 1000 tons



The volatilization issue is not as critical when using 32 UAN since only half of the N is in the urea form and also, it is usually applied in a concentrated band which minimizes volatilization. Also, there are now other liquid nitrogen fertilizers available that do not have any urea in them, for example, “19%” which is a by-product of the Attapulgitic clay industry in southwest Georgia. You can also add sulfur to 19 % to make a 18-0-0-3(S).

## Composition of UAN (28-32% N)



### Timing

Applying fertilizers at the correct time or times can also improve use efficiency. The basic rule of thumb is to apply nutrients at the time when plants need them the most. Since corns demand for N is lower early on and peaks before tassel, split applications where  $\frac{1}{4}$  to  $\frac{1}{3}$  of the total N is applied at planting followed by the remainder at sidedressing when the plants are 18 to 24 inches tall is a good strategy. Early N can also be provided by use of starter fertilizers.

### Placement

Placement of N can come into play on corn at a number of different times. Placement of starter fertilizers is critical to get the full “starter” effect. A “2 x 2” (2 inches to the side and 2 inches below the seed) is the most commonly recommended placement for starter fertilizers on corn. However, there is research currently being conducted looking at putting starter fertilizers directly in the furrow on corn. Rate of starter fertilizers in this placement may be critical as there is danger of salt injury and poor germination resulting in reduced stands if the rate is too high.

Placement of sidedress N can also come into play, especially again, with urea fertilizers that are broadcast on the surface and not incorporated. There is also a theory that banding fertilizers (not only N but P and K too) will increase the use efficiency and rates can be reduced. This has not been proven to be true in replicated research.

### Rate

Finally, rate should be the easy part right? Just follow the soil test recommendation. Or use 1.2 lb N per bushel of expected yield goal right? Not so fast. First, we do not actually test for N in soil in the southeast since it is so mobile or transient in our soils. How can you recommend it if you don't test for it? you may ask. Well, the recommendations for N that you find on a soil test result form are based on field trials and assume you do not have any significant N in the soil profile to start with. Other parts of the country and world (where they have better soils or less rain/more evaporation) can account for residual soil N, but we can't in the southeast. And the 1.2 lb N/bu of yield goal can vary also. It can depend on not only environmental conditions but also the fact that new corn hybrids often have better protected roots systems making them better scavengers of N.