Plant Exploration — Why Is It Important?©

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INTRODUCTION

As universities throughout the world eliminate classes and programs in plant breeding, this discipline is becoming a dying art and science. Instead, genetic engineering and molecular sciences are being touted as the future for new plant development. However, as the world climate changes, and as new pests and diseases damage and destroy commercially valuable plants, it is critical that new plants are found, evaluated, hybridized, and introduced. Novel genetic resources, that are adaptable, valuable, and ornamental, are critical for the future. Plant exploration, collection, and breeding are as important as ever to meet the new challenges of the green industry because germplasm is a vital resource for the generation of new plants (Chang, 1987).

There are three main reasons that plant exploration is important: To find and collect new plant material, to breed and develop new and valuable commercially acceptable plants with the collected germplasm, and to educate future plant breeders.

FINDING AND COLLECTING NEW PLANT MATERIALS

Plant collection and introduction is a valuable process because plant genetic resources are the basis for sustained plant improvement. Crop plants have been bred and hybridized for the past 10,000 years. The improved selections that have resulted from all of this work have eliminated the resource from which they were originally based — this is called "genetic erosion." The genetic diversity that was supplied by landraces of ancient agriculture has been replaced with a relatively small number of selection that were bred for high yields and other adaptations that are necessary for high input agriculture. The genetic reservoir that is necessary for further improvement has been lost in cultivation. The good news is that in many situations, the original and wild progenitors of these crops still exist. However, as natural habitats disappear and land use increases, there is urgent need to collect and conserve the diverse genetic resources that remain.

The collection and preservation of the world's plant genetic resources have been given high priority by both the developed and developing countries. There is a large array of genetic diversity that is available in native landraces, primitive cultivars, and their wild relatives. Plant genetic resources are the most valuable and essential basic raw materials to meet the current and future needs of crop improvement. The collection and conservation of these resources in a systematic manner is a responsibility that cannot be neglected.

There are several advantages to collecting native species.

1) The natural gene pool of plants will be preserved by protecting them in secondary locations like botanic gardens and national collections. Extinction of certain species will be avoided because there are sources to reintroduce these plants if necessary.

2) The plant breeder benefits from collecting plants because new germplasm and genetic resources are available for breeding. Plant introductions expand the availability of high-quality, improved plants for breeding.
3) As new plants are collected from their native habitats, the genetic base will be widened.
4) Science benefits from these plant collecting expeditions because there is valuable information that is learned about the plants and the new genetics that are obtained.
5) New and creative ideas are generated when seeds and propagules are collected. As new locations for these plants are identified, there is an increased awareness of and understanding about plants and their communities.

Once new plants are discovered and collected, the procedures for the proper introduction and exchange of these new genetic resources should be followed. The import and export of plant genetic resources should strictly follow phytosanitary conditions. Inventories of these new plant genetic resources should be assembled and their availability should be shared with scientists and germplasm banks around the world. The new collection of plants should be preserved in a viable manner either through live collections or seed collections.

BREED AND DEVELOP NEW PLANTS

Agriculture has witnessed spectacular advances in both production and productivity of ornamental and food crops during the past 100 years. These advances are due to successful programs in plant breeding that have hybridized new crops and released valuable plants. Much of this research was achieved because of the realization that indigenous germplasm offered new genetic resources that widened the genetic base that is required for crop improvement.

The ultimate goals of plant breeding are to change the genetics of plants and to meet the demands of consumers who want new and novel plants. Modern plant breeders aim to improve native plants and provide new plants for cultivation or newer forms of plants that are currently in cultivation. Plant breeders want to produce improved plants with unique characteristics such as disease resistance, increased length of flowering, stress tolerance, variety diversity, and better postharvest life, etc. (Bridgen et al., 2002, 2009; Cadic and Widehem, 2001). In order to accomplish these goals, breeders must explore the potential value of under-appreciated and under-utilized plants, use modern breeding techniques, and improve scientific research.

Classical plant breeding is time-consuming and tedious but very rewarding. There are multiple plant breeding methods that can be used in a traditional program. These include mass selection, pure line selection, hybridization of inbred lines, backcross breeding, and recurrent selection. Genetic engineering is a new type of genetic modification that can physically remove the DNA from one plant and transfer it into another without concern if these plants have the ability to cross hybridize. The potential now exists to transfer almost any trait from any living organism into a plant.

It does not matter if classical breeding or genetic engineering is used; the ultimate test of successful breeding programs is if new plants are produced, evaluated, and introduced. This requires time to grow and evaluate plants in sufficient numbers.

EDUCATE FUTURE PLANT BREEDERS

The process of collecting plants and breeding them is not only valuable and necessary for the survival of the world, but it is also fun and educational. It is a way to learn about new plants, generate new ideas, develop new research endeavors, and improve science. In addition to the professional advantages, personal development from traveling the world, obtaining new experiences, facilitating collaborative relationships, and meeting new people and making new friends cannot be measured. It is important that the training and educating of new plant breeders continues.

LITERATURE CITED

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