nature genetics

Nature Plants

We welcome our new sister journal *Nature Plants* and the increased commitment to the plant science community that it represents. This is an opportunity for *Nature Genetics* to emphasize the use of genetic and genomic tools and resources in discovering new plant biology and solving major agricultural challenges.

The green revolution in crop breeding was won through phenotypic selection of desirable genetic traits to produce (notably) dwarf wheat with high yield potential that was responsive to chemical fertilizer and had broad disease resistance and adaptability to a range of climates. Reporting these achievements made in Mexico, India and Pakistan, Norman Borlaug in his 1970 Nobel lecture (http://www.nobelprize.org/nobel_prizes/peace/laureates/1970/borlaug-lecture.html) went on to dream of engineering cereal crops with nodules full of nitrogen-fixing symbiotic bacteria from legumes. He then criticized contemporary mutational genetics programs for missing the big picture, instead "putting beards on wheat plants and taking off the hairs."

In contrast, few of the gene variants underlying traits selected in the green revolution were identified before the era of crop bioinformatics that began in 2002 with the sequencing of the draft rice genomes (*Science* **296**, 79–92, 2002 and *Science* **296**, 92–100, 2002). We are now harvesting these genomes by the bushel, together with many new traits to be combined in future elite strains. On page 652 of this issue, Xiangdong Fu and colleagues examine one of the traits Borlaug discussed in his lecture—nitrogen use. In rice, heterotrimeric G protein signaling influences growth in response to nitrogen. In another recent issue, Yusaku Uga and colleagues investigated gene variants that yielded deeper-rooting and more drought-resistant rice plants (*Nat. Genet.* **45**, 1097–1102, 2013). Dissection of crop traits in complex allopolyploid genomes such as that of cotton was practically impossible before genomic technology. On page 567 of this issue, Yu-Xian Zhu and colleagues present the genome of the diploid tree cotton (itself a crop) as a model for the allopolyploid genomes of the long-staple cotton species.

We are particularly interested in attracting research articles on the genetic architecture of plant traits and crop plant performance, fundamental functional genomics of plant growth and development, natural and agricultural variation in plant species, and genomic methods for studying genetic and gene-environment variation. In seeking research papers, we will progressively move from the identification of mutations and quantitative trait loci, first reference genomes and new components of existing developmental pathways to emphasize in particular the use of genomic resources for new biology (for example, see page 530) and for solving agricultural challenges. Whereas rapidly reproducing model organisms such as *Arabidopsis* are essential for interventional experiments and study of basic biology, model organisms grown by the billions as crops offer complementary experimental opportunities in basic and crop biology with readily translatable results.

There is plenty more than agricultural productivity to be discovered in measuring genome variation in plants. There is the aim of understanding the architecture of traits, including the heterozygous advantage of F1 hybrids, gene-environment interactions and epistasis. Evolutionary and domestication analyses will lead to the preservation and reuse of crop diversity and the restoration of variants lost during domestication. Together with marker-assisted plant breeding, research and the development of genetically modified crop plants (GMOs) have an important place in the future of plant science (http://www.nature.com/scitable/spotlight/gmos-6978241). Variation is variation and some of it is useful to us.

Expanding upon the genetic discovery effort of which we are a part, *Nature Plants* (http://www.nature.com/nplants/) will also engage with the social and economic dimensions of plant science, climate change, policy-ready science, food security and distribution, and the next green revolution. ■