CROP BREEDING TO HELP MANAGE PHOSPHORUS

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Crop plants have an amazing wealth of genetic diversity that allows them to be adapted to different production systems and for new purposes. A goal of this research is to learn how to develop corn hybrids and related products that will maximize acquisition and use of P to produce grain and forage. A long-term focus is acquiring genetic knowledge that will allow us to produce hybrids for reduced input systems. Root complexity—the degree of root branching— and root biomass are genetically variable among maize genotypes. Genotypes with more complex root systems are better at deploying physiological processes throughout the soil profile and, therefore, are better at acquiring P. Arbuscular mycorrhizal fungi also benefit maize growth when nutrients are limited, and some species of mycorrhiza benefit corn plants more than others. A combination of genetically selected corn hybrids with mycorrhizal inoculants could dramatically result in reduced P recommendations in the future. In the short term, many farms in Wisconsin could benefit from crops that take a lot of phosphorus from the soil, effectively "remdiating" soils with excess P. Variability for P concentration does exist, making high P crops also a possibility. A primary determinant of the amount of P removed from fields by the crop is the total biomass per acre. Agricultural system level approaches will ultimately be needed to improve the redistribution of P that is cycled from crops to livestock to farmland.

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