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EM 1746.

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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.

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GROWER SUMMARY

Headline

- **Sonata, Fenella and Elegance** show great promise for use on UK farms for all market outlets.

Background and expected deliverables

For the UK strawberry industry to maintain and expand fresh fruit sales, it is vital that it is capable of consistently producing a high quality product over a long season. Significant changes are taking place in the range of varieties now used for fresh fruit production.

Of the June bearer (JB) varieties, **Elsanta** still occupies a large area of production due to its high yield, good fruit quality and long shelf life. It does however, have shortcomings in that it is very susceptible to several devastating, soil borne diseases which include verticillium wilt, red core and crown rot. In addition Elsanta also produces a high percentage of Class 2 fruit in the second or maincrop season, which increases the cost of picking and packhouse labour. Manipulating the production of Elsanta to extend its season to meet the demand from customers is an additional cost and one that could be avoided with new June bearing varieties with earlier or later cropping periods.

The use of selected new strawberry varieties to extend the season would help reduce production costs and capitalise on the strong sales opportunities in the late June and early July period. With new production techniques being employed such as bed replanting, more robust varieties are needed to help reduce production costs and increase sustainability.

In a previous HDC funded variety trial (SF 40d), **Sonata, Figaro and Elegance** performed particularly well, and Sonata is now being widely planted as a direct alternative to Elsanta both for 60-day and mainseason cropping. The industry is therefore beginning to replace Elsanta with new varieties that compare favourably. However, there is still a requirement for new advanced selections to further improve upon Elsanta and extend the production season.

The industry also needs to identify varieties that can be used for specialist niche growing, such as PYO/direct and organic sales, with the long-term aim of planning an improved production profile and targeting production to specific outlets.

The aim of this project was to provide scientifically-robust comparative data on the performance of new strawberry varieties in field soils compared with existing commercial varieties when grown under commercial conditions. The specific objectives were:

- To quantify the relative yield and quality characteristics of new varieties grown under standard conditions.
- To evaluate the susceptibility of new varieties to pest and disease compared with existing commercial varieties.
- To determine the shelf life and other post harvest attributes of new varieties and to provide fruit samples for major retailers to evaluate.
- To demonstrate the varieties to growers in a commercial setting.

Summary of the project and main conclusions

The experimental work encapsulated promising new varieties from overseas breeding programmes in addition to numbered selections from the East Malling breeding programme (Table 1). HDC is a member of the new East Malling Strawberry Breeding Club (EMSBC), allowing it to include EMR selections in HDC funded trials. Elsanta was included as a standard variety for comparison. Varieties that have performed well in previous trials were included to test continuity, consistency and comparison over time. These included Fenella and Elegance.

The trial was hosted by George Busby and Sons, Littywood Farm, Bradley, Stafford. The field soil was a loamy sand texture, sterilised with Basamid, formed into polythene-mulched beds for three plant rows per bed in a commercial plantation of 60-day Elsanta under Spanish tunnels. The trial was planted on 28 April 2010, in a randomised block with three replicate plots. Table 1 lists the varieties/selections included, their origin, production season and crown diameter of plants supplied.

In addition to the main replicated trial plots, nine grower plots were planted with 100 plants of varieties that had performed well in previous trials to gain a better feel for the variety and fruit quality. These varieties included **Sonata, Lucy, Darselect, Figaro, Syria, Florence, Millewa, Sweetheart** and **Cupid**, along with a series of numbered selections bred at EMR.

Table 1 Summary of varieties, season, origin, supplier and crown diameter as supplied

Variety/selection	Production season	Country of origin	Supplier of plants	Crown diameter supplied
Anitabis	Very early	Italy	Vivai Molari	9 mm
Rumba	Early	Netherlands	Fresh Forward	13 mm
EM1643	Early	UK	Meiosis Ltd	11 mm
Elianny	Early-mid	Netherlands	Vissers	14 mm
Elsanta	Mid	Netherlands	Fresh Forward	16 mm
EM1677	Mid	UK	Meiosis Ltd	11 mm
EM1727	Mid	UK	EMSBC	14 mm
EM1752	Mid	UK	EMSBC	11 mm
EM1756	Mid	UK	EMSBC	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
EM1607	Mid-late	UK	EMSBC	13 mm
EM1682	Mid-late	UK	EMSBC	14 mm
Malwina	Late	Switzerland	Meiosis Ltd	Potted plants
Salsa	Late	Netherlands	Fresh Forward	17 mm
EM1636	Late	UK	Meiosis Ltd	11 mm
EM1733	Late	UK	EMSBC	14 mm
EM1746	Late	UK	EMSBC	14 mm

Results collected in the first year of the project are published in the 2011 annual report and are available from HDC.

In 2011 the plants were forced for an early crop, fleeced in January 2011 and covered with a Spanish tunnel in March 2011. Picking commenced on 27 April and finished on 1 July. Varieties were assessed for plant and fruit quality attributes. April 2011 was a very warm month and early crops were advanced, May was much cooler and probably delayed fruiting in late varieties.

Records of maincrop yields, Class 1 (g/plant) and 50% harvest date are shown in Table 2. Records of fruit flavour, (based on blind tasting), fruit firmness, shelf life (5 days at a nominal 2°C) and Brix measurements at picking are summarised in Table 3.

Table 2 Results of Class1 and 2 yields, % Class 1, average berry weight and 50% harvest date – Maincrop 2011

Variety	Class 1 yield (g/plant)	Class 2 yield (g/plant)	% Rots	% Class 1 (marketable yield)	Average Berry weight (g)	50% harvest date 2011
Anitabis	154	107	17	58	12	14-May
Rumba	773	106	8	85	10	16-May
EM1643	459	220	5	68	8	12-May
Elianny	469	118	4	80	13	23-May
Elsanta	421	163	6	72	13	23-May
EM1677	478	213	4	69	9	18-May
EM1727	380	129	9	75	11	23-May
EM1752	566	175	5	76	7	23-May
EM1756	664	115	4	80	10	16-May
Elegance	833	110	1	86	11	16-May
Fenella	421	88	0	82	16	02-Jun
Isaura	703	74	10	90	26	11-Jun
EM1607	424	115	4	79	8	29-May
EM1682	606	118	2	84	18	31-May
Malwina	357	49		88	20	20-Jun
Salsa	660	166	1	80	21	31-May
EM1636	421	61	3	87	13	02-Jun
EM1733	275	93	4	73	14	04-Jun
EM1746	553	171	1	76	18	31-May
F.pr	ns	<0.001	ns	<0.001		
LSD 5%	338.6	50.6	6.9	8.8		

Table 3 Fruit Quality attributes on a 1-10 scale - 2011 Maincrop (NB Brix readings taken at harvest, not after storage)

Variety	Fruit Flavour 1 = Poor 10 = Good	Firmness 1 = Poor 10 = Good	Shelf Life 1 = Poor 10 = Good	Mean Brix Higher score = sweeter
Anitabis	6.4	7.8	4	9.0
Rumba	6.4	6.2	6	9.0
EM1643	6.8	8.4	6	10.0
Elianny	7.4	6.0	6	9.0
Elsanta	7.0	4.8	8	9.0
EM1677	6.2	9.4	8	8.0
EM1727	6.8	7.0	6	10.0
EM1752	6.2	4.6	8	8.0
EM1756	7.4	8.8	8	9.5
Elegance	6.8	9.0	8	8.0
Fenella	7.8	6.6	8	11.5
Isaura	7.6	5.2	6	6.0
EM1607	6.0	6.8	8	6.0
EM1682	6.8	6.8	4	7.5
Malwina	7.0	7.0	6	7.0
Salsa	5.6	5.8	4	10.0
EM1636	5.8	5.6	6	8.0
EM1733	6.8	5.8	6	6.6
EM1746	7.2	7.2	6	7.5

The trial picked over a long period with 50% picking dates ranging from 12 May (**EM1643**) to 20 June (**Malwina**) so there is scope to extend the Elsanta season with variety choice.

Observations from the 2011 season

Elsanta produced a high percentage of Class 2 fruit in this trial, which was typical of industry findings elsewhere.

Of the early varieties, **Rumba** produced the highest yields along with a high percentage of Class 1 fruit. **EM1643** also yielded well for an early variety, was very attractive in the punnet and produced firm fruit. **Anitabis** however produced very low yields.

Of the mid season varieties, **Elegance** performed best producing the highest yields, highest percentage of Class 1 fruit, good shelf life and firm fruit. **Fenella** also produced very high quality fruit with excellent flavour and shelf-life, although yields were lower than both Elegance and Elsanta. This is a vigorous variety which lends itself to bed replanting. **Elianny** produced a good looking berry, but yields were lower than Elegance and fruit was softer. **Isaura** produced high yields and high percentage of Class 1 fruit along with good flavour, but the fruit was very soft.

Of the mid season EM series, **EM1756** performed best producing good yields, high percentage of Class 1 fruit, good flavour and excellent shelf-life. **EM1727** was very attractive but yielded poorly. **EM1682** yielded well and looked good but had a poor shelf-life.

Of the late varieties, **Salsa** produced the highest yield but fruit was uneven in shape and colour and shelf-life were poor. Of the late season EM series, **EM1746** produced higher yields than the others but flavour and shelf-life were disappointing. **Malwina** was the latest fruiting variety of all so may be of interest for extending the season. However, yields were rather disappointing.

In addition to the main trial some varieties were planted in unreplicated plots on a PYO fruit unit with a very high level of Verticillium. The varieties selected were: **Figaro, Cupid, Sweetheart, Lucy, Elsanta, Fenella, Sonata, Elegance**, and, following consultation with Meiosis, EM numbered selections: **EM1677, EM1580, EM1643, EM1552, EM1682, EM1636, EM1659, EM1597, EM1696, EM1680, EM1669, EM1607** and **EM1634**. These were planted on 10th May 2010 within a commercial crop of PYO strawberries of the variety **Symphony**. Of special interest were EM1696, EM1597, EM1659, EM1552, EM1643, EM1580, and Sonata which demonstrated equal tolerance to wilt as Symphony. Cupid and Lucy also showed promise. Resilient varieties allow for lower input growing, can greatly reduce pesticide use and help with the lack of field rotation on some PYO sites.

Financial benefits

The high percentage of Class 1 fruit produced by many varieties compared to Elsanta, will help to reduce picking and marketing costs. It should also reduce the amount of fruit that has to be marketed through other outlets such as wholesale, where prices are a lot less certain.

Growers are also likely to benefit from the added bonus of soil borne disease resistance in some varieties. This will help growers to reduce costs involved in field fumigation. It will also enable them to re-use beds that are still covered with plastic and reduce the need to move tunnel structures.

Re-use of beds could save around £3,600 per ha alone by saving on plastic, irrigation and tunnel movement costs.

Action points for growers

- Assess some of these new varieties on your own farm.
- Examine the benefits of bed re-planting using varieties which lend themselves to this (eg Fenella).

SCIENCE SECTION

Introduction

Elsanta has been the mainstay June bearer (JB) variety since its introduction in the 1980s. The variety is well-understood and growers have developed production methods to optimise yields, both for the 60-day crop and as a maincrop variety. Yields have risen steadily and 35 to 40 tonnes/ha are now achieved, compared with 10 tonnes/ha some 20 years ago. First year yields have risen from virtually nil to 10-15 tonnes/ha in the same period. Understanding of the variety, coupled with the use of polythene tunnels, has helped produce this success story.

Elsanta does, however, require a lot of input in terms of soil sterilization and/or clean new sites as it has poor tolerance of Verticillium wilt (*Verticillium dahliae*), redcore (*Phytophthora fragariae*) and crown rot (*Phytophthora cactorum*). It tends to perform poorly on well-used sites, ruling it out for the PYO farm shop market unless grown in substrate. The variety **Sonata** is also widely planted and may be up to 35% - 40% of the total JB area. It does produce a lot less Class 2 fruit especially if forced as an early crop.

Elsanta is also susceptible to powdery mildew *Podosphaera aphanis*. The main attributes are potential yield and quality including shelf life. **Elsanta** is a June fruiting variety and little if any crop is picked in July. **Sonata** has a similar season. Techniques such as deep straw and black and white polythene cover tend to be unpredictable with varying delay, quality and yield. Cold-stored runners and waiting-bed plants give good results but a lot of plants are needed in high density plantings, sometimes with mixed, waiting-bed and 'A plus' runners. Plant selection and management constitute the largest proportion of costs to the grower in strawberry production so potential savings can have a significant impact on profitability.

The aim of this work was to evaluate new strawberry varieties to assess their potential to support **Elsanta** as the leading UK variety, particularly with season extension and plant health in mind. Strawberry variety development programmes are on-going in many regions worldwide, so it was important to obtain material from as many breeding programmes as possible to test new selections against UK standards. To select the varieties for this work, breeders, distributors and propagators were asked to recommend candidates for the trials via the HDC industry representative, Mrs Harriet Duncalfe. This included UK and overseas contacts, the East Malling Strawberry Breeding Club and Meiosis.

Materials and methods

Variety selections

Both the industry and plant breeders from home and abroad were consulted over candidate varieties for inclusion in the trials. A total of 19 named varieties and/or seedling selections were chosen for inclusion in the main trial (Table 1).

Elsanta and **Elegance** were included as standard varieties and **Florence** was included in the guards to act as a benchmark for seasonality and yield. In addition, selections of named and coded varieties were planted in single guard or grower plots. This was in response to grower comments received at previous growers' open days where it was felt that promising selections should have a larger plot size to give a more commercial feel to the experiment, and to enable larger amounts of fruit to be available for commercial evaluation purposes. These plots of up to 100 plants included the varieties **Darselect**, **Sonata**, **Florence**, **Figaro**, **Cupid**, **Sweetheart**, **Millewa**, **Syria (NF 137)** and **Lucy**

Table 1. Summary of varieties, season, origin, supplier and crown diameter as supplied - for 2011 trial

Variety/selection	Production season	Country of origin	Supplier of plants	Crown diameter supplied
Anitabis	Very early	Italy	Vivai Molari	9 mm
Rumba	Early	Netherlands	Fresh Forward	13 mm
EM1643	Early	UK	Meiosis Ltd	11 mm
Elianny	Early-mid	Netherlands	Vissers	14 mm
Elsanta	Mid	Netherlands	Fresh Forward	16 mm
EM1677	Mid	UK	Meiosis Ltd	11 mm
EM1727	Mid	UK	East Malling Strawberry Breeding Club (EMSBC)	14 mm
EM1752	Mid	UK	EMSBC	11 mm
EM1756	Mid	UK	EMSBC	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

Variety/selection	Production season	Country of origin	Supplier of plants	Crown diameter supplied
EM1607	Mid-late	UK	EMSBC	13 mm
EM1682	Mid-late	UK	EMSBC	14 mm
Malwina	Late	Switzerland	Meiosis Ltd	Potted plants
Salsa	Late	Netherlands	Fresh Forward	17 mm
EM1636	Late	UK	EMSBC	11 mm
EM1733	Late	UK	EMSBC	14 mm
EM1746	Late	UK	EMSBC	14 mm

Trial site details

The trial site was planted as part of a commercial plantation of 60-day Elsanta. The host farm was George Busby and Sons, Littywood Farm, Bradley, Stafford. The trial is sited on nearby rented land near Penkridge Stafford. The crop was fleeced in January 2011 and covered with a Spanish tunnel in March 2012. Picking commenced on 27 April 2012 and finished on 1 July 2012. The trial received the normal management programme for a 60-day Elsanta crop.

Production details

The field was flat and level, with a loamy sand texture. It was previously used for arable cropping. It had scored zero Cfu/g in a soil test for *Verticillium spp*, it was sterilised with Basamid and made into polythene mulched beds, to be planted at three rows per bed, irrigated with two lines of trickle irrigation. There were 47,000 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 management programme for such crops.

In 2011 the whole area was fleece covered at the end of January and the tunnel was covered in early March. The winter of 2011/12 was very severe, both in terms of low

temperature and the duration, starting in November and going on until February. This is likely to have caused some damage to the variety plots and increased variability over the trial. On top of this April 2011 was very hot with warm nights and picking was brought forward two weeks ahead of a more normal season in the area. This exaggerated the earliness of some varieties. May 2011 was also a difficult month, being very cool with several night frosts, and some flower blackening was observed. This reduced crop in the later cultivars and the overall yield was lower than had been achieved in previous trials due to the combined effect of these weather events. It is also possible that some varieties were affected more than others as cold tolerance is thought to vary between varieties.

Trial design

The trial was planted as a randomised block, with each variety plot replicated three times to allow statistical treatment of the data by analysis of variance. There were 20 plants per plot with 19 varieties, totalling 57 plots in all. A 60-day yield was not taken in 2010 due to variance in the plant material supplied.

Low input site

In addition some varieties were planted in unreplicated plots on a low input PYO field unit at Claremont Farm, Bebington, Wirral. The field 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, EMSBC selections: EM1677, EM1580, EM1643, EM1552, EM1682, EM1636, EM1659, EM1597, EM1696, EM1680, EM1669, EM1607 and EM1634. They were planted on 10 May 2010 within a commercial crop of PYO strawberries.

Assessments

Due to runner variation when supplied, yields were not taken in 2010 but a field assessment of 60-day potential was made from flower truss, runner size as received and plant vigour. Runner number was scored on a scale of 1 to 5 (where 1 = low, 5 = high) and plant vigour was scored on a scale of 1 to 5 (where 1 = weak, 5 = strong).

In 2011 harvest started on 27 April, two weeks earlier than in previous years. As previously stated the trial had endured a difficult winter and was then forced by a very hot April. This is likely to have introduced variables into the performance of some varieties. The trial was picked three times a week by the farm staff and sorted into grades then weighed. Brix tests

were also carried at picking. Results presented are a mean of three replicates and three fruits per replicate. The fruits were rubbed by hand to assess firmness plus mouth feel when tasting. Shelf life was assessed after five days at 2°C. The fruit quality assessments were done with the assistance of the grower host, George Busby. There was also a contribution from the attendees at the variety trial open afternoon on 23 May 2012 when 18 of the 19 varieties were picking.

Results and Discussion

Table 2 presents the results from harvest in 2010 and shows various plant characteristics scored on a scale of 1-5. For 60 day production an assessment of 3.0 or above suggests the potential of the variety is likely to be good enough for this method of establishment. However, often systems can be developed to get more out of the runners so dismissal of a variety at this stage is unwise. Runner number and vigour are compared to **Elsanta** as the trial was planted on a system designed for **Elsanta**. A weaker variety with otherwise positive attributes could be planted at higher densities and achieve good results.

Powdery mildew infection can be particularly problematic in substrate compared with soil based growing systems. Many varieties, including Fenella, scored lower than **Elsanta**, which is concerning for those selections. Zumba, EM1643, EM1727, EM1682, Malwina and EM1636 showed greatest resistance to mildew.

Table 2. Plant characteristics (60-day potential, runner number, plant vigour) and berry weight (g) from the 60-day crop harvested in 2010

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
Anitabis	2.0	2	2	8.5	1
Zumba	3.0	3	3.5	14.2	3.7
EM1643	2.5	2.5	4	10.3	3.7
Elianny	3.5	3.5	3.5	12.4	2.3
Elsanta	4.0	3	4	13	2
EM1677	2.5	4	3	9.0	3
EM1727	4.0	4	4.5	9.3	3.7
EM1752	2.5	5	5	10.3	4
EM1756	2.5	4.5	4.5	11.1	2
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
EM1607	3.0	3.5	3	9.3	1.7
EM1682	3.5	4.5	4	11.2	3.7
Malwina	-	3.5	3.5	8.5	3.7
Salsa	4.0	3	4	10.3	3
EM1636	2.5	3	3	10.3	3.7
EM1733	3.5	2.5	3.5	11.8	3
EM1746	3.5	3.5	4	9.8	3.3

Table 3. Fruit quality and shelf-life of fruit harvested from the 60-day crop – harvested 2010
NB Brix tests were carried out after cold storage for five days.

Variety	Fruit flavour 1 = Poor 10 = Good	Firmness 1 = Poor 10 = Good	Shelf life 1 = Poor 10 = Good	Mean Brix Higher score = sweeter
Anitabis	7	5	4	6.3
Zumba	6	6	6	7.2
EM1643	4	6	5	5.8
Elianny	6	7	7	6.0
Elsanta	8	8	8	7.9
EM1677	5	8	6	5.8
EM1727	6	6	6	7.9
EM1752	4	6	6	7.5
EM1756	6	9	8	7.5
Elegance	5	7	7	6.8
Fenella	5	6	4	6.4
Isaura	6	6	6	6.4
EM1607	6	4	4	6.7
EM1682	6	6	6	5.5
Malwina	7	7	6	7.0
Salsa	6	6	5	6.7
EM1636	7	5	6	6.3
EM1733	6	8	7	6.6
EM1746	6	8	8	6.4

For flavour **Elianny**, **Elsanta**, **Fenella**, **Isaura** and **Malwina** were high scoring as were **EM1746**, and **EM1756**. Combining firmness with shelf life were **Elegance**, **EM1677**, **EM1756** and **EM1607**. For sweetness most varieties did well except **Isaura**, **EM1607** and **EM1733** (Table 4).

Table 4. - Maincrop 2011 Fruit quality and shelf-life of fruit harvested from the maincrop comments from the 2011 open day are incorporated in the flavour column.
NB Brix samples were taken at harvest and not after storage

Variety	Fruit flavour 1 = Poor 10 = Good	Firmness 1 = Poor 10 = Good	Shelf life 1 = Poor 10 = Good	Mean Brix Higher score = sweeter
Anitabis	6.4	7.8	4	9.0
Rumba	6.4	6.2	6	9.0
EM1643	6.8	8.4	6	10.0
Elianny	7.4	6.0	6	9.0
Elsanta	7.0	4.8	8	9.0
EM1677	6.2	9.4	8	8.0
EM1727	6.8	7.0	6	10.0
EM1752	6.2	4.6	8	8.0
EM1756	7.4	8.8	8	9.5
Elegance	6.8	9.0	8	8.0
Fenella	7.8	6.6	8	11.5
Isaura	7.6	5.2	6	6.0
EM1607	6.0	6.8	8	6.0
EM1682	6.8	6.8	4	7.5
Malwina	7.0	7.0	6	7.0
Salsa	5.6	5.8	4	10.0
EM1636	5.8	5.6	6	8.0
EM1733	6.8	5.8	6	6.6
EM1746	7.2	7.2	6	7.5

The Class 1 yields in g/plant were not significantly different when analysed statistically so comparisons cannot be definitive, however **Anitabis** and **EM1733** tended to show the lowest yields and **Isaura**, **Elegance** and **Rumba** the highest with over 700g/plant class one on average (Table 5). There were significant differences in Class 2 yields and in the percentage Class 1 marketable yield. Here **Anitabis** was poor, as was **EM1746**, **EM1733**, **EM1752**, **EM1727**, **EM1677**, and **EM1643**. The industry standard **Elsanta** was also low in percentage class one. **Malwina**, **Isaura**, **Fenella**, **Elegance**, **Rumba** and **Elianny** were at the higher end of Class 1, as were **EM1756**, **EM1682** and **EM1636**.

The trial picked over a long period with mid picking dates from 12 May for **EM1643** up to 20 June for **Malwina**, so there is scope to extend the **Elsanta** season with variety choice.

Table 5. The table below lists the yield results for the maincrop in 2011. Records of the yield of Class 1 fruit, Class 2 fruit, rots and % Class 1 are shown.

Variety	Class 1 yield g/plant	Class 2 yield g/plant	% Rots	% Class 1 (marketable yield)
Anitablis	154	107	17	58
Rumba	773	106	8	85
EM1643	459	220	5	68
Elianny	469	118	4	80
Elsanta	421	163	6	72
EM1677	478	213	4	69
EM1727	380	129	9	75
EM1752	566	175	5	76
EM1756	664	115	4	80
Elegance	833	110	1	86
Fenella	421	88	0	82
Isaura	703	74	10	90
EM1607	424	115	4	79
EM1682	606	118	2	84
Malwina	357	49	5	88
Salsa	660	166	1	80
EM1636	421	61	3	87
EM1733	275	93	4	73
EM1746	553	171	1	76
F.pr	ns	<0.001	ns	<0.001
d.f	36	36	36	36
LSD 5%		50.6		8.8

Table 6 shows the results of the verticillium wilt challenge site. Although not a replicated trial, some varieties are worthy of looking at in more detail as lower input growing can greatly reduce pesticide use and help with the lack of field rotation on some PYO sites. Of especial interest could be **EM1696**, **EM1597**, **EM1659**, **EM1552**, **EM1643**, **EM1580**, and **Sonata**. **Cupid** and **Lucy** also showed promise.

Table 6. Verticillium wilt challenge unreplicated site results showing plant vigour, runner number, plant health and mildew/wilt susceptibility – Wirral 2011

Variety	Plant vigour	Runner number	General quality	Level of resistance
	1 = Weak 5 = Strong	1 = low 5 = high	1 = poor 5 = good	1 = low 5 = As good as Symphony
EM1634	3	3	4	1
EM1607	3	1	3	1
EM1669	4	4	3	1
EM1680	2	2	1	1
EM1696	4	4	4	5
EM1597	4	3	4	4
EM1659	5	3	4	4
EM1636	3	2	3	4
EM1682	4	2	4	3
EM1552	3	4	3	4
EM1643	2	4	3	4
EM1580	4	3	4	5
EM1677	3	3	2	1
Elegance	3	1	3	1
Sonata	5	3	5	5
Fenella	2	1	3	2
Elsanta	5	2	4	2
Lucy	3	2	3	3
Sweetheart	4	2	4	1
Cupid	3	2	5	3
Figaro	4	2	4	2

Conclusions

- **Elsanta** in this season, with hot weather early, on produced a lot of Class 2 fruit, and this is typical of industry findings.
- **Anitabis** was early but low in Class 1.
- **EM 1643** was an attractive early with a lot of Class 2.
- **Rumba**, with low Class 2, was the pick of the early varieties.
- **Elegance** performed well and was good quality with 86% Class 1 and this variety is now a mainstream alternative for **Elsanta**.
- **Elianny** was a good looking berry but the yield wasn't high.
- **Fenella** did well and had a high Brix reading and again this variety has a place in mainstream production and could be useful for bed replanting.
- In the EMSBC series **EM1727** looked good but yielded poorly, **EM1756** was also good and cropped better, with shelf life and flavour and was the pick of the bunch. **EM1682** as a mid-late yielded and looked well but was not a good keeper. **EM1746** as a late was good in appearance but average on flavour and shelf life.

- **Isaura** was high yielding and the flavour good, but was soft.
- **Salsa** was uneven in shape and colour.
- **Malwina** was very late and seemed unaffected by the early season and will be of interest as a late but the yield was not high.

Knowledge and Technology Transfer

- Factsheet year 1 September 2010
- Annual report November 2010
- Factsheet year 2 August 2011
- Trial open day 18 May 2011
- HDC Final report April 2012

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Appendices

Trial plan

GUARD Florence	GUARD Darselect	GUARD Syria
GUARD LUCY	GUARD Sonata	GUARD Figaro
19 EM1756	38 EM1733	57 EM1727
18 Fenella	37 Isaura	56 Malwina
17 EM1746	36 EM1677	55 EM1677
16 EM1682	35 Elianny	54 EM1636
15 Elsanta	34 Salsa	53 EM1733
14 Salsa	33 EM1746	52 Elegance
13 Elegance	32 Elsanta	51 Isaura
12 Anitabis	31 EM1727	50 Elianny
11 Isaura	30 Malwina	49 EM1682
10 EM1607	29 EM1682	48 EM1643
9 Elianny	28 Elegance	47 Fenella
8 EM1752	27 EM1752	46 Salsa
7 Zumba	26 EM1756	45 EM1756
6 EM1643	25 Zumba	44 EM1746
5 EM1677	24 EM1636	43 Anitabis
4 EM1733	23 EM1643	42 Elsanta
3 EM1727	22 EM1607	41 EM1752
2 EM1636	21 Anitabis	40 Zumba
1 Malwina	20 Fenella	39 EM 1607
GUARD Millewa	GUARD Sweetheart	GUARD Cupid