Chapter 39

Wheat and Heterosis

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INTRODUCTION

Hybrid vigour has been exploited for decades in plant and animal improvement programmes; however, for wheat (*Triticum aestivum* L.), commercialisation of heterosis has been regarded as mostly unsuccessful. The reasons for this have been argued on many platforms, and for almost four decades, but breeders are still seeking answers and discussing plans and technologies that could make hybrids a commercially successful proposition.

History of Hybrid Wheat

The history of hybrid wheat has been well documented (Pickett, 1993) and (Pickett & Galwey, 1997). Research and development have centered around the identification of suitable systems to produce hybrid wheat seed, the expression of heterosis, and the performance of hybrids.

Present Status of Hybrid Wheat

1. Although the majority of companies have withdrawn from breeding wheat hybrids, multinational organisations like Pioneer Hi-Bred International and Hybritech Seeds International as well as national institutions such as Hybrinova (France), Hybrid Wheat Australia (Australia), SENSASKO (South Africa) and CARNIA (South Africa) are still involved in the production of hybrid seed and marketing of hybrids. The only government known to be involved is the Peoples Republic of China. Acreages being grown to hybrid wheat seems to be non-significant in comparison to that being grown to conventional varieties.

2. In general, hybrid development was accomplished as a result of profit driven motives. The key opportunity of hybrid wheat would therefore lie in its ability to draw investment from private enterprise to support research and development of hybrids. Since hybrids offer the best product protection, it is a potential investment with secured returns. Hybrids also provide private companies involved in the field of biotechnology with a vehicle to sell their biotech products or package.

3. The conclusion is made that most wheat breeders have abandoned rather than adopted hybrid technology. Breeders lacked sufficient results from directed breeding for combining ability, and during the first 20 years resources were spent on sorting out sterilising agents, fertility restoration and crossability. Real comit-