Hybrid vigor has been recognized as a widespread phenomenon in plants and animals for many years. Corn breeders first recognized its potential for increasing yields and developed procedures for commercial production of hybrid seed. Commercial hybrids now are used extensively in many crops, including corn, sorghum, sugarbeet, and sunflower. Research is being conducted on many other crops that may permit the widespread use of commercial hybrids in the future.

Commercial hybrids have the greatest potential for crops in which the hybrid seed can be produced reliably and economically. Three biological requirements for successful hybrid seed production include the presence of hybrid vigor, elimination of fertile pollen in the female parent, and adequate pollination by the male parent (Chapter 4). If the biological requirements have been met in a species, a practical program of seed production on a large scale must be developed before hybrids can be used by farmers.

The purpose of this chapter is to describe practical aspects of commercial production of hybrid seed. The principles will be illustrated with four crop species whose biological characteristics necessitate the use of different techniques for some aspects of seed production. Corn is a monoecious species that is naturally cross-pollinated by wind. The flowers of sunflower are perfect, but the stamens develop before the stigma is receptive and it is cross-pollinated by insects. Sorghum is a self-pollinated species that has been successfully adapted to commercial hybrid seed production. Wheat is a self-pollinated species that has been studied extensively for hybrid production, but has not yet been adopted as a commercial hybrid on a large scale.