



Grower Summary

SF 128a

To assess the performance of new June-bearing strawberry varieties and advanced selections in a commercial UK substrate production system over two harvest periods.

Final 2015

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AHDB Horticulture,
AHDB
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

Project Number: SF 128a

Project Title: To assess the performance of new June-bearing strawberry varieties and advanced selections in a commercial UK substrate production system over two harvest periods.

Project Leader: Sarah Troop

Contractor: Meiosis Ltd

Industry Representative: Stephen McGuffie, New Farm Produce

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Headline

Malling Centenary gave the best all round performance in this substrate grown variety trial, producing fruit with excellent quality, large berry size and good class 1 yields.

Background

Protected table top substrate systems are an increasingly important part of the strawberry fruit production industry. For the industry to make the best use of substrate production, growing the varieties suited to this production system is a key ingredient for success.

Elsanta has been the most widely grown June-bearing variety in substrate production for some time but it has limitations. These include the production of a high proportion of medium size berries, a characteristic that leads to higher picking costs. It also has a tendency to produce misshapen fruit due to its sensitivity to cool temperatures at flowering. As production costs continue to increase, for example, through the introduction of the minimum wage, growers are looking for alternative varieties that reliably produce large berries with a high proportion of class 1 fruit. This would enable picking costs to be significantly reduced without requiring any major change to current production systems.

Around the world, there are many breeding programmes investing heavily in the development and marketing of new varieties and each year several new ones are released into the marketplace. If growers are to use these in their current substrate production systems, they must first screen their performance on one site under the same growing conditions to compare their productivity and fruit quality against the market standard. Growers particularly look for varieties which provide season extension, increased productivity, improved harvest efficiency and/or fruit quality characteristics such as berry size, flavour and shelf life.

This project (SF 128a) was set up to assess the performance of a number of new named June-bearing varieties and numbered selections in a commercially grown substrate produced strawberry crop, comparing them to the industry standard Elsanta.

Results summary

The following is a summary of information provided in the SF 128a Full Trial Report.

Table 1. Varieties and numbered selections included in the trial and planting material used

| Variety/ Selection | Breeder | Country of origin | Season | Plant Type |
|---|------------------------------------|--------------------------|---------------|-------------------|
| EM1552 Malling Sunrise | East Malling Research | UK | Early | Tray 9cm x 7cm |
| Magnum (exclusive to Total Berry growers) | Marionnet SARL | France | Early | Tray 9cm x 7cm |
| Fleurette | Goossens Flevoplants | Netherlands | Early | Tray 9cm x 7cm |
| Garda | CRA - FRF | Italy | Early-mid | A+ plants |
| Malling Centenary | East Malling Research | UK | Early-mid | Tray 9cm x 7cm |
| EM1677 Malling Glow | East Malling Research | UK | Mid | Tray 9cm x 7cm |
| Elsanta | Plant Research International (PRI) | Netherlands | Mid | Tray 9cm x 7cm |
| EM1996 | East Malling Research | UK | Mid-late | Tray 9cm x 7cm |
| EM1998 | East Malling Research | UK | Mid-late | Tray 9cm x 7cm |
| EM2044 | East Malling Research | UK | Mid-late | Tray 9cm x 7cm |
| EM2056 | East Malling Research | UK | Mid-late | Tray 9cm x 7cm |
| Vivaldi | Fresh Forward | Netherlands | Mid-late | Tray 9cm x 7cm |
| Jive | Fresh Forward | Netherlands | Late | Tray 9cm x 7cm |

- The thirteen June-bearing strawberry varieties/selections listed in Table 1 were planted in table-top coir substrate production in a permanently skinned enclosed polytunnel

with vents and removable doors for ventilation. The trial site was at New Farm Produce in Elmhurst, Staffordshire, kindly hosted by Stephen McGuffiie.

- The trial was located in the centre rows of the polytunnel, with guard plants protecting the trial on all sides. Fertigation and agrochemical inputs were managed in the same way as a commercial crop of Sonata. Tray plants were used to establish the trial, with the exception of Garda, for which only A+ plants were available. The plant quality of EM1552, EM1677, EM1996, EM1998, EM2044, EM2056 and Malling Centenary was not as good as the other varieties in trial. This adversely affected the year 1 60-day yield results of these seven selections.
- The first year harvest commenced on 30th April, 2014 and harvest continued until 30th June. The second year harvest commenced on 18th May, 2015 and continued until 13th July.

Summaries of the project results are laid out in Tables 2-4 and Figures 1-3 below.

Table 2. 2014 Year 1 60-day Fruit Yield data (listed by Class 1 yield)

| Variety | 50% pick date | Total yield g/plant | Class 1 yield g/plant | % Class 1 | BERRY SIZE % | | |
|--------------------|---------------|---------------------|-----------------------|-----------|-------------------|---------------|----------------|
| | | | | | Extra-large >45mm | Large 35-45mm | Medium 25-35mm |
| Jive | 06/05/14 | 603.2 | 567.8 | 94.1 | 8 | 56 | 36 |
| Vivaldi | 30/05/14 | 577.7 | 542.8 | 94.0 | 1 | 37 | 62 |
| Fleurette | 21/05/14 | 340.8 | 332.4 | 97.5 | 2 | 57 | 41 |
| Elsanta | 20/05/14 | 374.0 | 326.9 | 87.4 | 6 | 45 | 49 |
| Magnum | 20/05/14 | 330.9 | 314.0 | 95.0 | 4 | 48 | 48 |
| Malling Centenary* | 21/05/14 | 290.5 | 286.7 | 98.7 | 2 | 51 | 47 |
| EM1677* | 19/05/14 | 205.0 | 198.9 | 97.0 | 5 | 54 | 41 |
| Garda** | 18/05/14 | 203.1 | 177.3 | 87.3 | 1 | 33 | 66 |
| EM1552* | 14/05/14 | 165.9 | 158.7 | 95.7 | 2 | 40 | 58 |
| EM2044* | 20/05/14 | 156.6 | 153.4 | 98.0 | 4 | 62 | 34 |
| EM1996* | 22/05/14 | 153.3 | 137.3 | 89.6 | 0 | 60 | 40 |
| EM2056* | 15/05/14 | 131.0 | 128.8 | 98.3 | 24 | 56 | 20 |
| EM1998* | 19/05/14 | 102.5 | 98.3 | 96.3 | 1 | 57 | 43 |

* small tray plants compared to the other varieties in trial

** A+ plants

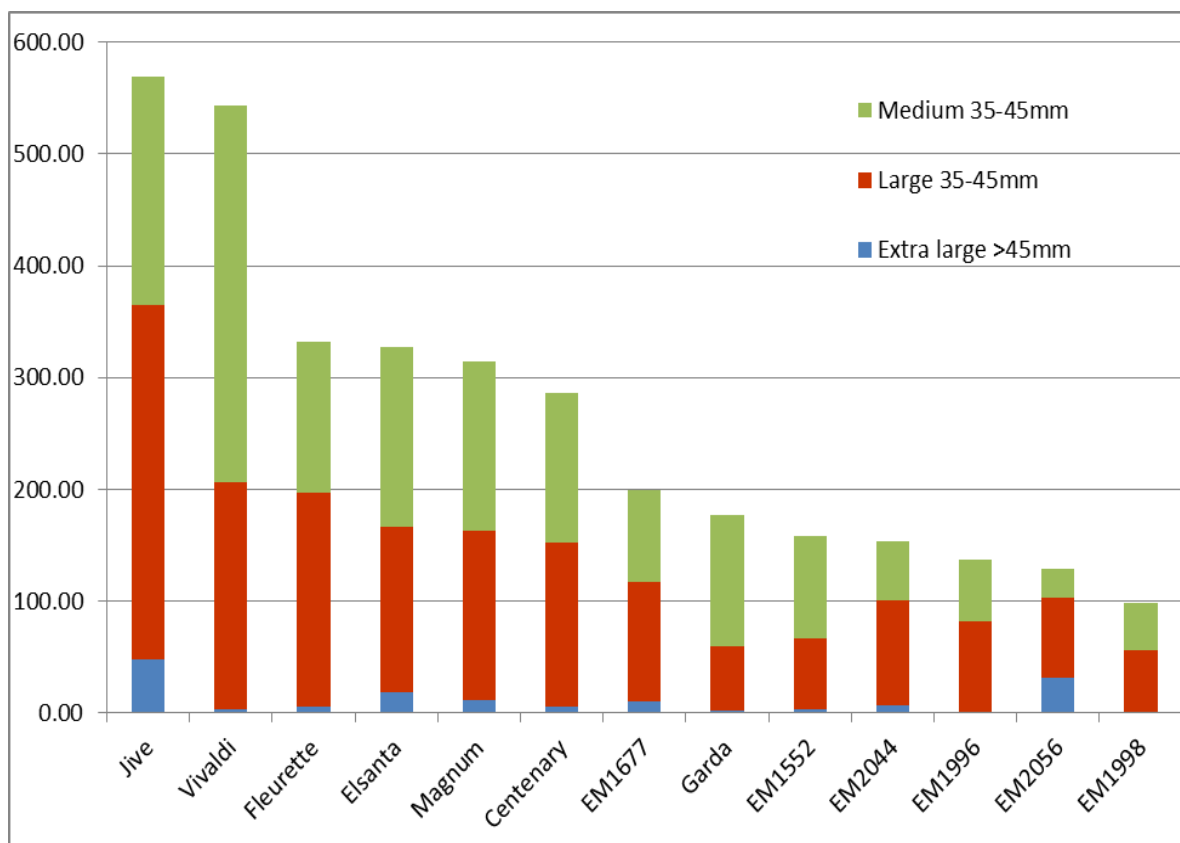


Figure 1. Year 1 60-day Class 1 Berry Size (g per plant)

Table 3. 2015 Year 2 Main Crop Fruit Yield data (*listed by Class 1 yield*)

| Variety | 50% pick date cv Elsanta | Yield g per plant | | % Class 1 | Class 1 Berry size % | | |
|-------------------|--------------------------|-------------------|---------|-----------|----------------------|---------------|----------------|
| | | Total | Class 1 | | Extra large >45mm | Large 45-35mm | Medium 35-25mm |
| EM1552 | -12 days | 712.9 | 575.4 | 80.7 | 0.4 | 24.3 | 75.3 |
| EM1677 | +1 day | 799.0 | 555.0 | 69.5 | 0.0 | 15.2 | 84.8 |
| Malling Centenary | -5 days | 567.3 | 530.6 | 93.6 | 0.7 | 35.6 | 63.7 |
| Vivaldi | +3 days | 659.6 | 529.6 | 80.5 | 0.4 | 15.7 | 84.0 |
| Fleurette | -5 days | 592.8 | 519.6 | 87.8 | 1.1 | 24.4 | 74.5 |
| EM2044 | +4 days | 670.9 | 510.9 | 76.3 | 1.1 | 18.9 | 80.0 |
| EM1996 | +5 days | 621.1 | 466.5 | 75.5 | 0.3 | 18.7 | 81.0 |
| Jive | +5 days | 595.3 | 456.7 | 76.7 | 1.9 | 43.7 | 54.4 |
| Elsanta | 16/06/15 | 682.7 | 451.3 | 66.6 | 0.1 | 14.4 | 85.5 |
| EM1998 | +2 days | 586.9 | 439.9 | 74.9 | 0.2 | 22.2 | 77.5 |
| EM2056 | +6 days | 528.7 | 419.7 | 79.4 | 0.6 | 30.0 | 69.4 |
| Magnum | - 5 days | 528.8 | 399.9 | 75.9 | 0.3 | 20.0 | 79.8 |
| Garda | -8 days | 386.8 | 267.1 | 68.7 | 0.9 | 23.0 | 76.1 |

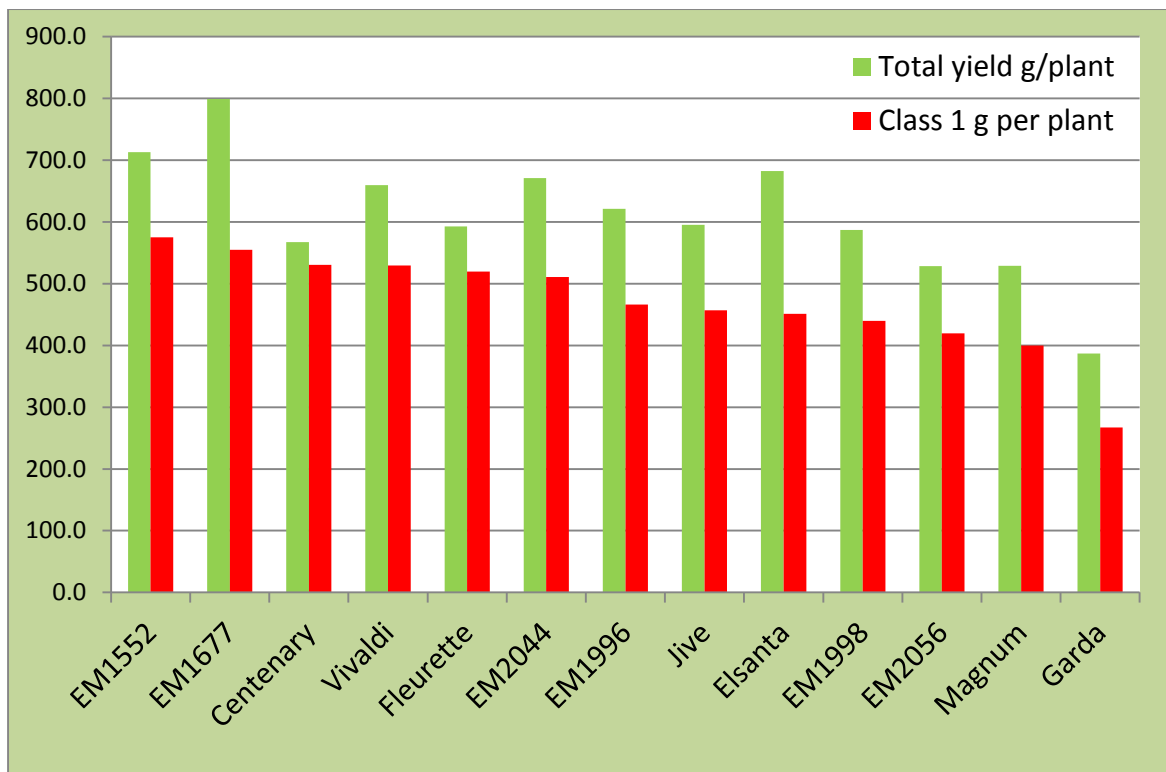


Figure 2. 2015 Year 2 Main Crop Fruit Yield (g per plant)

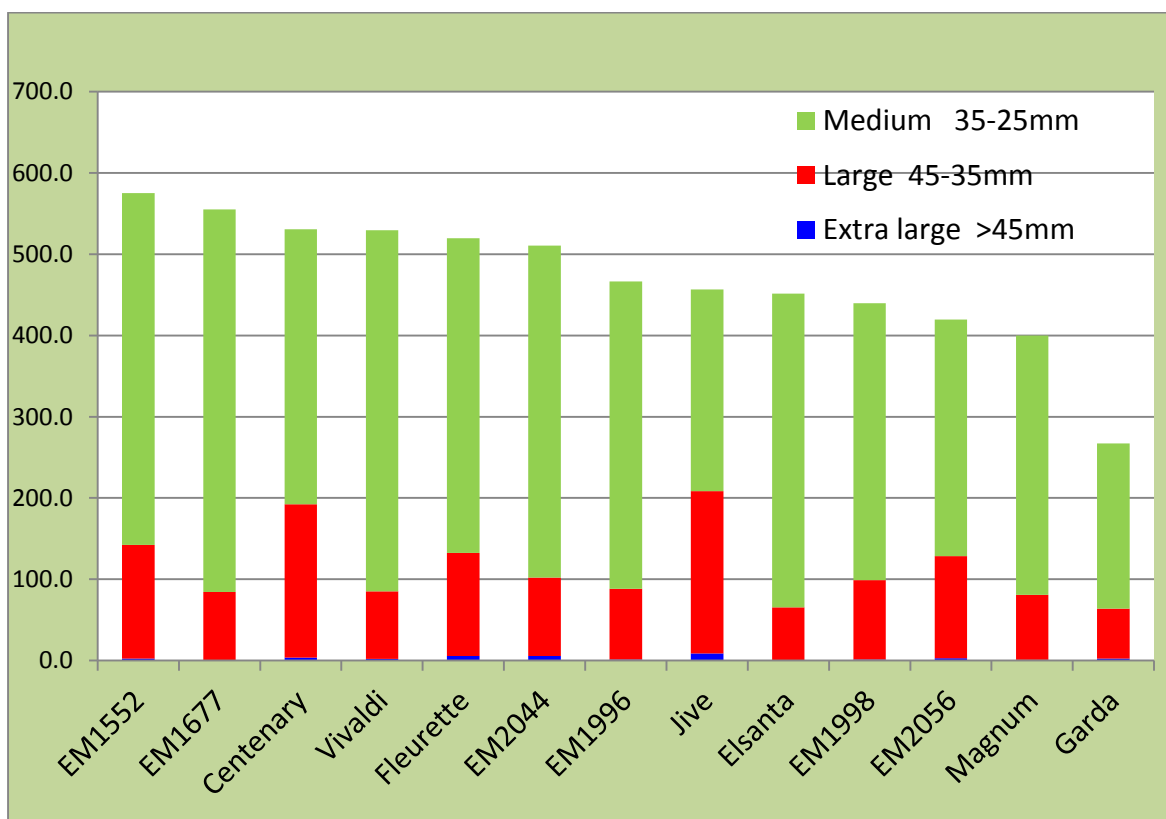


Figure 3. Year 2 Class 1 Berry Size (g per plant)

Table 4. Fruit Quality

| Variety | External berry colour | Uniformity of berry shape | Firmness | Berry appearance | Fruit flavour | Shelf life | Mean Brix |
|-------------------|---|--------------------------------------|------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------|
| | <i>1 = light orange 8 = dark wine-red</i> | <i>1 = irregular 9 = uniform</i> | <i>1 = soft 9 = firm</i> | <i>1 = poor 9 = excellent</i> | <i>1 = poor 9 = excellent</i> | <i>1 = poor 9 = excellent</i> | <i>(sugar content)</i> |
| EM1552 | 7.0 | 7.5 | 6.0 | 7.0 | 6.2 | 6.5 | 8.9 |
| Magnum | 7.5 | 6.5 | 8.0 | 6.5 | 7.4 | 8.0 | 9.3 |
| Fleurette | 5.0 | 7.0 | 7.0 | 7.5 | 6.8 | 7.5 | 7.8 |
| Garda | 7.5 | 7.5 | 8.0 | 7.0 | 6.8 | 6.0 | 9.1 |
| Malling Centenary | 6.0 | 8.5 | 8.0 | 9.0 | 8.2 | 7.8 | 8.4 |
| EM1677 | 7.0 | 8.0 | 8.0 | 8.0 | 6.2 | 7.8 | 7.4 |
| Elsanta | 6.5 | 6.5 | 7.0 | 6.5 | 6.5 | 6.5 | 7.3 |
| EM1996 | 6.0 | 7.5 | 7.5 | 7.5 | 7.3 | 7.5 | 9.6 |
| EM1998 | 6.0 | 7.5 | 7.0 | 7.5 | 8.0 | 7.0 | 9.0 |
| EM2044 | 6.0 | 7.5 | 7.5 | 7.5 | 6.5 | 7.8 | 8.2 |
| EM2056 | 6.5 | 7.0 | 7.0 | 7.0 | 5.5 | 7.0 | 7.0 |
| Vivaldi | 8.0 | 6.5 | 8.0 | 8.0 | 4.3 | 6.0 | 7.0 |
| Jive | 6.0 | 7.0 | 6.5 | 7.0 | 2.0 | 6.5 | 6.6 |

Early season varieties: The earliest variety in trial was EM1552 (Malling Sunrise) cropping 12 days ahead of Elsanta and producing most of its yield in a two week period, an advantageous trait for an early variety. The 60-day fruit yield was low (partly due to poor plant quality), berries were only moderate in size but class 1 percentage was high. The main crop total and class 1 yields were significantly higher than Elsanta. The class 1 yield was the highest in trial. The average berry size was also better than Elsanta. The fruit had good brix levels

with good colour, though it was not as firm as Elsanta, and some berries suffered from splitting under the calyx. EM1552 is a variety with low tolerance to Verticillium wilt and suffered a few plant losses in trial from suspected Phytophthora cactorum, so it is recommended for substrate or clean soil production systems.

Garda reached its 50% pick date 8 days ahead of Elsanta whilst Malling Centenary, Magnum and Fleurette were 5 days in advance. Of these four varieties **Malling Centenary** gave the best performance with the highest total and class 1 yields in the main crop year, significantly higher than Elsanta, and a similar class 1 yield to Elsanta in the 60-day cropping season. Berry size was very good as was fruit quality. The **Garda** plants suffered badly in trial, as establishment in year one was poor and in year two a reaction to one of the crop protection sprays caused further plant stress. Fruit yield in both years was low and in shelf-life tests, the berries darkened and showed symptoms of bruising, but flavour was sweet and brix levels good.

Magnum and **Fleurette** gave similar class 1 60-day yields to Elsanta. In the main crop year, Magnum had a very disappointing yield with moderate fruit size whilst Fleurette yielded similar to Malling Centenary. Magnum was noted for its reliably sweet flavour and good brix levels and Fleurette for its light skin colour, though it did show bruising quite readily.

Midseason varieties: EM1677 (Malling Glow) and EM1998 reached the 50% pick date at a similar time to Elsanta. **EM1677 (Malling Glow)** was the best performing of the three varieties, giving the highest total yield in the main crop trial and second highest class 1 yield. Its 60-day yields are usually similar to Elsanta, however poor plant quality resulted in reduced yield in 2014. Like its parent Elegance, the berries are very attractive, with good firmness and shelf life and it has a pleasantly sweet flavour. **EM1998** gave a very low 60-day yield followed by a similar class 1 yield to Elsanta in the main crop year. The berries were moderate to small in size and sensitive to bruising.

Mid-late season varieties: Vivaldi was three days later than Elsanta, EM2044 four days later, EM1996 and Jive 5 days later and EM2056 6 days later than Elsanta.

Of these selections **EM1996** gave good fruit quality results and similar 60-day and main crop yields to Elsanta, with more medium than large size fruit. However in EMR trials, yields and fruit size have been shown to be consistently better than Elsanta.

The 60-day results show that **Jive** and **Vivaldi** produced the highest total and class 1 fruit yields, although it should be noted that plant quality was superior to that of many of the other varieties established in the trial. In the main crop year, Vivaldi also produced good yields but Jive had a similar yield to Elsanta. Of the two varieties, Jive had large fruit size though the berries suffered from splitting and cracking of the skin and flavour was disappointing with brix levels lower than Elsanta. Vivaldi looked very attractive in the punnet but had a high proportion of small size berries that were darker in colour with a weak flavour.

EM2044 produced reasonably good fruit yields. In year 1, fruit size was large but there was a high percentage of medium size fruit in year 2. Firmness and shelf life were good but the flavour was quite bland in some picks. Brix levels were higher than Elsanta on average.

EM2056 was the latest selection in trial with a 50% pick date 6 days after Elsanta. It had a high proportion of large fruit but yields were lower than Elsanta. Flavour was quite bland from most picks and the berries were quite sensitive to bruising.

Main conclusions

The following conclusions are drawn from the data collated from the 2014 60-day and 2015 main crop seasons:

- **Malling Centenary** gave the best all round performance producing fruit with excellent quality, large berry size and good class 1 yields. Improved plant quality would have helped the variety to reach its full yield potential in the 60-day cropping year. The large berry size and high percentage class 1 will provide growers with the opportunity to reduce harvest costs over the current industry standards.
- An exceptionally early cropping variety, **EM1552 (Malling Sunrise)** gave the highest yields in the main crop year with a 50% pick date 12 days ahead of Elsanta. Fruit was

produced in a concentrated two week period, an ideal trait for the early season marketplace.

- With a similar early-mid season cropping to Malling Centenary, **Fleurette**, produced good fruit yields in both the 60-day and main crop years. However, the light orange berry colour readily displayed bruising on the fruit.
- **Magnum** produced consistently good fruit flavour and brix levels. The variety produced mainly medium size berries and class 1 yields were not high. The cropping season is later than Elsanta and the berries showed very good firmness. Magnum is exclusive to Total Berry and is not available to other growers.
- The midseason **EM1677 (Malling Glow)** produced good total and class 1 fruit yields in the main crop season. Berry size, colour and firmness were good, although percentage class 1 could be improved by a wider plant spacing. With good tolerance to Verticillium wilt, it may be a useful alternative to Elsanta.
- The later season **Jive** had exceptionally large fruit size and good yield in 60-day cropping, though berries did suffer from some splitting and cracking of the skin. **Vivaldi** produced very attractive fruit but the berry colour was darker than Elsanta and berry size mainly medium rather than large. Both Jive and Vivaldi had disappointingly weak flavour.
- **EM1996** and **EM2044** had similar mid-late cropping seasons. Both gave similar class 1 yields in the main crop year to Elsanta. Fruit size was medium and fruit quality generally an improvement over Elsanta.
- **Garda**, **EM1998** and **EM2056** were the least promising varieties in substrate culture. Each gave lower yields than Elsanta and suffered fruit quality issues. Other varieties may be better suited to UK substrate production systems.