

Flowering project targets the right information on arrowing

Research from the CSIRO has taken a close look at sugarcane flowering in the hope of delivering information that can assist the SRA sugarcane breeding program.

For many farmers, arrowing is something they would prefer to avoid given its potential to limit their yield and CCS in some climates and situations.

But for sugarcane breeders, flowering is an essential process that forms the basis of creating new sugarcane varieties through the SRA plant breeding program.

Without flowering, there would be no start to the 12-year journey of a new sugarcane variety that begins at SRA research station at Meringa and eventually leads to locally-adapted varieties for each region of the industry.

With that in mind, a recently completed research project through the CSIRO has studied sugarcane flowering, with the objective of delivering information and tools for sugarcane plant breeders.

In addition, it was also hoped that by better understanding flowering then researchers may be able to identify ways of limiting flowering in field-grown crops.

Chief investigator Dr Anne Rae said the project had two aims: to understand how the genetics of the cane plant influenced flowering; and to see if that flowering process could be short-cut by applying hormones or growth chemicals to the cane.

"There has been a lot of work understanding the genes that affect flowering in other species such as rice, for example," she said.

"We wanted to transfer that learning to sugarcane and see if there were any triggers that we might be able to manipulate."

Manipulating flowering by being able to make arrows appear on demand could allow for more crosses – which would also mean more potential for the breeding program.

And if arrowing could somehow be induced twice in a year – instead of just once – then other research processes could also be accelerated.

"For instance if you are bringing in new genes through introgression or a genetically modified trait then if you could make the plants flower twice per year then you could do it twice as fast," she said.

The Australian sugarcane industry has already invested in highly successful technology to assist with the flowering process and to improve variety development.

The SRA Meringa research station has three photoperiod facilities, which use artificial environments to trick the plants into flowering when the breeders want.

Prior to that, breeders were limited to crossing varieties that happened to flower at the same time, as well as facing the limitation that hot weather can greatly reduce flowering or some varieties had a low tendency to flower.

Project details

Key Focus Area: 1

Optimally-adapted varieties, plant breeding and release

Project name

Faster flowering – new opportunities for genetic improvement

Project number

2012/024

Principal provider

CSIRO

Project leader

Dr Anne Rae

At Meringa, sugarcane plants are usually induced to flower between mid-February and mid-March, but several days of high temperatures (above 32 degrees) can greatly reduce flowering, which further underlines the importance of the photoperiod facilities to induce flowering.

This new research by CSIRO and funded by SRA has improved the understanding of flowering.

"Through the work of the scientist on the project, Dr Donna Glassop, we have a better understanding of the genes that are responding to day length and lead to flowering. That means there are genes we could possibly tweak and manipulate in the future."

The second part of the project that used hormones on the plants also delivered useful information. "We were not able to make the plants flower earlier, but we did control the developmental pattern of the plant to contribute to more flowering-like behaviour. We pushed it in that direction, so we were pleased with that result given the complexity of the work."

Dr Rae said the project also delivered important information that crossed over with a number of other important research endeavours.

"We now have a large resource of information that could be used in the future in both directions for flowering, turning it on and turning it off," she said.