KS-1

Ever-expanding Horizons. RONALD L. PHILLIPS. Department of Agronomy and Plant Genetics and Microbial and Plant Genomics Institute, University of Minnesota, St. Paul, MN 55108. Email: phill005@umn.edu

World population is exploding—one billion people are added every 14 years. Though we've traveled a long road—from the first hybrid plant, to Gregor Mendel's "Experiments in Plant Hybridization", to the Green Revolution, to the regeneration of plants from cells, to genome sequencing—it's still hard to imagine the road ahead. Genomics offers a new paradigm through knowing the complete genetic code of an organism, the ability to assess gene expression across the entire genome in one experiment, understanding the function of every gene, and the networking of genes and biochemical pathways. Comprehensive gene expression studies will allow the basic understanding of mechanisms that often are the basis of whole industries, such as hybrid vigor. Comparative genome mapping extends the application of new knowledge to an ever-expanding list of species. Large-scale genome projects of major economically important plant species and model systems broaden the horizon for the application of molecular/cell biology. Genetic barriers are being surmounted via embryo rescue techniques, tissue culture, and transformation. Oat by maize crosses have led to strains which have a complete oat genome, plus one maize chromosome. These "addition lines" are useful for many studies including the mapping of DNA sequences, chromosome sorting, cytogenetic studies, and the introduction of unique traits such as C4 photosynthesis into C3 species. Transformation technology involving in vitro techniques has produced useful biotech crop varieties that have been grown on more than one billion acres worldwide. New biofortification traits should lead to improved health for up to one of every three citizens of the world. Golden rice high in pro-Vitamin A may improve the lives of one million children a year. Another application under development is the modification of corn feed that can potentially reduce *E. coli* O157:H7 contamination in the food supply. Just over the horizon, a new era awaits. . . one in which applications of science will lead to improved lives for millions of people.