

Project title: Field evaluation of new mainseason strawberry selections in the UK

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The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Chris Creed
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Signature**Chris Creed**.....

Date23 November 2010...

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Date .. .2..December 2010..

on behalf of Dr T O'Neill

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GROWER SUMMARY

Headline

Several selections are showing promise at the early stages of the trial. These include **EM 1733, Elegance, EM 1746, EM 1756, Elianny, Isaura, and Zumba.**

Background

The UK strawberry needs new varieties to meet the changing requirements of supermarkets and other outlets. Whilst **Elsanta** has occupied the largest area of production for many years because of its potential for high yield, good fruit quality and shelf life, its susceptibility to soil-borne disease and the cost of manipulating its season means that other varieties are being sought, with some, such as Sonata, increasingly planted.

Improved characteristics are especially desirable for:

- fruit quality (e.g. percentage Class I, size, flavour etc.).
- resistance to pest and disease
- extended seasonal cropping profile

Variety trials also help to identify varieties that could be used for specialist markets such as early and late season protected culture, PYO/direct and organic sales, so that growers are able to target specific markets and outlets. The trial offers an opportunity to test varieties from various breeding programmes around Europe that may be appropriate for British markets.

Results of the Variety Trials

For a more comprehensive review of the results please refer to the “Full Trial Report”.

The trial was sited within a commercial planting of the variety Elsanta on a farm in the West Midlands (Penkridge), courtesy of George Busby and Sons, Littywood Farm, Bradley, Stafford. Previously used for arable cropping, the land was sterilised prior to planting on raised beds. The trial was planted on 28 April 2010. The varieties or breeders’ selections chosen for the trial are listed below in Tables 4, 5 and 6, together with assessments of their key plant and fruit characteristics.

Table 4. Selections included in the trial

Variety / selection	Production season	Country of origin	Plant Supplier	Crown diameter supplied
Anitabis	Very early	Italy	Vivai Molari	9 mm
Zumba	Early	Netherlands	Fresh Forward	13 mm
EM 1643	Early	UK	Meiosis Ltd	11 mm
Elianny	Early-mid	Netherlands	Vissers	14 mm
Elsanta	Mid	Netherlands	Fresh Forward	16 mm
EM 1677	Mid	UK	Meiosis Ltd	11 mm
EM 1727	Mid	UK	East Malling Strawberry Breeding Club	14 mm
EM 1752	Mid	UK	East Malling Strawberry Breeding Club	11 mm
EM 1756	Mid	UK	East Malling Strawberry Breeding Club	10 mm
Elegance	Mid-late	UK	Meiosis Ltd	13 mm
Fenella	Mid-late	UK	Meiosis Ltd	9 mm
Isaura	Mid-late	Belgium	Fresh Forward	16 mm
EM 1607	Mid-late	UK	Meiosis Ltd	13 mm
EM 1682	Mid-late	UK	Meiosis Ltd	14 mm
Malwina	Late	Germany	Meiosis Ltd	Potted plants
Salsa	Late	Netherlands	Fresh Forward	17 mm
EM 1636	Late	UK	Meiosis Ltd	11 mm
EM 1733	Late	UK	East Malling Strawberry Breeding Club	14 mm
EM 1746	Late	UK	East Malling Strawberry Breeding Club	14 mm

Table 5. Plant characteristics and berry weight

Variety and season	60 Day potential 1 = poor 5 = good	Runner number 1 = low 5 = high	Plant vigour 1 = weak 5 =strong	Average Berry Weight (g)	Powdery Mildew 1 = suscept. 5 = resist
<i>Early</i>					
Anitabis	2.0	2	2	8.5	1
Zumba	3.0	3	3.5	14.2	3.7
EM 1643	2.5	2.5	4	10.3	3.7
Elianny	3.5	3.5	3.5	12.4	2.3
<i>Midseason</i>					
Elsanta	4.0	3	4	13	2
EM 1677	2.5	4	3	9.0	3
EM 1727	4.0	4	4.5	9.3	3.7
EM 1752	2.5	5	5	10.3	4
EM 1756	2.5	4.5	4.5	11.1	2
<i>Mid - Late</i>					
Elegance	3.0	3	3	10.8	1.7
Fenella	2.0	3	2.5	8.4	1
Isaura	4.0	3	3.5	12.3	1
EM 1607	3.0	3.5	3	9.3	1.7
EM 1682	3.5	4.5	4	11.2	3.7
<i>Late</i>					
Malwina	-	3.5	3.5	8.5	3.7
Salsa	4.0	3	4	10.3	3
EM 1636	2.5	3	3	10.3	3.7
EM 1733	3.5	2.5	3.5	11.8	3
EM 1746	3.5	3.5	4	9.8	3.3

Table 6. Fruit characteristics

Variety and season	Fruit Flavour 1 = poor 10 = good	Firmness 1 = poor 10 = good	Shelf Life 1 = poor 10 = good	Mean Brix Higher score = sweeter
<i>Early</i>				
Anitabis	7	5	4	6.3
Zumba	6	6	6	7.2
EM 1643	4	6	5	5.8
Elianny	6	7	7	6.0
<i>Midseason</i>				
Elsanta	8	8	8	7.9
EM 1677	5	8	6	5.8
EM 1727	6	6	6	7.9
EM 1752	4	6	6	7.5
EM 1756	6	9	8	7.5
<i>Mid - late</i>				
Elegance	5	7	7	6.8
Fenella	5	6	4	6.4
Isaura	6	6	6	6.4
EM 1607	6	4	4	6.7
EM 1682	6	6	6	5.5
<i>Late</i>				
Malwina	7	7	6	7.0
Salsa	6	6	5	6.7
EM 1636	7	5	6	6.3
EM 1733	6	8	7	6.6
EM 1746	6	8	8	6.4

The following varieties are of most interest to the industry. Further information on all varieties can be found in the Full Trial Report.

In the early group **Elianny** and **Zumba** performed well. These offer season extension over the **Elsanta** season.

Elsanta still produces well as a 60-day plant and is hard to beat. It scored well on flavour, firmness and shelf life with a good potential 60-day yield and large fruit. In this midseason group **EM 1756** also performed well.

Elegance and **Isaura** performed well in the mid late season varieties . These offer an extension to the **Elsanta / Sonata** season.

Amongst the late varieties, **EM 1733** scored consistently well, although its score for flavour was somewhat behind. **EM 1746** and **Salsa** also did well, with **EM 1636** scoring well for flavour. This maturity group is important to the UK strawberry industry so that the mainseason extends into that for the everbearer varieties.

Main conclusions

Although too early to draw any firm conclusions, a number of varieties are showing promise of significant improvement over present standards both in terms of fruit quality and season. The trial is continuing in 2011, when the maincrop season will give a fuller picture.

SCIENCE SECTION

Introduction

For the UK strawberry industry to maintain and expand fresh fruit sales, it is vital that it maintains the capacity to produce a consistent high quality product over a long season, to meet the ever changing and demanding standards set by supermarkets and other outlets.

Significant changes are taking place in the range of varieties now used for fresh fruit production, with newcomers challenging established standards. For example, **Elsanta** still occupies the largest area of production as it has potential for high yield, fruit quality and shelf life. However, its susceptibility to several devastating soil-borne diseases and the cost of manipulating its season means that other varieties such as **Sonata** are being increasingly planted. Other introductions from recent trials such as **Elegance** and **Fenella** are currently creating a lot of interest.

There is a need to continue to seek varieties which offer better characteristics than those currently available, especially for:

- fruit quality (e.g. percentage Class I, size, flavour etc.)
- resistance to pest and disease, in view of increasing requirement for residue-free product and the risk of reduced pesticide availability
- seasonal cropping profile, to extend the current mainseason at either end without resorting to more expensive techniques, to provide reliable supplies to the market

Variety trials also help to identify varieties that could be used for specialist markets such as early and late season protected culture, PYO/direct and organic sales, so that growers are able to target specific markets and outlets. Trialling a wide range of material may identify new varieties for niche markets.

This trial offers an opportunity to test varieties from various breeding programmes around Europe that may be appropriate for British markets. Varieties performing well in earlier trials may need to be retested from time to time to check consistency with previous results.

Varieties and numbered selections included

Breeders and marketing companies were invited to submit named varieties or numbered selections for the proposed trial and those listed in Table 1 below were selected for evaluation:

Table 1. Trial varieties/selections included

Variety / selection	Production season	Country of origin	Plant Supplier	Crown diam. supplied
Anitabis	Very early	Italy	Vivai Molari	9 mm
Zumba	Early	Netherlands	Fresh Forward	13 mm
EM 1643	Early	UK	Meiosis Ltd	11 mm
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EM 1752	Mid	UK	East Malling Strawberry Breeding Club	11 mm
EM 1756	Mid	UK	East Malling Strawberry Breeding Club	10 mm
Elegance	Mid-late	UK	Meiosis Ltd	13 mm
Fenella	Mid-late	UK	Meiosis Ltd	9 mm
Isaura	Mid-late	Belgium	Fresh Forward	16 mm
EM 1607	Mid-late	UK	Meiosis Ltd	13 mm
EM 1682	Mid-late	UK	Meiosis Ltd	14 mm
Malwina	Late	Germany	Meiosis Ltd	Potted plants
Salsa	Late	Netherlands	Fresh Forward	17 mm
EM 1636	Late	UK	Meiosis Ltd	11 mm
EM 1733	Late	UK	East Malling Strawberry Breeding Club	14 mm
EM 1746	Late	UK	East Malling Strawberry Breeding Club	14 mm

Trial site details

The trial site was planted as part of a commercial plantation of 60-day Elsanta. The trial was hosted by George Busby and Sons, Littywood Farm, Bradley, Stafford. The trial is sited on rented land near Penkrige.

Production details

The field soil is flat and level, with a loamy sand texture. It was previously used for arable cropping. It had scored zero in a soil test for *Verticillium* wilt, was sterilised with Basamid and formed into polythene mulched beds, to be planted at 3 rows per bed and irrigated with 2 lines of trickle irrigation. Plant density established was 50,000 plants per ha.

All of the plants of varieties in the trial were supplied as cold stored runners, except for Malwina, which was module-grown and not cold stored.

The plants were hand planted on 28 April 2010 by one operative to avoid any variation in planting technique affecting establishment and subsequent performance. The plants were misted regularly overhead after planting in very dry weather. Establishment was excellent.

The plots were established in a commercial 60-day crop of Elsanta and the trial received the normal pesticide programme for such crops. The crop was covered with a Spanish tunnel in June 2010. Picking in the trial commenced on 1 July 2010 and finished on 6 August 2010.

In addition some varieties were planted in unreplicated plots on a low input PYO system at Claremont Farm, Bebington, Wirral. The field used has had several crops of strawberries and potatoes in the past and recorded 1.6 cfu/g for *verticillium* wilt in a soil test. This site was chosen to give the varieties a more robust test on a more challenging site. The varieties selected were: Figaro, Cupid, Sweetheart, Lucy, Elsanta, Fenella, Sonata, Elegance, and, following consultation with Meiosis Ltd, EM numbered selections: 1677, 1580, 1643, 1552, 1682, 1636, 1659, 1597, 1696, 1680, 1669, 1607 and 1634. They were planted on 10 May 2010 within a commercial crop of PYO strawberries.

Trial design

The main 60-day trial was planted as a randomised block with each variety replicated three times to allow statistical analysis. There were 20 plants per plot with 19 varieties totalling 57 plots in all. A 60-day yield was not taken.

Trial records and data collected

Each variety was assessed for vegetative characteristics including runner number, plant vigour and potential 60-day yields. Due to usual variation between varieties in the plant size supplied, yields were not recorded but an overall field assessment of '60-day potential' was made based on flower truss number, crown size and plant vigour. Plant vigour and runner number was assessed by a 1-5 score as was powdery mildew infection. Fruiting characteristics were also assessed, including berry weight from a mean of three harvests, flavour, firmness and shelf life.

The trial was monitored for pests and diseases including powdery mildew on 31 August 2010, when mildew infection was quite apparent. Up until harvest was finished, the plants received an intensive mildew protection programme. This included quinoxifen, boscalid + pyraclostrobin, myclobutanil, bupirimate and potassium bicarbonate. No other serious pest or disease problems were noted.

Post-harvest assessments were made on a sample of fruit harvested on **14 June 2010** and were repeated on **6 July 2010**. On each occasion, after 5 days in the farm cold store at 2°C, the fruit samples were assessed for appearance including bruising and berry colour. Brix levels were measured in three berries sampled per punnet (replicate x variety) **after** cold storage. Testing at this stage gives a lower reading than if taken from newly-picked fruit. Results presented are a mean of three replicates. The fruits were rubbed by hand to assess firmness plus mouth feel when tasting. The fruit quality assessments were undertaken with the assistance of the grower host George Busby. Desirable flavour traits looked for, included a sweet / acid balance plus aromatics and 'strawberry' taste, although it is acknowledged that opinions on flavor may vary.

The low input plots planted at the Claremont farm site were inspected for symptoms of wilt on 13 September 2010 and will be inspected again in early summer 2011.

2010 results

For the 60-day crop, the results of plant characteristics and fruit weight are presented in Table 2 and those for fruit quality in Table 3 (below). Records of 60-day potential, runner number, plant vigour and average berry weight are included.

Table 2. Plant assessments, berry weight and powdery mildew

Variety	60 Day potential 1 = poor 5 = good	Runner number 1 = low 5 = high	Plant vigour 1 = Weak 5 =Strong	Average Berry Weight (g)	Powdery Mildew 1 = suscept. 5 = resist
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Table 3. Fruit Quality Assessments

Variety	Fruit Flavour 1 = Poor 10 = Good	Firmness 1 = Poor 10 = Good	Shelf Life 1 = Poor 10 = Good	Mean Brix Higher score = sweeter
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EM 1756	6	9	8	7.5
Elegance	5	7	7	6.8
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Isaura	6	6	6	6.4
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EM 1682	6	6	6	5.5
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Low-input site

Visual inspection of varieties and selections planted on the low-input site did not show any symptoms of wilt despite known soil infection; the plots will be further assessed in 2011.

Discussion

The varietal scores shown above should be treated with caution at this stage. Lower scores may at least in part reflect the high input growing system used to get the best potential from the standard variety **Elsanta**. With different production systems, these traits may not be so evident or may be more so. It is unwise to rule out any variety at this early stage.

Elsanta still performs well as a 60-day plant and remains the standard by which others are judged for this crop. It scored well on flavour, firmness and shelf life, with a good potential 60-day yield and large fruit.

EM 1733 was also good across the range of attributes tested, showing real potential, though with some reservation as to flavour at this stage. **Elianny** and **EM 1756** were also firm and showed good shelf life plus large fruit, although scoring lower on flavour and 60-day potential with the material provided.

Other varieties performing well were **Elegance**, **EM 1746**, **Isaura**, **Salsa**, and **Zumba**.

Flavour becomes an increasingly important quality as multiples select varieties and in this regard **Anitabis**, **Malwina** and **EM 1636** scored well.

Conclusions

While the trial is in its first year, it is preferable to avoid drawing any premature conclusions or discard any variety. Several varieties appear very close to **Elsanta** in terms of yield and quality; this should benefit the industry by providing choice and avoiding over-reliance on a single variety, which could be viewed as a potential weakness.

Varieties like **Elegance** have done well in previous trials and are likely to be planted in increasing quantities as they offer possibilities of extending the June bearer season.

Technology transfer

A factsheet was produced in September 2010.