**CEC and Nitrogen “Holding Capacity” — Is There a Simple Rule?**

An idea being promoted at some farmer meetings is that a soil can hold 10 lbs of nitrogen for each millequivalent (meq) of CEC. Lets put this idea in the category of urban legend. This legend would have you believe that a sandy soil with a CEC of 11 would safely hold 110 lb/a nitrogen on the cation exchange sites. The truth is that all the ammonium from many common fertilizers will be held on the soil cation exchange site for a short time, until it converts to the nitrate form (This conversion can happen as fast as 5 days). The ammonium ion (NH4+) has a positive charge allowing the soil, which has a negative charge, to hold the ammonium until it is converted to the nitrate form. Guess what? When nitrogen fertilizer has converted to nitrate form, a soil does not “hold” any nitrogen because they both have a negative charge. The nitrate anion is free to move with water in the soil profile. Where the water goes, the nitrogen will follow.

That said, soil CEC can provide a good estimate of soil texture. (See table below). A low CEC soil indicates the soil has a sandy texture while a high CEC indicates the soil has a high clay content and is likely fine textured.

The soil texture determines the amount of water held by a soil and how fast it moves through the soil profile. So 2 inches of rain on a low CEC soil (CEC <10) will leach nitrate nitrogen deeper in the profile than a soil with a high CEC soil with lots of clay.

A sandy soil that has a CEC of 7 meq will not hold 70 lbs of nitrogen. A few inches of rain will move the nitrogen deep into the profile as illustrated in the table. If you apply 100 lbs of nitrogen to a soil with a CEC of 7, 70 lbs will not stay attached to the soil while the other 30 lbs will leach. Once the N has converted to nitrate, all 100 lbs of nitrogen will move down in the profile. So this urban legend is busted. When making decisions on how much N can safely be applied to a soil, you need to consider soil texture (CEC), drainage (well or poorly drained) if the field is subject to flooding, time of year for application, type of placement (band vs broadcast), etc. There is no easy rule that will work in all situations

For many years, AGVISE staff of experienced Agronomists and Soil Scientists have suggested growers should split apply spring nitrogen to light textured fields with low CEC (<10) because the risk for leaching nitrogen is high.

In summary, the CEC provides useful information on soil texture and water movement in the soil.

1. CEC will not tell you how much nitrogen the soil will “hold.” Ammonium based fertilizers convert quickly to nitrate N in the soil and the nitrate anion is negatively charged and will not be held on the soil which also has a negative charge.

2. The CEC will provide a good estimate of the soil texture.

3. The CEC can aid in decisions regarding the need for split applications or side-dressing crops like corn.

4. The next time somebody tells you there is magical formula that calculates the rate of nitrogen fertilizer that can safely be “held” on a low CEC sandy soil, ask him how much of his money he is willing to give you if the N is lost to leaching?