



## CROSSING

### HISTORY

Each year, from mid-May until the end of June, plant breeding activities at BSES Meringa focus on the first step in the plant improvement process, known as cross pollination, or simply, crossing. Crossing involves bringing two complementary parents together to produce sexual seed from which, hopefully, a new variety will develop with favourable characteristics resulting in it being selected for the industry. The following fact sheet briefly explains the crossing process.

### CROSSING CENSUS

Before crosses can be made, a census is conducted to determine which parent canes have flowers available. The number of flowers for each parent is counted, and a small sample of a flower from each variety is removed for laboratory testing to determine the sex of the parent (ie is pollen being produced or not?). The census results in a list of female (female fertile, male infertile) and male (female fertile, male fertile) varieties for each of which the number of available flowers is known.



## POLLEN TEST

A sample of male organs, also called anthers, is taken from each flower sample and tested for pollen viability using a simple starch-iodine test. Test results may range from zero pollen present (a good female) to abundant pollen with a high percentage of starch-filled grains (a good male).



## CHOOSING PARENTS

Following the pollen test, parents are chosen on their merit, based on economically important traits including cane yield, sucrose content, disease resistance and other factors. These data are accumulated from trials over many years. The BSES breeding program maintains a large collection of about 3,000 parents to ensure a wide range of genetic variability is available and to guard against genetic vulnerability in the commercial crop.



## COLLECTING FLOWERS

Once decisions have been made on the best available combinations between parents, the crossing team collects the desired flowers from the field. Care is taken to ensure flowers used as females in crosses are collected in a virgin, or unpollinated, state. This ensures that seed is produced as true-to-label as possible and is not the result of field pollination.



## CONTROLLED CROSSING

The parentage of seed from crosses made at BSES Meringa is controlled by making the crosses in a pollen-proof bag or crossing lantern. This is made of premium quality cotton/polyester cloth. Female flowers placed in this will be pollinated by the accompanying male flowers with minimum contamination from wind-borne pollen.



## PHOTOPERIOD FACILITY

On average, variable and only moderate flowering occurs at BSES Meringa due to quite significant fluctuations in weather conditions. Varieties which have difficulty flowering under such conditions are termed shy flowering. The photoperiod facility helps to overcome this. The facility is computer controlled, with day length manipulated to induce flowering. Night temperature in the facility is controlled at 22° to 24° to maximise pollen fertility.

## SEED PREPARATION

When female flowers in a cross are mature, which is indicated by the flowers beginning to break up, they are collected in a nylon bag and dried to a low moisture content in a special cold dehumidification seed drying facility.

## PACKING SEED

Once dried, the flowers or fuzz containing the seed is separated from the flower branches and packed in special multi-laminate plastic and aluminium foil packets that, when sealed, do not allow moisture uptake by the seeds. These packets are stored in a large freezer at 20°. Packets of seeds of selected crosses are sent to five BSES breeding programs and the New South Wales breeding program. Once at these destinations, the seeds are germinated to establish original seedling populations which form the basis of BSES plant improvement activities.



## ONGOING RESEARCH

Progress made in the BSES Plant Improvement Program would not be possible without the support of an active research program. Crossing is but one part of Plant Improvement Activities. The wide range of research and core activities undertaken by plant improvement scientists and research assistants helps ensure the industry has a productive, profitable and sustainable future.