Possible Effects of Intellectual Property Rights on Erosion and Conservation of Plant Genetic Resources in Centers of Crop Diversity

Donald N. Duvick
Iowa State University
Ames, Iowa

Genetic variability is the essential basis for crop improvement through breeding. Centers of diversity are fundamental sources of crop genetic variability. Thus, conservation of the plant genetic resources in centers of crop diversity is essential for long-term success in plant breeding.

Plant breeding may be carried out by trained scientists or by skilled farmers. The two groups differ in the ways they use genetic diversity. Subsistence farmers, depending on their own small-scale crop production for sustenance and for seed, use genetic diversity of the crop in the field as a bulwark against variable disease and insect attacks, and variable soil and weather problems. These farmers depend, as well, on the genetic diversity of the crop in the field to provide material for selection of new types. They have no other recourse, since they and perhaps their neighbors are the sole source of supply of their local varieties. They depend entirely on in-field genetic diversity for their livelihood and for progress in plant breeding. Each season is a fresh start; their entire future rests on the seeds they put in the ground or save in reserve in event of crop failure.

Professional plant breeders, in contrast, make very little use of in-field genetic diversity. They acquire needed genetic diversity for breeding from their own special breeding pools or from planned plantings of a diversity of materials from other sources. Global interchange of breeding materials among professional breeders is essential to their success in breeding. Professional plant breeders furnish farmers with genetic diversity for protection against biotic and abiotic stresses, not with internally variable cultivars, but instead with variable arrays of uniform cultivars. These cultivars are individually bred to meet an array of expected stresses. The breeders also furnish "genetic diversity in time" by continually breeding replacement cultivars, genetically different from those they replace. Perhaps the most important difference is that professional plant breeders can store seed for long periods of time. This allows them to build up very large collections of genetically diverse materials without the necessity of growing everything in nearly every season.

Professional plant breeders and farmer-breeders differ in one other important way. The farmer-breeders are likely to be located in one of the primary centers of crop plant diversity, in a developing country. The professional breeders are more likely to be located outside the primary centers and typically (but not always) they work in a developed country.

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Until about 70 yr ago, nearly all plant breeding took place near the farmer-breeder level. Then, as plant breeding became more specialized on genetic principles, the utility of non-local germplasm increased, and demand for it. Germplasm collections were assembled, knowing about the primary centers of crop plant diversity developed as a consequence of collection efforts. Collections were located in developing countries where centers were located in developing countries. As a result, the global interchange of germplasm among professional breeders began to replace farmers' traditional methods of breeding. Professional breeders were concerned with the need to preserve the existing global on-farm diversity before it was lost completely. By the 1960s some of the professional breeders were concerned with the need to preserve the existing diversity before it was lost completely. They made or supported others in extensive collections of farmer varieties. The collections, mainly clonal when required, were stored in germplasm banks.