

Bangalore hosts workshop on "Genomics of crop Improvement"

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A three day workshop on "Genomics of crop Improvement" was held at Institute for Bioinformatics and Applied Biotechnology (IBAB), established by Karnataka government with the Department of Biotechnology (DBT), Government of India at Bangalore. Dr K. VijayaRaghavan, Secretary, Department of Biotechnology, Government of India, inaugurated the workshop, on February 18, which was presided by Dr P. M. Murali, President, Association of Biotechnology Led Enterprises (ABLE) and MD & CEO, Evolva Biotech.

Prof Ronald L. Phillips, Regents Professor Emeritus, University of Minnesota, USA made a key note address on "Genetic diversity and human capacity building as fundamental for crop improvement." Scientists and experts spoke and discussed on many topics such as Linkage/Association Mapping (Statistical Genetics), Genotyping & Bioinformatics, Genomic/Genetic Resources, Comparative Genomics, Marker-Assisted Selection, Breeding for Stress, Nutrient Efficiency and Biofortification besides other issues as well. More than 100 scientists and several students especially from Indian Council of Agricultural Research (ICAR), Council of Scientific and Industrial Research (CSIR), and the Universities actively participated, besides few foreign delegates from Brazil, South Korea, and the USA.

Sharing his thoughts Prof Padmanaban, INSA Senior Scientist, Senior Science and Innovation Advisor, Biotechnology Industry Research Assistance Council (BIRAC), Department of Biotechnology, Government of India made it clear that a combination of modern biotechnology tools such as MAS and GM technology are complementary, and are essential for successful development of new cultivars capable of higher productivity and adaptation with fewer inputs.

However, wherever there is no or inadequate variation to use for desired traits (such as resistance to stalk borers in cereals) one need to resort to incorporate alien genomes (such as from universally found soil bacterium, *Bacillus* yielding Bt. gene that is also used by organic farmers for decades without nay safety issue) as suggested by Swaminathan panel while recommending creation of Biotechnology Regulatory Authority of India [BRAI].

Experts at the workshop pointed out that the same DNA science that has revolutionized modern medicine has now been successfully applied to improve crops and develop new varieties with high yield, enhanced resistances to pests, adaptability to adverse environment, and superior product quality. Decoding of genetic information stored in all genes of an organism - commonly called genomics- has allowed discovery of novel genes responsible for specific valuable traits useful to increase crop improvement.

Important take-away from the conference

1. Plant Genomic research in India is active and fast catching up with the international benchmarks. In the past, India has collaborated for sequencing of genomes of rice and tomato, and now for wheat; however, within last few months itself, solely with indigenous effort, draft genome sequences of neem and Amaranthus have been assembled by IBAB, Bangalore.
2. Genomic tools have been developed in various laboratories and successfully applied to breed new crop varieties such as that of rice combining resistances to blast, rust and gall midge; with conventional visual selection alone, improvement and stacking (pyramiding) for such complex traits could not have been possible. Many more products including wheat, rice, sorghum, chickpea, soybean, pigeonpea and vegetable crops varieties bred with DNA markers (by a process called MAS, or marker-assisted selection) are in the pipeline. Besides government laboratories, all major seed companies are routinely using this technology in breeding.
3. Many new markers and genes are discovered, and great deal of synteny (similarity in genome composition) and gene order (co-linearity) in crops are explored; many desirable genes appear in separate allelic forms in different species with varying effects on crop yields, and these can be used across reproductive barriers by methods such as genetic engineering wherever sexual barriers exist. Such products of genetic engineering are not inherently unsafe; note as many as 2000 gens are common even between human and plant genomes.
4. Many Indian and multinational private sector companies also took active part in the workshop by making oral and poster presentations; private sector invests significant amount of their revenues for development of such modern tools and their use in crop improvement. Indian farmers will soon be able to reap the enhanced benefits of these efforts that are bound to increase their profitability and greater assurance of food safety and better nutrition by all including the urban consumers who of late have been demanding such benefits without undue cost increases.
5. The group exhorted that the scientific community should effectively engage the public for fostering greater uptake of novel technologies for evolving better crop varieties, and to stand up to any wrong or mischievous propaganda to discourage large-scale cultivation of crops bred with the aid of combination of biotechnology tools.