applied as NO_3 or NH_4. This would be expected if the ^{15}N was mainly in the same form (NO_3) with similar positional availability between V3 and V8.

In addition to increasing plant uptake, DCD also enabled more fertilizer ^{15}N to be taken up by the microbial biomass (**Table 3**), probably by maintaining fertilizer N in the NH_4 form.

Conclusions

Efficient use of starter fertilizer N by young plants is dependent upon keeping the N positionally available. Nitrate-N in starter fertilizer can be readily leached out of the rooting zone of permeable soils before it can be utilized by young plants, although it may be recovered later by older plants. Application of starter N as NH_4 without a nitrification inhibitor only slightly improved plant N uptake. For the soils used in this study, nitrification of NH_4 followed by leaching was a greater barrier than microbial immobilization to the efficient use of starter NH_4.

DCD significantly increased crop utilization and microbial immobilization of starter NH_4. This is probably related to DCD maintaining more starter fertilizer N in the NH_4 form and maintaining positional availability. Under moderate leaching conditions, it may be advantageous to add a nitrification inhibitor to starters to ensure that fertilizer N remains positionally available to young corn plants. ■