

# Designing the perfect strawberry plant

The Irish soft fruit industry is booming. The shining star is the strawberry. But what is the science behind the effort to produce the perfect Irish strawberry? DR EAMONN KEHOE describes a project at Teagasc Kinsealy Research Centre aimed at producing such a strawberry plant for the Irish strawberry grower.

The fruit-growing season in Ireland has changed fundamentally over the last decade. In the past, the strawberry season lasted from June to July. Today, through new technology, the season has been extended from April to November. In fact, the strawberry growing business in Ireland is now worth an estimated €35 million per year. The industry is expanding in volume terms at a rate of about 10% per annum, making it a highly valuable sector of Irish commercial horticulture. The most popular strawberry grown in Ireland is still the Dutch cultivar 'Elsanta'. No cultivar has yet matched Elsanta's success.

## Strawberry plant imports

Irish strawberry growers used to import the vast majority of their Elsanta strawberry plants from both the Netherlands and the United Kingdom each year. This was because the Irish strawberry propagators could only supply field-grown 'bare root' plants and only for the early part of the season. However, things have now changed for the better. A number of growers have invested heavily in an attempt to stop the importation of plants and to produce their own. From a starting point in 2005, the 'tray plant' industry (i.e., plants are grown in trays outdoors for the entire production process) has expanded rapidly and is now worth an estimated €4 million per year. This should at least double over the next few years. The ultimate goal, when Ireland has satisfied its own market demand, is to export strawberry plants.

## Tray plant production

Strawberry tray plants are used especially in protected strawberry production. They have gained in popularity and have formed an important part of the growing system among growers in the Netherlands, Belgium and countries such as France, the UK and Italy. They are more suited for glasshouse cropping than bare root plants. This is because the tray plant is able to cope with the hotter conditions experienced in a glasshouse environment. Tray plants are also produced from runners,

which a mother plant produces in the spring. Runner tips are cut from these runners and are stuck into modular peat trays. They offer many advantages compared to field-grown bare root plants. Runners and cuttings are grown on substrates, reducing the risk of infection by root diseases to a minimum. Plant nutrition can be controlled completely, plants can be more easily lifted during frost and wet conditions and the roots remain intact in comparison to bare root plants. This improves plant storability and establishment after cold storage. Tray plants also produce 10–20% more large fruits than bare root plants, which also reduces picking costs substantially.

## Tray plant research

Applied research has been undertaken at Kinsealy to establish and test a tray plant production system for the Irish strawberry propagators. The main cultivar being tested is Elsanta. This system is aiming to help both those growers who are already propagating this type of plant and also those who may wish to set up such a plant production system in the next few years. As well as establishing a system for the propagators, a large part of the project is concentrated on trying to better understand strawberry plant flowering. Strawberry flower induction is sensitive to temperature and photoperiod, and to several agronomic and nutritional factors. The aim is to improve the cultural knowledge and understanding of the physiological control of axillary meristems (flower structures), which can enhance strawberry fruit production. It is also possible to programme axillary meristems to a particular grower's requirements and, even more crucially, for a particular part of the growing season. The quality and stage of flower development within the strawberry plant can also be checked by taking some plant samples at plant harvest time and dissecting them under a stereo microscope. The aim of the first experiments was to study the effect of runner size, date of runner harvest and two peat types (coarse and fine) on subsequent fruit yield characteristics. There was no significant difference between the yield recorded



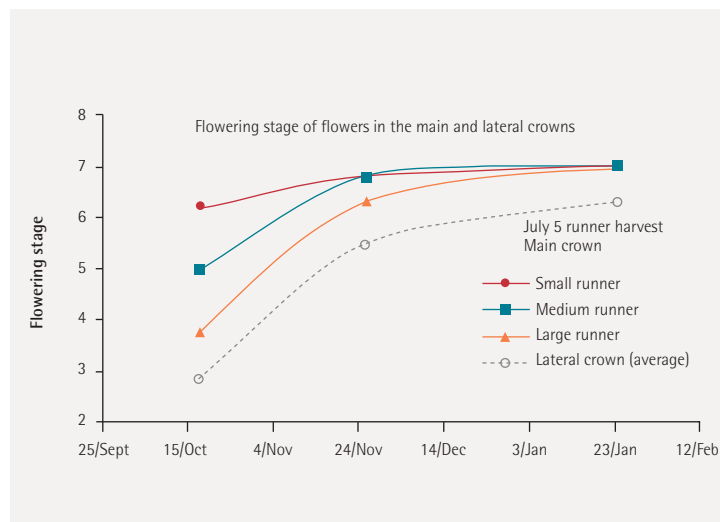


FIGURE 1: The flowering stage of the primary flower and lateral crowns for the July 5 runner harvest and three runner grades.

for season one or two for any of the treatments. However, the yields at our planting density of 10 plants per m<sup>2</sup> were very high for Ireland. The lowest and highest average yield recorded over the two seasons was 11.33 and 12.73kg per m<sup>2</sup>. Most Irish growers struggle to get a yield of 9kg per m<sup>2</sup> at the same planting density. This was most likely due to the fact that we were using very high quality plant material.

The average fruit weight was also higher from plants propagated from the large runner grade when grown in the fine substrate. However, the large runner grade grown in the finer peat resulted in a smaller fruit size when it was propagated at the later date in July. This is the first indication that the timing of taking the runner cuttings could have a significant effect on fruit yield parameters. Further work is currently being undertaken to further study the effects of runner harvest time and peat substrate type on fruiting parameters.

### Strawberry plant dissection

Strawberry plants were dissected a number of times in the later part of the growing season. The flowering stage of the apical meristems shows a regular development of the flower from the time the plant samples were harvested in mid October through to the final plant harvest in late January (Figures 1 and 2). However, there was a small difference between the stages of flower development between the three runner grades from the July 5 runner harvest. As the growing season progressed this difference in flower stage development narrowed further (Figure 1). The flower stage recorded from crowns from the second runner harvest time (July 19) had very similar stages of flower development (Figure 2). It should be noted also that the flower stage development for the lateral crowns in all the treatments was always less advanced from that seen in the main apical meristems mentioned above (Figures 1 and 2).

Strawberry crown dissection resulted in a very clear picture of the various stages of flower formation the plant goes through. This could be used as a method to further determine plant flower quality characteristics throughout

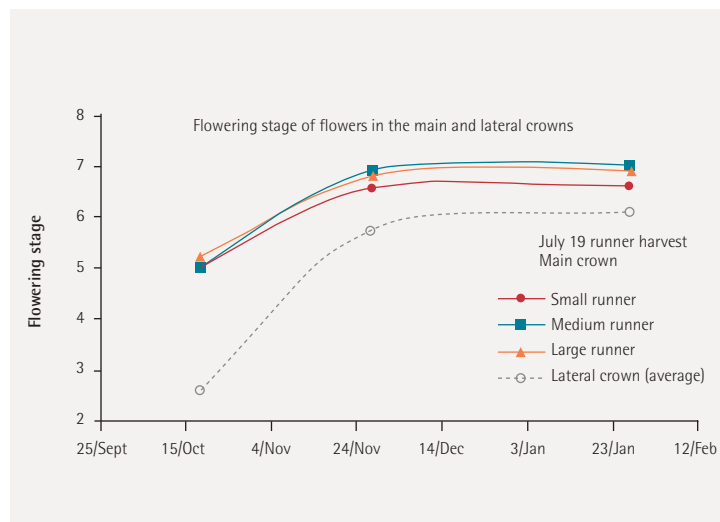


FIGURE 2: The flowering stage of the primary flower and lateral crowns for the July 19 runner harvest and three runner grades.

the whole growing cycle in the strawberry propagation nursery. It also gives the grower very useful information about the cropping potential of that plant for the following growing season and at what time of year that plant is best suited for production.

### Expected benefits to industry

By successfully growing their own plants, growers would have less reliance on imported strawberry plants. The quality of these imports is sometimes poor and plant disease risks are also very high (e.g., *Phytophthora* spp., *Xanthomonas fragariae*). The knowledge transfer from this research should allow growers to grow and supply quality strawberry plants for the full length of the Irish season. Strawberry yields should also be higher than that of traditional bare root plants and with higher quality fruit. Labour costs would also be reduced because of faster picking times. There is also the potential to develop an export market in the not too distant future.

### Further reading

Kehoe, E., Savini, G. and Neri, D. (2009). The Effects of Runner Grade, Harvest Date and Peat Growing Media on Strawberry Tray Plant Fruit Production! *Acta Horticulturae* (ISHS) **842**: 699-702.



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He has worked on this project in collaboration with Professor Davide Neri and Dr Gianluca Savini, Università Politecnica delle Marche, Ancona, Italy, through the EU-funded COST group 'Euroberry 863' ([www.euroberry.it](http://www.euroberry.it)). He is also working on further aspects of this work with Gebremedhin Beyene, a Teagasc Walsh Fellow, and Dr Alan Hunter at the UCD School of Agriculture, Food Science and Veterinary Medicine.