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CORN NITROGEN UPTAKE: SUSTAINED INTO LATER MATURATION

We have all heard the old adage "start right to finish well", but also recognize that the actions and effort between the start and finish lines will also reflect just how well we cross the finish line: top 20, top 10, or in the lead. This applies to plant nutrition also.

Having adequate N available to corn plants at key growth stages is a principle that is fairly well understood by most corn growers. There is fairly good recognition that much of the "grain-producing factory" is being built within the plant prior to the V6 (6 leaves with visible collars) growth stage, that kernel row numbers are established by V12, the number of kernels per row are decided by V18, and the final kernel number and size are largely determined by R1 (silking). By R6 (black layer), kernel weight and grain yield have been set.

Maximum corn N uptake rates, which may exceed 10 lb/A/day, usually occur 30 to 70 days after planting (V6 to V14). Forty to 70% of the N taken up may be partitioned to leaves before R1. Growing degree or heat unit accumulation governs the rate of change from one growth stage to the next. The rate of biomass (dry matter) accumulation proceeds rapidly before R1, and is strongly correlated with crop total N uptake. Nitrogen uptake is affected by the N supply, planting density or population, and the corn hybrid. Recent research has shown that across various plant populations, the N uptake rates on a per plant basis are rather similar. Higher plant densities result in higher total plant N uptake demand per acre. Purdue University scientists have compared data on old era (1940 to 1990) hybrids with new era (1991 to 2011) hybrids. They found that grain yield per unit of applied N increased with the new era hybrids at the same applied N rate as with the old era hybrids. New era hybrids may be more tolerant of stresses, and new era hybrids may accumulate more N during silking than the old era hybrids. Work by scientists at the University of Illinois has shown that today's hybrids develop as much as 35% of their crop biomass by silking, and up to 65% of the total N uptake. Clearly, that means a large portion of the crop's N uptake continues to take place after R1 …… and until R6. A sustained N uptake rate is governed by a sustained crop growth rate, which helps to feed the "sink" or ear demand. Sustained N uptake, together with an efficient remobilization of N from leaves and the stalk to the ear, help satisfy individual kernel growth demands and improves the harvested grain yield potential.

As important as N nutrition is, growers must also remember the full-season need for other essential nutrients like P, S, and zinc (Zn). For example, the total uptake and the pattern of plant demand for K are similar to those for N. A balanced supply of these nutrients helps keep leaves photosynthetically active longer, and also helps increase crop N recovery and use efficiency. This year, be sure that your crop growth rates and nutrient uptake do not fizzle out during the early reproductive growth stages, and shrink your grain-producing factory. Keep that factory producing efficiently and profitably by either side-dressing or top-dressing any needed N and other essential nutrients that were not applied before crop emergence. Sustained, full-season nutrition leads to good yields, and raises the prospects of good profits.

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Abbreviations:N = nitrogen; P = phosphorus; K = potassium; S = sulfur.