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Plant Breeding and Genomics Focus of New National Web Resource

As global food needs increase, so does the need for crops that can be efficiently and safely produced. Traditional plant breeding methods have served well in the past and now breakthrough technologies are available to aid this process. These technologies include key information on the genetics, or “genomes” of crops.

Researchers and educators from America’s land-grant universities, government agencies and industry have banded together to create the first-ever internet resource aimed at quickly putting basic research on crop genomes into practice, to more efficiently improve crops at plant breeding programs across the U.S. The resource is housed at eXtension (pronounced E-extension), www.extension.org, at the www.extension.org/plant_breeding_genomics and includes articles, videos, and tutorials.

eXtension resource areas

The researchers and educators working on this project are what the new national U.S. Cooperative Extension System project calls an eXtension Web Community. This group, the Plant Breeding and Genomics (PB&G) community of practice, is one of many within eXtension.

Some of the other communities in eXtension include geospatial technology; corn and soybean production; cotton production; horticulture; pest management; science, engineering and technology for youth; organic agriculture; bee health. Each community continues adding new information on a regular basis. New communities are also being added every month.

eXtension is an educational partnership of more than 70 land grant universities helping Americans improve their lives with access to timely, objective, research-based information and educational opportunities. eXtension’s interactive Web site is customized with links to local Cooperative Extension sites.

Putting Research into Practice

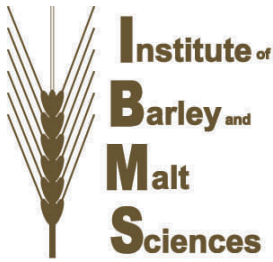
Whole genome sequences are already known in key crops such as potato, rice, poplar, soybean, maize, cotton and cucumber. David Francis, associate professor at The Ohio State University, explained that “this information explosion means that practitioners need resources for continuing education to keep up with new developments.”

Francis, noted, “The eXtension portal provides an entry point into the research knowledge of the Land-Grant University System. We’ve developed a resource to help train the next generation of plant breeders, help current professionals keep abreast of new developments, as well as inform growers and processors about the technological advances that bring them new varieties.”

Allen Van Deynze, director of research for the Seed Biotechnology Center at the University of California, Davis emphasized the importance of accessibility to information “The goal of the Plant Breeding and Genomics resource on eXtension is to act as a portal to the vast number of public databases in crops and genetic and genomic resources.”

Resource for Agricultural Producers

Another important function of the eXtension site will be to provide up to date production information on new varieties available to agricultural producers. Members of the barley Coordinated Agricultural Project (Barley CAP) added information on barley production practices and other basic barley information needed by barley producers.



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Page 2

Gary Muehlbauer, professor at the University of Minnesota and lead PI of the Barley Coordinated Agricultural Project (CAP), emphasizes that “providing helpful information on barley improvement efforts is a central goal of eXtension and CAPs”. He states that the barley grower site on eXtension “highlights information available for growers regarding planting and production of existing varieties, as well as those improved through the genomics and breeding efforts of Barley CAP research”.

An example of information provided for producers and plant breeders alike is the Barley CAP-produced podcast on the threat of a new rust virus. Barley, like all crops, is attacked by disease-causing organisms. One potential threat, which can dramatically reduce yield and quality, is the fungus, Ug99, first detected in Uganda in 1999. “Although Ug99 is not yet confirmed in the U.S., this highly virulent strain is spreading in Africa and to the Middle East and will ultimately come to the U.S.” Brian Steffenson, plant pathologist at the University of Minnesota, points out. He states “what concerns barley researchers and growers is that most U.S. varieties are susceptible to the fungus”.

Barley CAP researchers, partnering with the USDA-ARS Ug99 Cereal Rust Initiative, screened over 2000 U.S. breeding lines in Africa, identified Ug99 resistance in several advanced barley lines and were able to find molecular markers associated with the resistance. Leading this study, Steffenson shares that, “the genomics efforts of Barley CAP made it possible to identify the genes responsible for resistance and develop the tools that will dramatically accelerate breeders’ efforts to develop stem rust-resistant barley varieties for growers”.

Contributors

SolCAP, a USDA National Institute of Food and Agriculture (NIFA)-funded program focused on potato and tomato was the lead group on the project, and the Barley CAP played a pivotal role in organizing a template for other groups to develop information pages geared toward growers' needs. Other educational materials included on the site were developed by Wheat CAP and Rosaceae CAP (RosBREED).

The PBG community currently has 195 members who represent 30 universities and federal agencies, 11 educational institutions outside of the USA, and 5 industry groups. Forty of these individuals wrote, edited, and reviewed the content. Also, new and updated content will be published monthly.

Terry Meisenbach, a Communications and Marketing expert with eXtension explained, "eXtension is a direct response to concerns about information quality on the Internet. Users can access eXtension with the same confidence they access their own state extension networks.”

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