Project title:	East Malling Strawberry Breeding Club
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Project leader:	Adam Whitehouse, NIAB EMR
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Location of project:	NIAB EMR
Industry Representative:	Rachel McGauley
Date project commenced:	1 June 2013
Date project completed (or expected completion date):	31 May 2023

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.

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Signature  Date 31st May 2021

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CONTENTS

GROWER SUMMARY

Headline

Six new selections; four June-bearers and two everbearers were selected from the 2020 East Malling Strawberry Breeding (EMSBC) preliminary trials to go forward to UK growers' trials. Of the four June-bearers there were three mid-season and one mid-late season types. All these selections will be trialled on UK grower sites in 2022-23. In addition, fourteen advanced selections were trialled on growers' sites in 2020, with five being retained for further trialling in 2021, 2022 and 2023 (EM2622, EM2696, EM2721, EM2723 and EMR796).

Background

The main objective of the East Malling Strawberry Breeding Club (EMSBC) is to develop and improved strawberry varieties, both June and everbearing with increased yield, larger fruit size, extended season of production and greater resistance to fungal diseases. Funding for the programme was renewed in 2013 to follow on from the first tranche of the EMSBC breeding programme which started in 2008 and that delivered the June-bearer variety Malling™ Centenary. AHDB continues to contribute to the EMSBC via project SF 96a. In 2017 it was agreed that AHDB would continue to remain a member of the EMSBC and continue funding the programme until May 2023.

This report covers two preliminary trials held at NIAB EMR in 2020 that are part-funded by the AHDB membership of the EMSBC (June-bearer main crop and everbearer trials), as well as a brief summary of more advanced selections that have been assessed on offsite EMSBC growers' sites.

Results of selection trials

Descriptions and results from the most promising selections in each of the 2020 preliminary trials are shown below, accompanied with tables of results for each trial:

NIAB EMR June-bearer trial

Four selections from the 2020 EMSBC trials showed sufficient potential to progress to small-scale growers' trials in 2022-23. A description of each selection appears below, listed in order of season (earliest to latest), with accompanying data show in Tables 1 and 2:

EM2818 a midseason selection with a high percentage of Class 1 fruit. Sensory flavour was judged to be sweet and this was reflected in a high mean Brixº score.

EM2836 is a high-yielding selection, with large fruit size (86% >35 mm). Berries are firm with very glossy and uniform appearance.

EM2859 is a good all-rounder with class 1 yield, fruit size and Brixº were all superior to the standard, Malling™ Centenary.

EM2883 is a midseason selection with excellent fruit size (76% >35mm). Berries are very glossy and bright and had very good shelf-life scores.

Table 1. June-bearer selections: yield, fruit size and season

Selection	Class 1 yield (g/plant)	% Class 1	% large fruit (>35mm)	50% pick date
EM2818[1]	484	91	68	15 June
EM2836[1]	650	96	82	15 June
EM2859[1]	573	91	67	15 June
EM2883[1]	625	93	76	15 June
M. Centenary[2]	*582*	*90*	*53*	*11 June*

[1]Mean of two plots [2]Mean of eight plots

Table 2. June-bearer selections: mean fruit quality scores

Selection	Appearance (1-9)	Skin firmness (1-9)	Flesh firmness (1-9)	Flavour (1-9)	Shelf life (1-5)	Mean Brix^{o}
EM2818[1]	5.5	6.3	6.0	6.0	3.0	9.5
EM2836[1]	6.6	6.7	7.9	5.6	3.8	8.5
EM2859[1]	5.5	6.2	6.7	5.8	3.4	9.3
EM2883[1]	5.4	6.2	6.2	5.0	3.5	7.4
M. Centenary[2]	*6.0*	*6.3*	*5.9*	*5.8*	*3*	*7.7*

[1]Mean of two plots [2]Mean of eight plots

Full descriptions of the fruit quality scoring system can be found in Appendix I of the main report, but as a guide 1=poor, 9=excellent, shelf life comparison 1=worse, 3=same,5 better than standard.

NIAB EMR Everbearer trial

Two new selections progressed to small-scale growers' trials to be held assessed in 2022. Descriptions of these selections and associated trial data (Tables 3 & 4) are shown below:

EMR919 is an early cropping selection, with a good yield, produced fruit throughout the season. Attractive fruit with a uniform conic shape, and good eating texture.

EMR925 is a high yielding selection, with peak of production later in the season. Good all round fruit characteristics.

Table 3. Everbearer selections: yield, fruit size and season

Selection	Class 1 yield (g/plant)	% Class 1	% large fruit (>35mm)	50% pick date
EMR919[1]	886	67	54	3 Aug
EMR925[1]	1111	84	59	10 Aug
M. Champion[3]	*884*	*69*	*40*	*23 July*
Murano[4]	*644*	*66*	*49*	*27 July*

[1]Mean of two plots [3]Mean of twelve plots [4]Mean of four plots

Table 4. Everbearer selections: fruit quality scores

Selection	Appearance (1-9)	Skin firmness (1-9)	Flesh firmness (1-9)	Flavour (1-9)	Shelf life (1-5)	Mean Brix^{o}
EMR919	5.8	5.7	5.3	5.4	3.5	7.8
EMR925	5.5	6	6.3	5.5	3.5	7.0
M. Champion	*5.6*	*6.5.*	*6.9*	*5.0*	*3.0*	*7.4*
Murano	*5.1*	*5.8*	*6.0*	*5.4*	*2.8*	*7.6*

[1]Mean of two plots [3]Mean of twelve plots [4]Mean of four plots

Full descriptions of the fruit quality scoring system can be found in Appendix I of the main report, but as a guide: 1=poor, 9=excellent, and for shelf life comparison: 1=worse, 3=same, 5 better than standard

Offsite main crop (June-bearer) growers' trial

One advanced selection (EM2622) that had been overwintered on growers' sites from the 60-day trials in 2019 was main-cropped in 2020.

EM2622 is a late season selection, with a similar season to Florence (10-14 days later than Malling™ Centenary). Plant yields were variable, but with a good fruit size. Fruit is attractive, uniform conic, with good skin and flesh firmness. Sensory flavour was judged as sweet, with a high average Brixº of 9.5º in the main crop. EM2622 also performed well in shelf life testing at PCH. Plant type is dense, but with a good stand and upright habit. Fruit was well displayed on long trusses for easy picking. EM2622 is moderately susceptible to Verticillium wilt and powdery mildew and intermediate resistance to crown rot.

EM2622 will now progress to large-scale trials in 2022-2023.

Offsite 60-day (June-bearer) growers' trial

Nine selections had previously been selected for 60-day trialling in 2020 (EM2547, EM2591, EM2617, EM2628, EM2656, EM2674, EM2696, EM2721, and EM2723). Three selections, EM2696, EM2721 and EM2723, performed sufficiently well in the 60-day growers' trials to be overwintered and will be trialled as main crop in 2021.

EM2696 a mid-season June-bearer. Produced a high yield and percentage Class 1 fruit. Berries were slightly smaller than other selections in trial, but scored well for all round fruit quality characteristics, with a glossy, regular conic shape. Plants had an open habit with a good fruit display. Mean Brixº scores were high. Initial pathogen screening at NIAB EMR suggests that EM2696 has moderate resistance to crown rot and moderate susceptibility to powdery mildew.

EM2721 is a moderate yielding selection with good percentage of Class 1 fruit. Plant habit was open with a good fruit display. Fruit on average was smaller than Malling™ Centenary but was attractive, with good flavour, sweet with aromatics. Firmness was variable, and fruit sometimes suffered with green tips. Initial pathogen screening at NIAB EMR suggests that EM2721 has moderate resistance to crown rot and resistance to powdery mildew.

EM2723 is a mid-late season selection. Yields were high with a good percentage of Class 1 fruit. Fruit was well displayed and plants had an open habit. Berries were attractive, with a uniform shape, with good sensory flavour and high mean Brixº. Initial pathogen screening suggests that EM2723 has moderate susceptibility to crown rot, moderate susceptibility to powdery mildew and intermediate resistance to Verticillium wilt.

Offsite everbearer growers' trial

Two advanced selections were trialled in small-scale growers' trials: EMR727 and EMR745 with two advanced selections in large-scale trials: EMR721 and EMR796. One selection will progress: EMR796, and this will be taken forward for commercialisation and additional agronomy trials in 2022.

EMR796 is a very productive selection that has an extended fruiting season. In trials it produced a high percentage Class 1 fruit with excellent fruit size. Berries had an attractive appearance that was glossy, uniform, with good colour. Fruit consistently scored well for sensory flavour, however Brixº scores could be variable, but the overall mean score was high. Skin and flesh scores were good on average, but under very warm conditions, the skin could become fragile and suffered damage when exposed to high winds. Plant habit is upright, with moderate vigour and well displayed fruit on long trusses. Powdery mildew susceptibility was noted on some sites, but incidence was very variable between site locations and spray programmes. Initial pathogen screening suggests that EMR796 has moderate resistance to crown rot.

SCIENCE SECTION

Introduction

This report covers two trials (June-bearer main crop and everbearer) as part of the 2020 preliminary trials assessed at NIAB EMR on behalf of the East Malling Strawberry Breeding Club (EMSBC). The EMSBC was set up in 2008 to continue the national strawberry programme that has operated at EMR since 1983 with the AHDB contributing via project SF 96. A second tranche of the EMSBC was agreed in 2013 for a 10-year term (with a break clause after five years) and commenced on 1 June 2013. In 2017 the AHDB agreed to remain a member of the EMSBC and continue part funding the programme until 2023 via project SF 96a.

It is the intention of the breeding programme to release new varieties which show advantage over those currently available for a particular purpose or slot in the season. This advantage may be in terms of fruit quality, yield, resistance to diseases), fruit size and display (to reduce picking costs) and any combination of these characters.

In addition the programme is benefiting from associated research projects funded at NIAB EMR that feed into the breeding work, primarily those associated with the development of a molecular genetics approach to disease resistance. The integration of basic science to benefit the programme has recently been demonstrated by the use of predictive scores for disease susceptibility based on genotyping of all selections and parental lines.

Trial Methods

This year was the first year of trialling at the new EMSBC substrate trial site (Churchfields East, East Malling). Both trials were maintained on table tops under Haygrove Pioneer tunnels using an automatic irrigation system using Delta-T sensors. Agronomy, including fertigation and integrated pest management programmes were provided by an industry agronomist.

Fruit was harvested twice-weekly from each trial into individual trays that were assigned a unique alpha-numeric plot code (to avoid selection bias). Fruit was graded into five categories, primarily based on fruit size (diameter in mm): giant (>45 mm),

large (>35 mm), medium (>28 mm), small (<28 mm) and waste (fruit rendered unmarketable due to damage (physical and/or pathological), misshape or rots. Class 1, or marketable fruit, was classified as fruit >28 mm diameter, with unmarketable being defined as <28 mm diameter and waste fruit. Yield is presented as the mean of all plants in each individual plot.

Fruit quality (appearance, skin and flesh firmness and flavour) assessments were performed immediately after each pick, using the scoring system shown in Appendix I. Assessments were carried out by a panel of experienced breeders.

Post-harvest records of Brixº (soluble sugars) and shelf-life, were taken as often as possible throughout the season with a minimum of three records for each selection per season.

Brixº was measured using a sample of two berries per selection per pick that were halved longitudinally with the juice from each half-fruit being assessed using a digital refractometer. The mean score for each selection across the season are presented in the results section.

Shelf-life tests were performed on ten unblemished fruit that were sampled once a week for each selection during its fruiting season. Samples were collected at the fruit evaluation stage immediately after picking and were transferred in open, 454 g punnets to a +2 ºC cold-store for 24 h. After 24 h these samples were transferred to a controlled environment cabinet and maintained at 17 ºC at 70% RH for a further 72 h. An assessment of each sample was then performed via a comparative assessment against a standard cultivar using the scoring system shown in the Appendix 1. The mean scores for each selection across the season are presented in the results section.

NIAB EMR June-bearer trial

The main crop trial contained 94 new selections, nine advanced and four standards. Misted tips were struck on June 25th 2019 into 9-hole trays containing Legro standard tray plant mix, which were transferred to unheated, fully vented glass on 25th July 2019 for growing on. Plants were fertigated following a recommended industry feeding schedule provided by BerryPlants Ltd (EMSBC Trial plant propagator). Trays were moved to -2 C cold store (BerryPlants Ltd., Newchurch, Kent) when fully dormant on December 5th 2019, and were removed from the store in March 2020 and planted into

1m white CocoGreen coir bags(CocoGreen, Manchester, UK) on 11th March 2020 at a density of 8 plants per linear metre. Plants were then fertigated for the remainder of the season following the recommendations of industry agronomist. First pick was on 21st May 2020 ('EM2547' with the first pick from Malling™ Centenary on 28th May 2020) and continued through until 9th July 2020.

NIAB EMR Everbearer trial

The everbearer trial contained 28 new selections, one re-trialled selection, five advanced (EMR704, EMR721, EMR727, EMR794, EMR796) plus standards (Malling™ Champion, Murano). The trial was established from mini-tray (130cc) derived runner tips struck in August 2019 and overwintered in closed, unheated polytunnels. These were planted on 1st April 2020 into wetted up white Botanicoir Coir bags (Botanicoir, London, UK) at density of six plants per metre, with two replicates (1m bags) of each new selection. Plants were de-blossomed on April 27th and again May 20th 2020 and runners were counted and removed from June 10th 2020 and again in mid-July and mid-August, although two runners per plant were retained to provide tips for meristemming. Harvesting began on June 25th and continued twice weekly until September 24th 2020.

Offsite Growers trials

EMSBC offsite growers' trials are hosted and financed by individual EMSBC members on their own farms, so only a brief summary of trial methods for these trials are presented. Fourteen offsite growers' trials were used in total for 60-day, main crop and everbearer trials.

Offsite main crop (June-bearer) growers' trials

One advanced selection EM2622 was assessed for yield and fruit quality in the main crop trials in 2020. It was assessed on two growers' sites, after first being assessed as 60-day plants (60 tray or waiting bed plants per site) in 2019, and originally selected for grower trials in 2017. The plants were grown in substrate, under polythene-clad tunnels.

Offsite 60-day (June-bearer) growers' trials

Nine advanced selections were assessed for yield and fruit quality in small-scale 60-day offsite trials in 2020: EM2547, EM2591, EM2617, EM2628, EM2656, EM2674, EM2696, EM2721 and EM2723. All UK plantings were in substrate under polythene-clad tunnels. Selections were trialled in small-scale trials (60 tray plants per site) having been selected for growers' trials in 2018.

Offsite everbearer growers' trials

Four advanced everbearer selections were assessed for yield and fruit quality in offsite trials in 2020: two (EMR727 and EMR745) in small-scale trials (60 tray or waiting bed plants per site) and two (EMR721 and EMR796) in large-scale trial (a maximum of 1000 tray or waiting beds per site). All UK plantings were in substrate under polythene-clad tunnels. EMR721 and EMR796 were assessed in large-scale trials after being selected for growers' trials in 2016 and 2018 respectively, and the remaining selections in small-scale trials (60 tray plants per site) after selection for growers' trials in 2018.

Results and Discussion

NIAB EMR June-bearer trial

Plants established well, and flowering and fruiting advanced quickly in favourable weather conditions following planting. During the cropping season some plots of Malling™ Centenary had to be removed due to crown rot. No other selections in trial showed symptoms of crown row infection.

The trial data for the five selections chosen to progress to growers' trials in 2022/2023 are shown in Table 6, and a short description of each follows:

EM2818 (Midseason)

A midseason selection with a 50% pick date similar to Malling™ Centenary (Figure 1.b). Class 1 yield was on average relatively low, despite a high percentage of Class 1 fruit (Figure 1.c.). Fruit size was good, with berries well displayed on long trusses. Berries had a regular shape, with slightly raised seeds and necks, and a glossy skin with an orange-red colour (Figure 1.a.). Gloss and colour were retained in shelf-life tests. Flavour was judged to be sweet which was reflected by high average Brix^{o} scores. Plants had moderate vigour with an upright habit. Predictive disease scores for indicated some resistance to crown rot and powdery mildew.

Figure 1.a. Fruit of EM2818

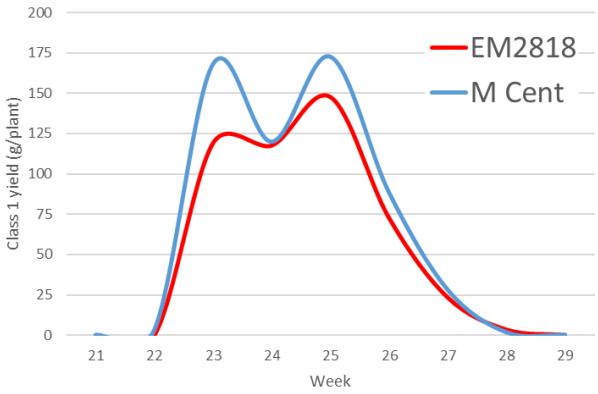

Figure 1.b. Cropping profile of EM2818

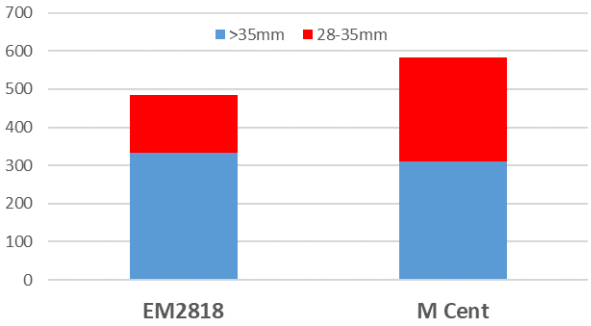

Figure 1.c. Mean Class 1 yield per plant (g/plant) of EM2818, compared to Malling™ Centenary

EM2836 (Midseason)

A high-yielding, large fruit-sized (86% >35mm) selection, with a 50% pick date a few days later than Malling™ Centenary (Figure 2.b.). Berries were well displayed on the plant, and carried on long pedicels that prevented clustering. Berries were firm, with a very glossy skin and had a uniform appearance (figure 2.a.). Flavour was judged to be sweet on some occasions, but was marked down on early picks due to a dry texture. Shelf life was similar to Malling™ Centenary, but gloss and brightness were maintained after tests had been completed. Predictive disease resistance scores indicated possible susceptibility to crown rot but good resistance to powdery mildew.

Figure 2.a. Fruit of EM2836

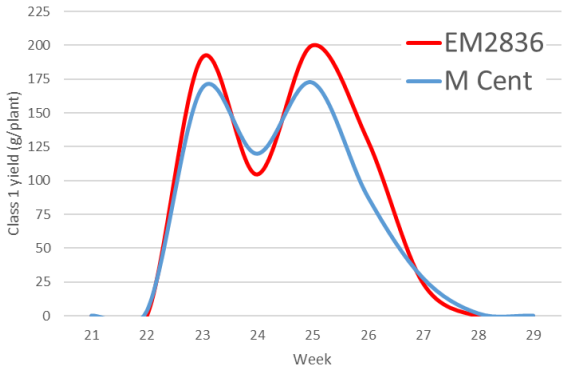

Figure 2.b. Cropping profile of EM2836

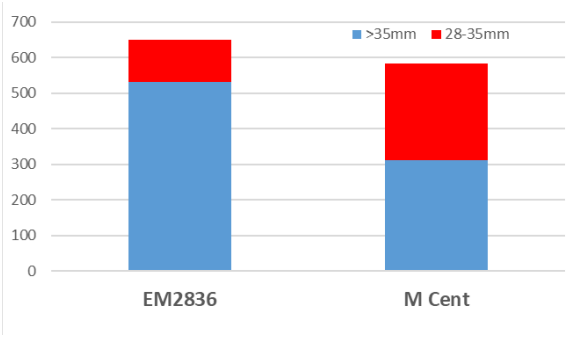

Figure 2.c. Mean Class 1 yield per plant (g/plant) of EM2836 compared to Malling™ Centenary.

EM2859 (Midseason)

Judged to be a good all-rounder with a mean 50% pick date three days later than Malling™ Centenary (Figure 3.b.). Class 1 yield, fruit size and Brixº were all superior to Malling™ Centenary but plants were more vigorous, with a more open habit and poorer fruit display. Fruit quality scores were variable, but flavour was judged to be sweet on some harvests. Mean appearance scores were marked down due to high seed density

(Figure 3.a.). Predictive scores for disease resistance indicate some resistance to crown rot and mildew.

Figure 3.a. Fruit of EM2859

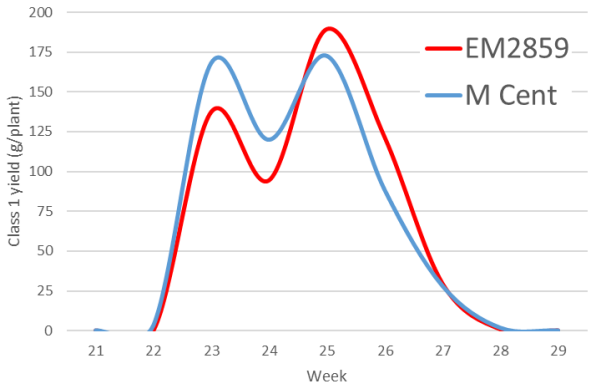

Figure 3.b. Cropping profile of EM2859

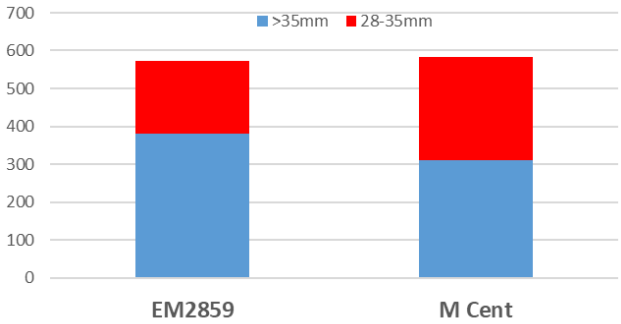

Figure 3.c. Mean Class 1 yield per plant (g/plant) of EM2859 compared to standard.

EM2883 (Midseason)

A mid-season selection with a relatively good yield and excellent fruit size (Figure 4.c.). Berries were firm with excellent shelf life. Fruit was well-displayed and held away from the plant, but tended to cluster. Berries were very glossy and bright, with appearance

marked down on a few occasions due to unevenness in shape and also noses could bleach (Figure 4.a.). Flavour was often judged to be sweet but with an acidic aftertaste on some occasions. Average Brixº scores was similar to the standard. Predictive diseases resistance scores indicate EM2883 may have some resistance to both crown rot and mildew.

Figure 4.a. Fruit of EM2883

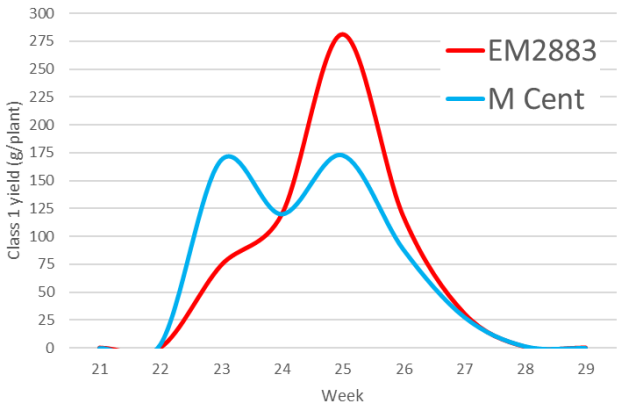

Figure 4.b. Cropping profile of EM2883

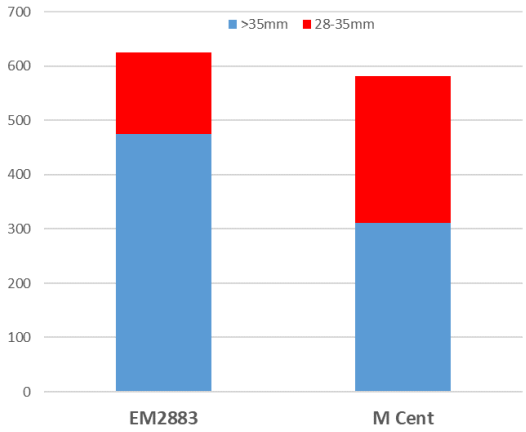

Figure 4.c. Mean Class 1 yield per plant (g/plant) of EM2797, compared to Malling™ Centenary.

NIAB EMR Everbearer trial

The trial was planted on 1st April 2020. Plants established well and were de-blossomed on April 27th and again May 20th 2020. The planting coincided with a period of sunny and warm weather, and all of the trial plants established well but slowed down in late April/early May when a series of cold nights and overnight frosts checked development. However warm, sunny days through May and into June advanced flowering and fruiting and picking started slightly earlier than average for the site and continued steadily until a particularly hot spell of weather in early August, with 'tropical nights' (>20°C), condensed production and negatively impacted on fruit quality and led to a slowdown in flower production. Cooler weather later in August allowed some recovery in flowering and the season continued until late September. Pest control was good throughout the season although SWD became more prevalent from the end of August. Disease control was excellent, helped by high tunnels, adequate venting and dry conditions. Powdery mildew was only noted on the leaves of runners at the very end of September on some selections. Overall yields were in line with expectations on the standards, but Brixº and flavour were variable throughout the season. Advice and recommendations on fertigation regimes and spray programmes were provided by a qualified, industry agronomist and the plot was visited and inspected every two weeks.

The results from the most promising selections for UK growers is summarised in Table 7. Data quality, yield and plant characteristics were considered together to identify the most promising selections trialled in 2020. The EMSBC Board decided to progress two selections to UK growers' trials in 2022, and the descriptions of these selections appears below:

EMR919

EMR919 had a good yield in the context of this trial. Fruit size was better than the standards (Figure 5.c.). Percentage Class 1 yield was comparable to both Murano and Malling™ Champion, with mark out due to some early misshapes and green noses. Flavour was judged to be good and well-balanced, with higher average Brixº than the standards, and with a pleasant 'melt-in-the-mouth' texture. Berries were glossy, with uniform shape, described as 'pointed' conic (Figure 5.a.). Berries had both firm skin and flesh and this was reflected in good shelf life scores. Fruiting season was relatively early with a 50% pick date following on from Malling™ Champion, and continued to crop when production from the standards declined (Figure 5.b.). Plants were quite

vigorous, but fruit was very well-displayed on long trusses. Some mildew was noted on a few runners in late-September. Predictive scores indicated EMR919 may have resistance to crown rot.

Figure 5.a. Fruit of EMR919

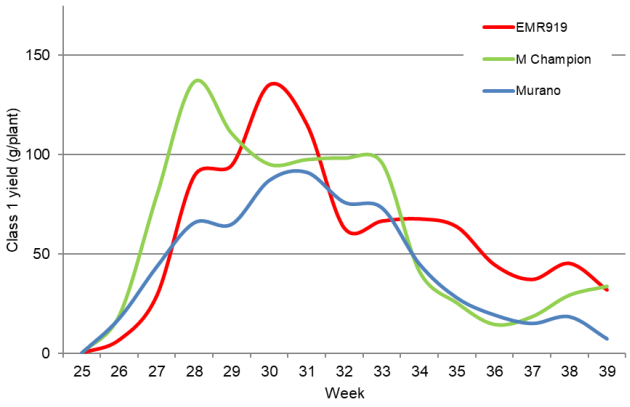

Figure 5.b. Cropping profile of EMR919

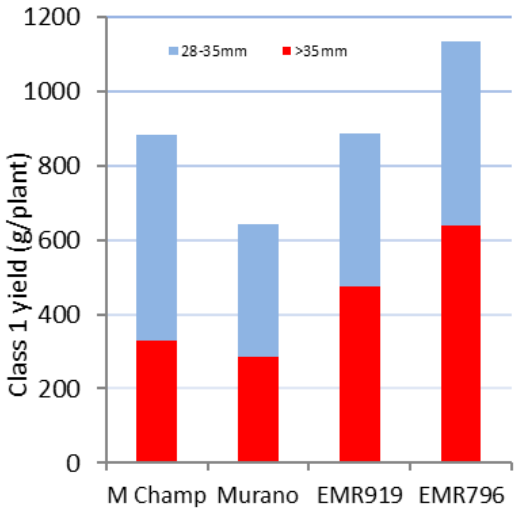

Figure 5.c. Mean Class 1 yield per plant (g/plant) of EMR919 compared to standards

EMR925

EMR925 had an excellent yield and average fruit size, but larger than the standards, Malling™ Champion and Murano (Figure 6.c.). Percentage Class 1 fruit was high, but fruit was marked down for appearance due to wedge-shaped primaries and raised seeds on some harvests. Berries were bright, glossy, with firm skin and flesh, however later in the season (September) skin colour was noted as slightly paler (Figure 6.a.). Sensory flavour was good, although Brixº scores were only average. Shelf life scores were better than Malling™ Champion, and the raised seeds noted on some harvests did not increase in prominence in shelf life tests. Peak production was later in the season with a 50% pick date in the first half August (Figure 6.c.). Plants were more vigorous than the standards with big leaves, but berries were held on long pedicels and trusses, and held strongly upright during flowering. Predictive scores indicate this selection may be resistant to crown rot, but may have some susceptibility to mildew.

Figure 6.a. Fruit of EMR925

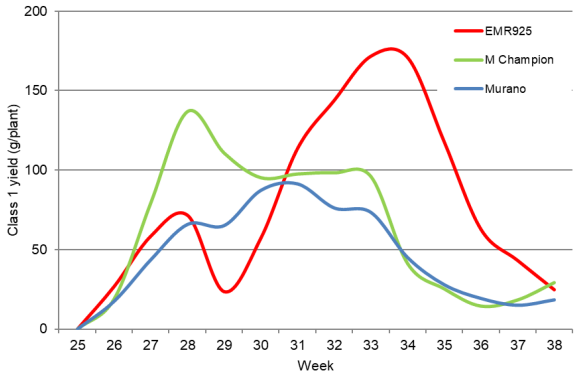

Figure 6.b. Cropping profile of EMR925

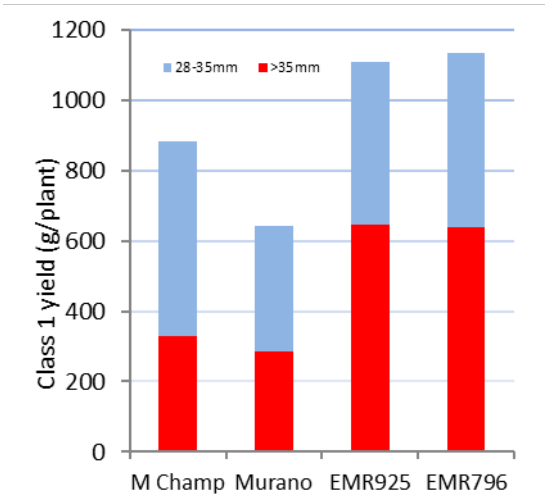

Figure 6.c. Mean Class 1 yield per plant (g/plant) of EMR925 compared to standards

Offsite main crop (June-bearer) growers' trials

One selection, EM2622, that had been trialled in the offsite 60-day and maincrop (June-bearer) growers' trials in 2019 and 2020 respectively, and was put forward by the EMSBC Board for larger-scale trials on two sites in 2022-23. EM2622 is, a late season June-bearer, with excellent fruit quality and highly rated in retailer sampling

Offsite 60-day (June-bearer) growers' trials

The results of the offsite growers' trials were reviewed by the EMSBC Board in October 2020 and it was agreed that three selections (EM2696, EM2721 and EM2723) trialled in the small-scale, 60-day trials should continue to main crop offsite trials in 2020. Trialling of EM2547, EM2591, EM2617, EM2628, EM2656 and EM2674 would discontinue as they had been superseded by newer selections in the pipeline.

A summary of EM2696, EM2721 and EM2723 which will be carried forward to main crop trials is shown below:

EM2696

A mid-season selection, with a good yield of 496 g/ tray plant and a high average percentage of Class 1 fruit of 93%. Fruit quality was very good all round with firm skin and flesh. Sensory flavour was consistently sweet, full flavoured, with a high mean Brixº (9.9º). Berries were glossy, with regular conic shape, with slightly sunken seeds. Plants had an open habit with good fruit display. In initial pathogen screening assessments at NIAB EMR it was indicated that EM2696 has moderate resistance to

crown rot, and is moderately susceptible to mildew.

EM2721

EM2721 is a mid-season, moderate yielding selection (average of 415 g/tray plant) and a high percentage of Class 1 (93%). Fruit size was slightly smaller than Malling™ Centenary but superior to Elsanta. Fruit quality scores were high, but firmness could be soft. EM2721 scored well for sensory flavour, and was sweet, with some aroma. Brixº scores were moderate with a mean of 9.4º over all sites. Plants had an open habit with a good fruit display. In initial pathogen screening assessments at NIAB EMR, EM2721 showed moderate resistance to crown rot and resistance to powdery mildew.

EM2723

A mid-late season selection, the highest yielding selection in small scale trials with a mean yield 472 g/tray plant. The percentage Class 1 fruit was high, 91% overall. Fruit was attractive, uniform, but fruit size was smaller than other selections on trial. Sensory flavour was scored highly, with comments such as sweet, and sometimes peachy flavour. Brixº scores were high with a mean score of 9.9º overall. Plants had moderate vigour with good display. Initial pathogen screening assessments at NIAB EMR indicate EM2723 has moderate susceptibility to crown rot, and reports of plant affected by the pathogen were confirmed on two trial sites. It also has moderate susceptibility to mildew and intermediate resistance to wilt.

Offsite everbearer growers' trials

The results of the offsite growers' trials were reviewed by the EMSBC Board in October 2020. Two selections (EMR727 and EMR745) were assessed in small scale offsite growers' trials, both selections were deselected at this stage, as they had been superseded by newer material.

Two selections were assessed in large scale trials, EMR721 and EMR796. EMR721 was deselected, EMR796 has been put forward for commercialisation and additional agronomy trials in 2021.

EMR796 is an early season everbearer. Yield potential was very high (1192 g/plant) with a high percentage of Class 1 fruit (92%). Some agronomic work is being carried out to assess the effect of planting density and plant-type on yield. Fruit size was large with a mean average berry weight of 26.9 g/berry. Berries were attractive, uniform conic shape, with a bright appearance which was retained in shelf life tests. Sensory flavour was consistently good, with a high mean Brixº of 9.0º. In optimum conditions, skin and flesh firmness scores were very good, but under extreme conditions (very warm/high winds) skin exhibited some fragility. Plant habit and vigour is good, with an upright habit, moderate vigour, and with fruit very well displayed on long trusses. Pathogen screening indicates that EMR796 shows moderate resistance to crown rot and some susceptibility to powdery mildew was recorded, but this was very variable between sites and the control methods applied.

Table 6. NIAB EMR June-bearer results (standards in *italics*)

Selection	Class 1 yield (g/plant)	% Class 1	% large fruit (>35mm)	Appearance (1-9)	Skin firm (1-9)	Flesh firm (1-9)	Flavour (1-9)	Shelf life score (1-5)	Mean Brix°	50% pick date	Vigour (1-5)	Density (1-5)	Display (1-3)
EM2818[1]	484	91	68	5.5	6.3	6.0	6.0	3.0	9.5	15 June	4	2	3
EM2836[1]	650	96	82	6.6	6.7	7.0	5.6	4.0	8.5	15 June	4	2	3
EM2859[1]	573	91	67	5.5	6.2	6.7	5.8	3.4	9.3	15 June	4	2	2
EM2883[1]	625	93	76	5.4	6.2	6.2	5.0	3.5	7.4	15 June	4	2	3
M. Cent[2]	582	90	53	6.0	6.3	5.9	5.8	3	7.6	11 June	-	-	-

[1]Mean of two plots [2]Mean of eight plots

The key to fruit and plant characteristics scores are shown in Appendix I

Table 7. NIAB EMR Everbearer trial results (standards in *italics*)

Selection	Class 1 yield (g/plant)	% Class 1	% large fruit (>35mm)	Appearance (1-9)	Skin firm (1-9)	Flesh firm (1-9)	Flavour (1-9)	Shelf life score (1-5)	Mean Brixº	50% pick date	Vigour (1-5)	Density (1-5)	Display (1-3)
EMR919[1]	886	67	54	5.8	5.7	5.3	5.4	3.5	7.8	27 Jul	5	5	3
EMR928[1]	1111	84	59	5.5	6	6.3	5.5	3.4	7.0	10 Aug	4	3	3
M. Champion[2]	*884*	*69*	*40*	*5.6*	*6.5*	*7.0*	*5.0*	*3.0*	*7.4*	*23 Jul*	*3*	*3*	*3*
Murano[3]	*644*	*66*	*49*	*5.1*	*5.7*	*6.0*	*5.4*	*2.8*	*7.6*	*27 Jul*	*3*	*3*	*3*

[1]Mean of two plots [3] Mean of twelve plots [4]Mean of four plots

The key to fruit and plant characteristics scores are shown in Appendix I

Conclusions

NIAB EMR June-bearer trial

- Four selections. EM2818, EM2836, EM2859 and EM2883 were identified as being of sufficient interest to progress to offsite growers' trials in 2022 (60-day) and 2023 (main crop). One selection was of particular interest: EM2836. EM2836 was one of the highest yielding selections on trial, with good all round fruit quality traits and stood out from the beginning of trialling for its glossy appearance and large fruit size.

NIAB EMR Everbearer trial

- Two new selections, EMR919 and EMR925 were identified as being of sufficient interest to progress to growers' trials in 2022. Both had excellent fruit quality.

Offsite main crop (June-bearer) trials

- One advanced selection, EM2622 that was trialled in 2019/2020, will be progressing to larger-scale offsite trials in 2022-23. EM2622 is a late season June-bearer, with excellent fruit quality and highly rated in retailer sampling.

Offsite 60-day (June-bearer) trials

- Three advanced selections: EM2696, EM2721 and EM2723, were deemed to have performed sufficiently well to carry forward to main crop offsite trials in 2021.

Offsite everbearer trials

- One advanced selection, EMR796, will be progressing to further agronomy trials in 2021 and commercialisation. EMR796 has Malling™ Centenary-type attributes but as an everbearer. It has good all round fruit quality traits, large fruit size, and high yield and percentage Class 1.

Knowledge and Technology Transfer

A fruit walk for AHDB members was not possible in 2020 due to the Covid 19 pandemic, however Adam Whitehouse presented the latest selections from the EMSBC programme in a virtual fruit walk shared to member of the EMSBC Board (including AHDB) in June 2020 and distributed to the funding partners. In addition AHDB representatives (Rachel McGauley and Robert Saville) were able to attend Board meetings (February, August and October) where updates on the programme, trials and selections were made. In addition, Adam Whitehouse presented at the AHDB Soft Fruit Day webinar on 18th November 2020.

Appendices

Appendix I. Scoring system employed for fruit and plant characteristics

Fruit characteristics:

Appearance	3=poor 5=acceptable 7=attractive
Skin Firmness	3=weak 5=acceptable 7=tough
Flesh Firmness	3=soft 5=acceptable 7=firm
Flavour	1=unpleasant 3=poor 5=acceptable 7=pleasant 9=very pleasant

Shelf life:

Comparison to standard	1=Much worse 2=Worse 3=Same 4=Better 5=Much better

Plant characteristics:

Plant Vigour	1=weak 5=intermediate 9=excessive
Plant Density	1=open 3=intermediate 5=dense
Fruit Display	1=poor 2=intermediate 3=good