Running a High-Health and Trueness-to-Type Programme©

Geoff Langford
Berryworld Limited, Tai Tapu, RD2, Christchurch 7672, New Zealand
Email: geoff.berryworld@gmail.com

BACKGROUND

A number of crops have high health schemes to ensure that plants sold meet consumer expectations. Fruit crops have tended to lead the way because of the risk of disease spread, the relatively large number of units sold, and the importance of ensuring that plants sold are subsequently productive and true to type. In recent years, New Zealand government backed schemes have largely disappeared. This means that industry groups have had to take responsibility for high-health schemes where this is considered desirable. In berry crops, there are schemes for strawberries and blackcurrants and a blueberry plant scheme is being developed.

At the moment, there are around 14 million strawberry plants sold annually in New Zealand. Plant numbers peaked at 21.5 million in 1999 but fell as growers changed to new cultivars that were more vigorous and needed more space. Despite lower plant numbers, areas planted in strawberries have actually increased since 1999 and total production has increased from an estimated 7100 tonnes to 8800 tonnes this year (2013-2014).

The Strawberry Runner Plant Scheme was set up in 1985 in conjunction with strawberry runner growers by the Ministry of Agriculture and Fisheries. It was initially established for the New Zealand Berryfruit Growers Federation but ownership has since passed to New Zealand Berryfruit Propagators Ltd. (NZBP) which is a limited liability company, 100% owned by Strawberry Growers New Zealand Inc.

Because the scheme has no government association, control is achieved by contractual arrangements with the four main plant growers. As part of the license contract to allow production of what are mostly University of California cultivars, growers must accept to produce according to the scheme in order to get a license.

OUTLINE OF THE SCHEME

The scheme is based on a 3-year propagation cycle starting with a nucleus plant. This may be a plant directly released from quarantine, a plant sourced from tissue culture stocks held by the scheme, or a recycled tested nuclear plant produced the previous year. Initial stocks are established in spring. The subsequent nuclear plants produced are sold (usually the following September) to the licensed plant growers and these are placed in elite beds where they are multiplied for a further year before going into runner beds. The following May, the runners produced are sold to fruit growers.

A single strawberry plant can produce up to 400 daughters in a single season. Multiplication rates are often lower than that and for nucleus stock plants we work on average production of 50 nuclear plants. These 50 nuclear plants, planted in elite beds could produce 10,000 elite plants which subsequently could be multiplied in the runner beds to give 2,000,000 plants for sale to fruit growers. The health of this last generation will depend upon both the health of the original stock plant and subsequent care at each stage of the scheme.

HIGH HEALTH ASPECTS

The focus of the programme is on those pest and diseases that can affect production of the plants when they reach the customer — in this case the fruit grower. The list of these pests and diseases is regularly reviewed and is added to if threats from newly arrived pests and diseases are discovered.

The present list of designated serious diseases includes: 17 viruses; 14 phytoplasmas; 2 fungal diseases, of which the most important is *Phytophthora cactorum;* and nematodes. Fortunately there are no bacterial diseases on the list at the moment, but we are on the

look-out for *Xanthamonas fragariae* that is a potential threat to strawberries but is not in the country, as far as we know, at present.

The programme deals with these threats through a combination of testing and preventative measures. All nucleus stock plants are hot water treated at 46°C for 10 min. to control nematodes and cyclamen mite before going into the nuclear stock unit. At this stage, the first *Phytophthora* test is taken from roots and potting mix from each plant. During the season, leaf samples are taken and tested for viruses and phytoplasmas by molecular methods carried out by MPI, and this testing is supported by grafting each of the 17 cultivars on to three indicator clones, which we do ourselves. A second *Phytophthora* test is carried out prior to sending the plants out.

Elite and runner beds are inspected annually and the nuclear unit has been audited three times in recent years. Finding people with appropriate knowledge of strawberry high-health programmes within New Zealand to audit the nuclear unit in a meaningful way has been a problem. However we do cross check our systems with the potato high health unit centred in the same glasshouse complex at Plant and Food Research at Lincoln.

For woody plants, there are increasing concerns about fungal diseases that have the ability to be carried without showing symptoms on propagation material. What happens subsequently in fruit production fields is that under specific conditions, these diseases then express, often at great cost to the grower. This is highly relevant for our woody berry propagation programmes. Diseases that have this ability include *Peronospora* sp. (downy mildew) and *Cercosporella* sp. (boysenberry decline) in *Rubus* species, and *Chondostereum purpureum* (silver leaf) and *Botryosphaeria* sp. in blackcurrants and blueberries We are still in the process of developing systems that include checks of propagation material for freedom from these diseases in these crops. We know that *Peronospora* will happily multiply in tissue culture stock and with its ability to infect roses as well, is a disease to be wary of.

Virus diseases and phytoplasmas are the others that can turn up in otherwise healthy appearing plants at a later date. As an example, raspberry bushy dwarf virus (RBDV) is causing problems at the moment in plants distributed a few years ago. These incidents remind us of the importance of having high-health systems for propagation

TRUENESS TO TYPE

It is now over 10 years since the last court case occurred involving a mix up with strawberry plants. Co-incidentally we introduced a trueness-to-type programme around the same time and this has prevented mix ups getting through to the fruit production stage and in recent years, the trial results have been used to circumvent a possible court case. However, we have had a recent mixed cultivar experience with blackcurrants which has created changes to our operating systems for this crop.

The strawberry trueness-to-type programme has multiple objectives. The first one is to ensure that all plants sold to commercial growers will perform as expected for that cultivar. The trial plots are also used to test relative performance of cultivars and demonstrate any differences between propagators. The plots are also used as test sites for Plant Variety Rights (PVR) descriptions. We run two sites for strawberries, one in Auckland for short day cultivars and one in Canterbury for day neutral cultivars. Plants from all elite beds and the nuclear stock unit are included in the replicated and randomised trial plots.

CONCLUSION

Running a high-health and trueness-to-type programme is not cheap. Having plants that don't perform at a later date with associated court cases over health and trueness-to-type issues can be much more expensive. The key is to identify the issues that are likely to impact on subsequent performance of nursery stock and have systems in place that demonstrate that when plants left the nursery, they were fit for purpose.