

# New methodologies in Plant Breeding

SCIENCE AND  
INDUSTRY  
ENDOWMENT  
FUND

## SIEF supported research is supporting new methodologies in Plant Breeding for creating and perpetuating major yield increases.

**the challenge** By 2050, the world will need double the amount of food produced today to feed an expected 9 billion people, and this must be achieved sustainably, on existing arable land and against the challenges posed by climate change. Traditional plant breeding programs have been able to increase crop yields by 0.5-1.5% each year, but even these increasing yields will not be sufficient to meet the growing needs of the population. In order to develop new breeding technologies that significantly increase crop yields, a greater understanding of plant breeding at the genetic level is required.

**the response** The Plant Breeding project aims to understand two important phenomena that may have a revolutionary impact on global food production:

Hybrid vigour occurs when an offspring performs better than its parents. Hybrid crops form the basis of corn production around the world and are also used in other grain and cereal crops such as canola, sunflower, sorghum and rice as well as in vegetable and ornamental plant production.

Hybrids have to be remade each growing season – their unique traits are not preserved from generation to generation. The study of an asexual seed formation pathway called apomixis is underway to determine how genetically identical seeds are formed. Apomixis does not currently occur in crops, but if apomixis could be developed as a breeding tool it could be used to maintain hybrid vigour in future seed generations.

**the collaboration** Researchers at CSIRO Plant Industry are taking on this significant challenge, providing insight and discoveries which have attracted international attention, resulting in further international funding (post SIEF) to develop and progress towards the projected impact.

**projected impact** Through increased understanding of plant breeding at the genetic level, the Researchers aim to deliver the following projected impact:

- Increased sustainability to support increasing population – translation into several major crops should occur within the next decade.
- Enable apomictic plants to maintain favourable yield characteristics thus improving the yield and therefore reducing global food insecurity.
- Enable the development of lines that mimic hybrids in yield but do not require a hybrid production system, thus allowing development of plants with greater tolerance to conditions such as frost, heat or salt stress which enables plants to be grown in places where conditions were previously unsuitable.



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### What is SIEF?

Spanning a history of over 85 years, the Science and Industry Endowment Fund (SIEF) provides grants to science and scientists for the purposes of assisting Australian industry, furthering the interests of the Australian community and contributing to the achievement of Australian national objectives. In 2009 this unique and esteemed funding arrangement was rejuvenated by a gift from CSIRO, made possible due to the commercial success of CSIRO's fast WLAN, or Wi-Fi technology. Thus past accomplishments are reinvested into new science and innovation for the nation.