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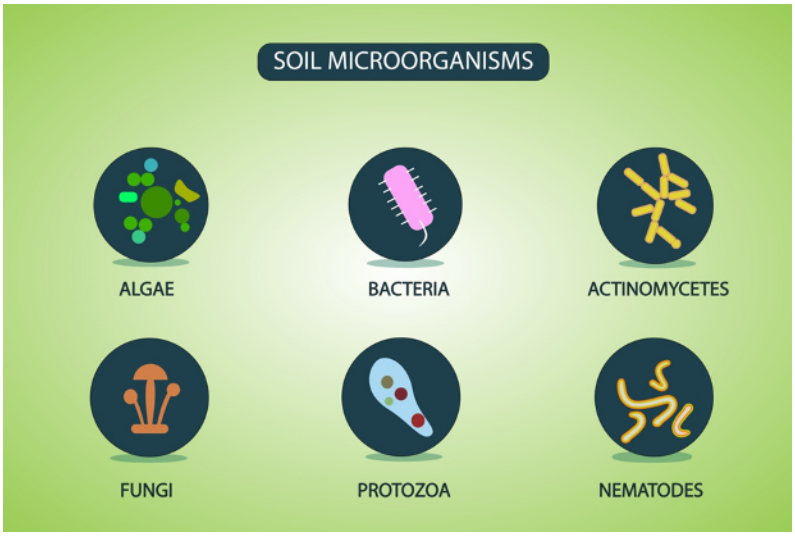
MARCH AGRONOMY UPDATE

THE NEXT BIG THING?

Almost 25 years ago, scientists embarked on a quest to map the human genome. It took 13 years, a concerted effort by 20 universities in half a dozen countries, and billions of dollars to achieve. And while it may not have resulted in the advances in human medicine and health that many expected, it did lead to major advances in the science of gene sequencing that is just beginning to have an impact on our industry.



When I consider potential applications for gene sequencing in agriculture, I immediately think about the work being done to map the genome of the crops we grow, and the shortcuts this provides to plant breeders in bringing new varieties with better genetic traits to market. But there is also a wealth of actionable information to be gained in other areas, and one that is already being commercialized is gene sequencing the organisms in the soil. Since a single gram of soil is estimated to contain about 10,000 species of micro-organisms, this would appear to be an impossible task. But some companies are already at work on it, using something called *metagenomics* that was developed to help doctors test a patient's stomach microbiome. This technology has now been adapted to agriculture and is being used to develop data bases of the genomes of many key soil species that impact our crops.

Already, companies like Trace Genomics, based out of Ames, Iowa have sequenced most of the major soil borne diseases we deal with in agriculture, and in some cases are able to provide a risk assessment of their impact on the crop based on the species and concentrations found in a soil sample. As the data base increases, companies will eventually be able to establish benchmark levels for most of these diseases, allowing us to make management decisions about the best crop, variety, or even seed treatment to use, on a field by field basis. But it's just not diseases. We are also quickly learning to identify the soil species involved in nutrient cycling. There is tremendous pressure on the agricultural industry to lower the greenhouse gas (GHG) emissions generated by commercial fertilizers. There may be great value in a soil genomic test that can tell you the concentration of organisms that are involved in denitrification (which help produce nitrous oxide, the GHG being targeted by the regulators these days). Just as knowledge of the types of diseases in the soil can steer you in the right direction in picking the best crop variety and/or seed treatment, knowing the composition and concentration of the species involved in the breakdown of nitrogen fertilizer may be able to give insights into whether or not a nitrogen stabilizer is required, or what type of stabilizer is best suited to the situation.

Healthy soil is the key to sustainable agriculture, and tools like genomics are going to allow people to understand and manage soil health in targeted and efficient ways that we are just beginning to understand. *This may actually be "the next big thing".*