In earlier chapters, procedures were discussed by which plant breeders could extend the range of genetic variability in crop plants. These processes—gene recombination, polyploidy, and mutation—are not new innovations. They extend the natural forces by which present cultivated crop species have evolved and reached the forms in which we know them today. This evolutionary process has taken thousands of years, beginning long before civilization itself and continuing today. In the breeding of crop plants, people have learned to exploit and utilize the product of these forces and to accelerate the evolutionary process through genetic manipulation. Our acceleration of the evolutionary process, by plant breeding, has gained such momentum in recent years that through its success it portends to obliterate the vestiges of many naturally evolving crop plant populations and to replace them with modern crop varieties. This is one of the unfortunate consequences of the success of plant breeding because it means loss of irreplaceable germplasm of native cultivated varieties and wild genotypes.

What distinguishes a cultivated plant from a wild plant? In general, a plant is cultivated because it has usable and economically valuable parts or products. In the beginning this was probably a seed, or a fruit, which people could harvest and utilize for food. The cereal grains are examples of plants cultivated and harvested for their edible seeds. It is of interest that, of the thousands of species of grasses, only a few in their evolutionary development acquired the property of storing large amounts of food in the endosperm. These are the cereals cultivated extensively for food—wheat, rice, maize, sorghum, barley, millet, oats, and rye being the principal ones. Other grasses, and many legumes, such as alfalfa (lucerne) and the clovers, developed succulent stems and leaves, which could be harvested as forage for livestock. The grain legumes store large quantities of protein, or oil, in the cotyledons and are grown for these constituents. Other plants, like cotton and flax, have fibers...
that people learned to spin into thread and to weave into cloth. Today, new species are being domesticated and utilized. Crambe, a member of the Brassicaceae family, is being developed as a potential oilseed crop. Crambe seed contains oil high in erucic acid, a compound needed in the manufacture of plastics and nylon. Guayule, a native desert shrub in Mexico and southwestern United States, contains a latex that is being sought as a potential source of natural rubber.

In addition to producing a useful product, domesticated plants tend to have certain characteristics that distinguish them from wild plants. Schwanitz lists some of the more obvious differences:

1. more robust plant,
2. larger fruit or seed,
3. loss of natural means of seed dissemination
4. uniform flowering,
5. reduction of bitter or toxic substances,
6. earlier maturity,
7. loss of seed dormancy.

No doubt many of these changes were aided through selection by humans, either deliberately or by accident.

An important feature that distinguishes cultivated from wild plants is the extent that they have been transported from the area where they originated. As civilizations developed and people became more mobile, they carried seeds of the cultivated crops with them. Wheat and oats were spread westward and northward into Europe from the areas of their origin in the Eastern Mediterranean. With the discovery of the Americas, cultivated crops of the New and Old World were exchanged. Corn, potatoes, sunflowers, and peanuts from the new world were carried to Europe, Asia, and Africa. Wheat, oats, barley, rye, sorghum, alfalfa, and many others were brought to the new world. The introduction and cultivation of crops in new environments results in further evolutionary developments and adaptive changes within the introduced species. The changes occur most rapidly if the crop introductions are unselected populations, or land varieties, containing a wealth of genetic variability that permits them to adapt to the new environment.

GERmplasm conservation

Crop plants were domesticated over a very long period of time, but the germplasm resources accumulated in the process are being eroded very rapidly. The earliest cultivated forms, called landraces, evolved from wild populations. The landraces that did not acquire broad genetic diversity during this evolutionary period eventually succumbed to the ravages of disease, drought, cold, competition with weeds, or other unfavorable environmental stresses. The landraces that survived became the progenitors of the modern crop variety. Unfortunately, progress in breeding, often by selection and pu-