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Fernandez et al.

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(54) **STRAWBERRY PLANT NAMED 'NCS 10-156'**

(50) Latin Name: ***Fragaria* x *ananassa* Duchense**
Varietal Denomination: **NCS 10-156**

(71) Applicant: **North Carolina State University**, Raleigh, NC (US)

(72) Inventors: **Gina E. Fernandez**, Raleigh, NC (US); **Jeremy Pattison**, Raleigh, NC (US); **James R. Ballington**, Raleigh, NC (US)

(73) Assignee: **North Carolina State University**, Raleigh, NC (US)

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A01H 5/08 (2018.01)
A01H 6/74 (2018.01)

(52) **U.S. Cl.**
USPC **Plt./208**

(58) **Field of Classification Search**
USPC Plt./156, 208, 209
See application file for complete search history.

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Primary Examiner — Susan McCormick Ewoldt
Assistant Examiner — Karen M Redden
(74) *Attorney, Agent, or Firm* — Myers Bigel, P.A.

(57) **ABSTRACT**

A new and distinct variety of commercial strawberry plant (*Fragaria* x *ananassa* Duchense) named 'NCS 10-156' substantially as illustrated and described, characterized by its early season of ripening, medium size, excellent flavor, very attractive conical shape with good quality fruit that has soft flesh firmness and soft skin toughness.

4 Drawing Sheets

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Latin name of the genus and species: The Latin name of the novel strawberry plant disclosed herein is *Fragaria* x *ananassa* Duchense.

Variety denomination: The inventive strawberry variety has been given the variety denomination 'NCS 10-156'.

BACKGROUND OF THE INVENTION

The present invention relates to a new and distinct variety of strawberry (*Fragaria* x *ananassa* Duchense) named 'NCS 10-156'. This strawberry plant (genotype) originated in a strawberry breeding plot in Salisbury, N.C. The genotype was collected from open pollinated fruit from the seed parent 'NCH 05-73P'. The seed parent is an unreleased breeding selection from a cross that was made to improve the university's strawberry breeding program genepool. The seeds collected from the female parent in the spring of 2009 were germinated in the summer and planted in the fall of 2009. The selection was made in the spring of 2010. 'NCS 10-156' was first asexually propagated at the Piedmont Research Station, Salisbury N.C., Rowan County, in 2011. Ten daughter plants were propagated from runner tips originating from the mother plant and transplanted to second test trials where they were compared to several other genotypes in 2011. Plants were established in replicated trials in 2012-17. 'NCS 10-156' exhibited early fruit production with excellent taste in multiple locations and years. Propagules of 'NCS 10-156' in all trials have been identical to the initial daughter plants. The combination of traits disclosed herein that characterize 'NCS 10-156' have been retained true to type through successive cycles of asexual propagation.

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SUMMARY OF THE INVENTION

'NCS 10-156' when grown in the piedmont regions of North Carolina consistently produced fruit early in the season with excellent flavor (Tables 1 and 2, FIG. **3**). Yields of NCS 10-156 are higher than 'Sweet Charlie' (U.S. Plant Pat. No. 8,729), the standard early producing cultivar in North Carolina. Fruit of 'NCS 10-156' has higher soluble solids than 'Camarosa' (U.S. Plant Pat. No. 8,708) and 'Chandler' (U.S. Plant Pat. No. 5,262), which gives it a very sweet flavor. 'Sweet Charlie', 'Camarosa' and 'Chandler' are the most commonly planted standard cultivars used by

the strawberry industry in North Carolina at this time. 'NCS 10-156' is considered a short day plant which means flowering occurs one time during the season. 'NCS 10-156' begins to flower during week 9-10 and fruit ripening begins week 14-15, the duration of the flowering and fruiting periods are 4 to 8 weeks depending on the season. Preferred planting date is 25 September in Salisbury, N.C. and 5 October in Clayton, N.C. The shelf life of 'NCS 10-156' is short, therefore it is suitable for pick your own and local markets. Nursery performance has been very good in western NC locations due to abundant production of many runners that produce multiple daughter plants that root easily. Yield data of the parents of 'NCS 10-156' is not available. The new and distinct variety of strawberry *Fragaria* x *ananassa* Duchense 'NCS 10-156' has the following unique combination of desirable features that are outstanding in a new variety including (1) early ripening, (2) yields higher than the current early season cultivar 'Sweet Charlie', and (4) excellent flavor.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying photographs show typical specimens of 'NCS10-156'. The photographs were taken in Clayton, N.C.

FIG. **1** shows whole 8-month old plants of 'NCS 10-156' including leaves, inflorescences and fruit at varying stages of ripeness.

FIG. **2** shows a close up of fruit of 'NCS 10-156', sliced and whole.

FIG. **3** shows a close-up of fruit of 'NCS 10-156', sliced and whole.

FIG. **4** compares the weekly marketable yield of strawberry varieties 'Chandler', 'NCS 10-156' and 'Sweet Charlie'.

DETAILED BOTANICAL DESCRIPTION

The following is a detailed description of a new distinct strawberry variety known as 'NCS 10-156'. The description is based on observations taken from the 2014-2017 growing seasons in Clayton, N.C. and Salisbury, N.C. The plants are set in the fall and fruiting occurs in the following spring. This description is in accordance with International Union for the Protection of New Varieties of Plants (UPOV) terminology. Color designations and descriptions and other phenotypical traits may deviate from the stated values depending on location and season as this genotype has not been observed in all environmental conditions. Color terminologies are based on The Royal Horticultural Society Colour Chart, London (R.H.S.) (5th Edition. 2007).

Plant:

Average height.—20 cm.
Average width.—15 cm.
Canopy density.—Moderately dense.
Growth habit.—Semi erect moderate compact.
Number of crowns/plant.—3-6.
Vigor.—Moderate.

Leaf:

Overall.—Pinnately compound with 3 leaflets.
Mean leaf length including petiole.—283 mm.
Wide.—151 mm.
Terminal leaflet length.—78 mm.
Terminal leaflet width.—60 mm.
Petiole length.—205 mm.
Secondary leaflet length.—78 mm.
Secondary leaflet width.—55 mm.

Terminal leaflet:

Upper leaf surface color.—137A.
Lower leaf surface color.—138B.
Terminal leaflet length.—7.7 mm.
Terminal leaflet width.—7.5 mm.
Length to width ratio.—1.02.
Shape in cross section.—Concave.
Terminal leaflet serration number.—16-20.
Terminal leaflet margin profile.—Obtuse.
Terminal leaflet shape overall.—Orbicular.
Terminal leaflet shape of base.—Cuneate.
Terminal leaflet shape of serrations.—Pointed.
Interveinal blistering.—Slight.
Pubescence density of lower surface.—Sparse.
Leaf glossiness.—Semi-gloss.
Venation pattern.—Pinnate.

Petiole:

Petiole length.—17.2 mm.
Petiole diameter.—3 mm.
Pubescence density of petiole.—Slight-moderate.
Petiole pose of hairs.—Erect, perpendicular.
Petiole color.—144B.
Anthocyanin.—Absent.

Petiolule:

Length.—Terminal leaflet, 6 mm; lateral leaflet, 6 mm, diameter, 2 mm.
Color.—144B.

Stipule:

Stipule length.—26.8 mm.
Stipule width.—7.5 mm.
Stipule color.—145B.
Stipule pubescence.—Present.
Anthocyanin.—Slight.
Bract pair or single.—Mostly single occasionally paired.

Secondary leaflets:

Color upper surface.—137A.
Color lower surface.—138B.
Secondary leaflet length.—7.7 cm.
Secondary leaflet width.—7.5 cm.
Length to width ratio.—1.02.
Shape in cross section.—Concave.
Leaflet shape.—Orbicular.
Leaflet glossiness.—Glossy.
Secondary leaflet serration number.—14-18.
Secondary leaflet margin profile.—Obtuse.
Secondary leaflet shape of base.—Cuneate to slightly rounded.
Secondary leaflet shape of serrations.—Pointed.
Interveinal blistering.—Moderate.
Pubescence density.—Lower surface — Sparse.
Leaf glossiness.—Semi-gloss.
Venation pattern.—Pinnate.

Stolons:

Number of daughter plants.—25-40 depending on environmental conditions.
Anthocyanin.—Variable, absent to moderate.
Thickness.—3 mm.
Pubescence.—Very sparse nearly glabrous.
Average length.—452 mm.

Inflorescence:

Time of flowering.—Short day flowering habit.
Position relative to canopy.—Flowers open at or below canopy.

Branching of the inflorescence.—At or close to crown.
Number of flowers/inflorescence.—5.3.
Relative flower size.—Medium.
Relative calyx size to corolla.—0.78.
Inflorescence attitude at harvest.—Level to erect.
Inflorescence length.—18-20 mm.
Flower diameter.—35 mm primary, 25 mm secondary.
Calyx diameter.—26 mm.
Blossom longevity.—1-2 days.
Number of stamens.—Average of 27.
Anther color.—13A to 16A.
Filament color.—149D to 150C.
Style color.—149D.
Stigma color.—2C.

Petals:

Petal length.—13.5 mm.
Petal width.—14.2 mm.
Petal size ratio.—0.95
Petals/flower.—5.
Petal color.—155D.
Corolla diameter (*mean diameter of the petals collectively*).—33.3 mm.
Flower shape.—Orbicular
Number flowers/inflorescence.—3-6.
Petal spacing.—Even to overlapping.

Sepals:

Sepal number.—10.5.
Sepal color.—137A.
Sepal length.—11.1 mm.
Sepal width.—4.2 mm.

Calyx:

Calyx color.—N137A tip, N139 base.
Corolla diameter.—33.3 mm.
Calyx size compared to fruit.—> or =. The calyx attachment is usually level with the fruit, and the sepal attitude is outward and some upward orientation.

Pedicels:

Color.—145A.
Pubescence.—Light.
Number of pedicels attached to the truss.—3.
Diameter.—2 mm.
Length of pedicel attached to the primary fruit.—59 mm long. At peak production, the plant will have multiple crowns. Each crown will produce one or more truss and each truss will have pedicels.

Fruit:

Fruit fragrance.—Highly fragrant.
Flavor.—Sweet, high soluble solids content (SSC), see Table 4.
Fruit skin color.—53A.
Fruit flesh color.—47A.
Evenness of color.—Outside skin even, inside from 47A in the apex gradually changing to NN 155C in the center near the calyx.
Flesh and skin firmness at full ripe stage.—Moderately soft (See Table 3).
Rain damage.—Slight.
Fruit size average.—14.6-19.9 g (see Table 1 and Table 2).
Fruit shape.—Conical.
Fruit length.—36.4 mm.
Fruit width.—31.3 mm.
Fruit length to width ratio.—1.16.
Fruit skin glossiness.—Uniform glossy.
Fruit calyx orientation.—Most flat, sometimes raised up.
Band without achenes.—4-8 mm.
Center cavity size.—0-6 mm.
Unevenness of surface.—Seeds sometimes raised, so surface can be uneven.
Disease resistance.—Susceptible to grey mold (*Botrytis cinerea*) and anthracnose fruit rot (*Colletotrichum acutatum*).

Seeds:

Achene color.—151A and 53A. Achene color is individually present depending on location on fruit.
Achene attachment.—At surface to raised.
Achene shape.—Oval.

The technical (pomological) descriptive data comparing yield of 'NCS 10-156' to that of 'Sweet Charlie', 'Camarosa' and 'Chandler' in Salisbury, N.C. and in Clayton, N.C. is presented in Tables 1-2. Weekly marketable yield of 'Chandler', 'NCS 10-156' and 'Sweet Charlie' are presented in FIG. **4**. Tables 3-4 provide post-harvest storage life attributes comparing 'NCS 10-038' to 'Camarosa' and 'Chandler' as well as 'NCS10-038'. This data was previously published in part in Perkins-Veazie, P., J. Pattison, G. E. Fernandez and G. Ma. 2016. Fruit Quality and Composition of Two Advanced North Carolina Strawberry Selections. *Intl. J. Fruit Science.* 16:(Sup 1): 220-227).

TABLE 1

Piedmont Research Station, Salisbury NC, 2015-16. Total yield, marketable yield, percent marketable yield and average berry weight.

Genotype	Total Yield (g/plant)	Total Yield (lbs/A)	Marketable Yield (g/plant)	Marketable Yield (lbs/A)
NCS 10-038*	931	35749	771	29605
NCS 10-156	697	26757	586	22484
Camarosa	637	24431	550	21107
Chandler	665	25505	505	19389
Sweet Charlie	488	18712	406	15592

Genotype	Percentage Marketable Yield (% of total)	Marketable Percent of Chandler	Average berry weight (g)
NCS 10-038*	82.8	153	16.4
NCS 10-156	84.0	116	18.9
Camarosa	86.4	109	21.7
Chandler	76.0	100	16.9
Sweet Charlie	83.3	80	17.3

*'NCS 10-038' is co-pending Plant Pat. Application No. 16/602,013

TABLE 2

Central Crops Research Station, Clayton, NC 2015-16. Total yield, marketable yield, percent marketable yield and average berry weight.

Genotype	Total Yield (g/plant)	Total Yield (lbs/A)	Marketable Yield (g/plant)	Marketable Yield (lbs/A)
NCS 10-038*	785	30131	712	27309
Camarosa	668	25619	607	23290
Chandler	669	25690	539	20698
NCS 10-156	558	21400	485	18603
Sweet Charlie	337	12941	306	11725

TABLE 2-continued

Central Crops Research Station, Clayton, NC 2015-16. Total yield, marketable yield, percent marketable yield and average berry weight.

Genotype	Percentage Market-able Yield (% of total)	Marketable Percent of Chandler	Average berry weight (g)
NCS 10-038*	90.6	132	17.5
Camarosa	90.9	113	18.2
Chandler	80.6	100	19.8
NCS 10-156	86.9	90	14.6
Sweet Charlie	90.6	57	14.2

*'NCS 10-038' is co-pending Plant Pat. Application No. 16/602,013

TABLE 3

Subjective ratings of strawberry fruit held at 4 C for 8 days averaged for 2014 and 2015 seasons[z].

Selection	Overall appear-ance[y]	Fruit shrivel	Fruit dark-ness	Calyx brown	Calyx shrivel	Fruit firm-ness	Berries with mold (%)
Camarosa	3.8a	3.9ab	3.7bc	3.8a	3.6a	4.3a	3.1a
Chandler	4.0a	4.3a	3.8b	3.9a	3.8a	3.2b	4.6ab
NCS 10-038	4.0a	4.4a	4.2a	3.4a	3.6a	3.8b	6.1ab
NCS 10-156	3.3b	3.3b	3.2c	3.0b	3.0a	2.2c	12.3b

[z]All fruit quality attributes were given subjective ratings of 1 to 5 where a higher number indicates better fruit quality.
Berries with mold was determined by 100% x (no. berries with mold/total no. berries).
[y]Means within column with same letter indicate no significant difference using Tukey's HSD, $p < 0.05$.

TABLE 4

Fruit composition of fully ripe freshly harvested strawberry selections grown at Piedmont, NC in 2014 and 2015[z].

Selection	SSC (%)	pH	Titrat-able acidity (TA) (% as citric acid)	SSC/ TA	Total antho-cyanin (mg P3G/ 100 g fwt)[y]	Total phenolic content (mg GA/100 g)
Day 0						
Camarosa	7.1b	3.82a	0.69b	10.6ab	41.27a	155.62a
Chandler	6.8b	3.71b	0.69b	10.0ab	48.55a	157.57a
NCS 10-038	7.1b	3.67b	0.75a	9.8b	28.87b	142.05b
NCS 10-156	7.8a	3.78a	0.72ab	11.0a	33.95ab	152.23a
Day 8						
Camarosa	7.6b	3.97a	0.64b	12.1a	51.52a	152.16bc
Chandler	7.6b	3.87b	0.66b	11.6a	45.39ab	158.50a
NCS 10-038	6.9c	3.81b	0.68b	10.2b	29.86c	147.59c
NCS 10-156	8.7a	3.87b	0.77a	11.6a	37.04b	153.21b

[z]Each selection consists of a mean of 3 to 7 samples, representing 3 harvest dates per year. Means within column with same letter indicate no significant difference using Tukey's HSD, $p < 0.05$.
[y]P3G and GA are pelargonidin 3-glucoside and gallic acid equivalents, respectively.

That which is claimed is:

1. A new and distinct variety of *Fragaria* x *ananassa* Duch. plant named 'NCS 10-156', substantially as described and illustrated herein.

* * * * *

Fig. 1

Fig. 2

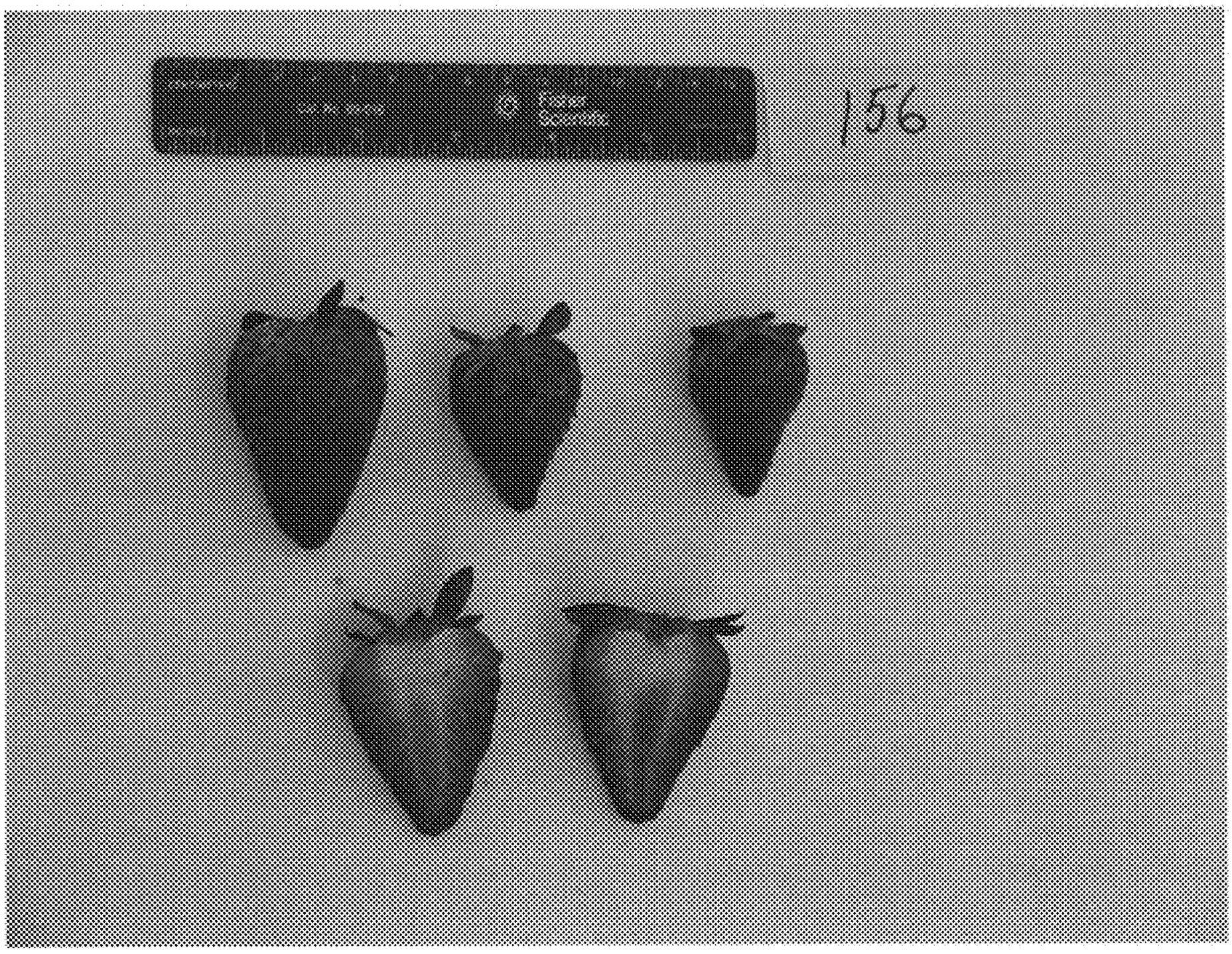


Fig. 3

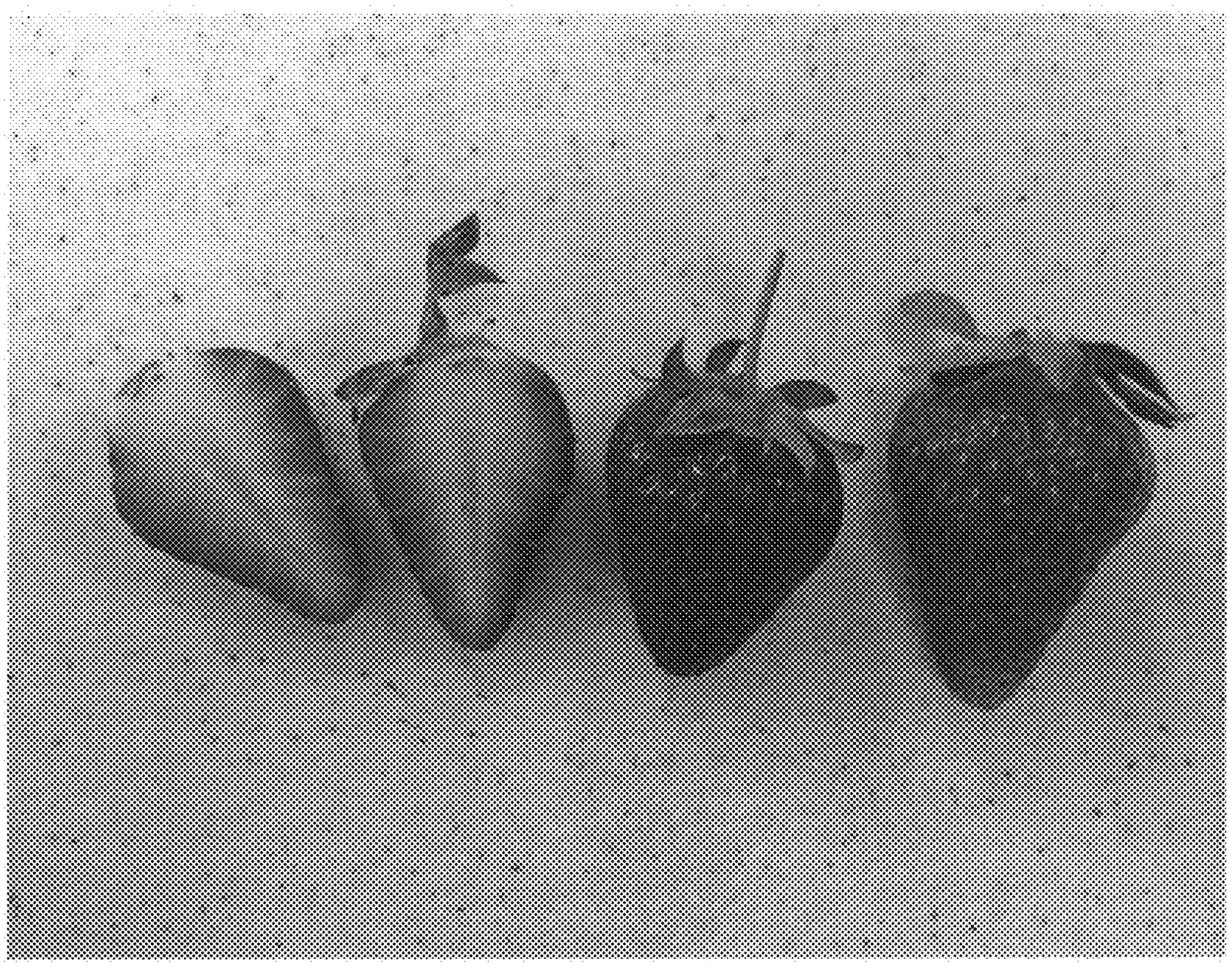
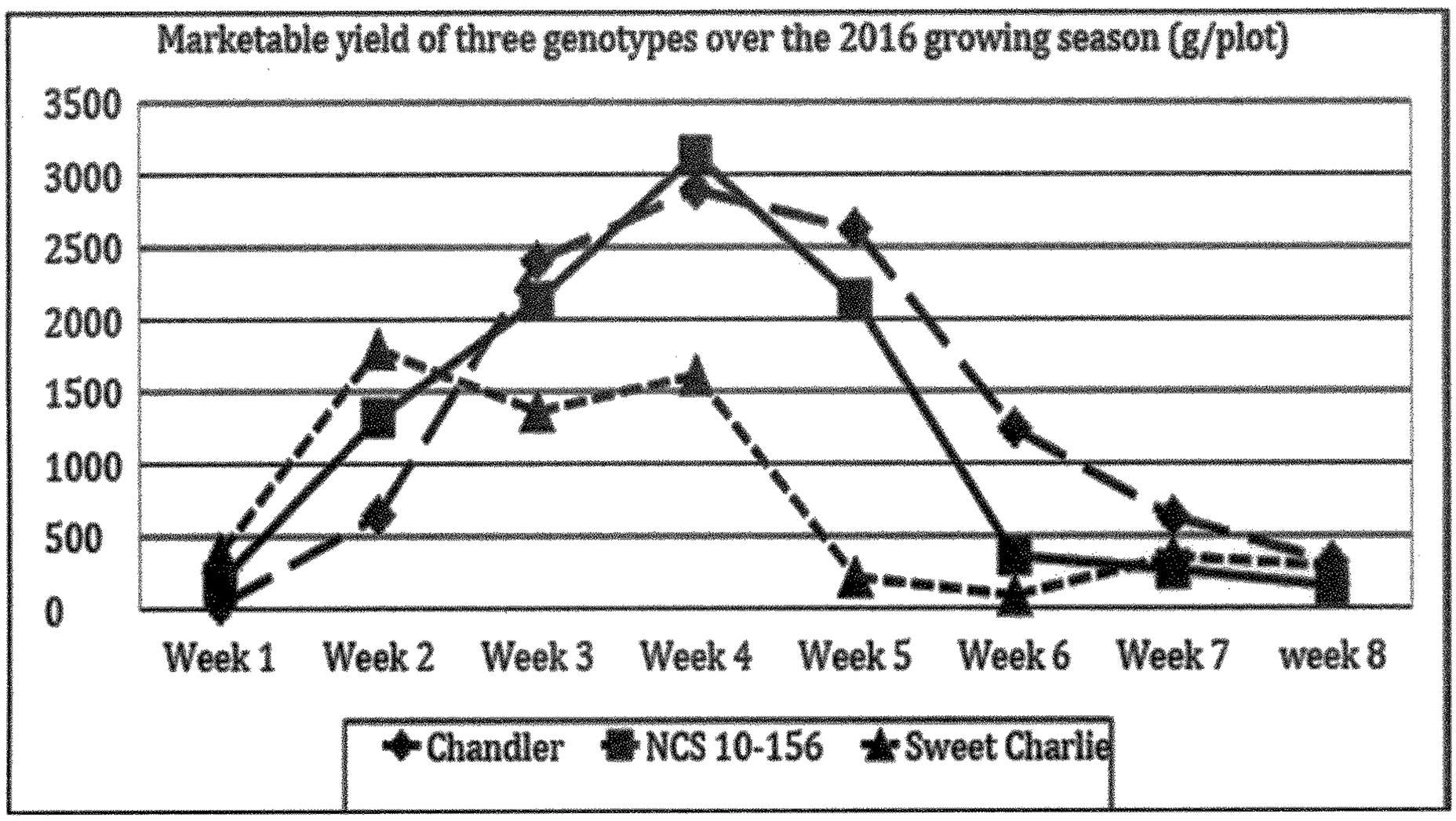


Fig. 4


Marketable yield of three genotypes over the 2016 growing season (g/plot)
3500
3000
2500
2000
1500
1000
500
0
Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
week 8
Chandler
NCS 10-156
Sweet Charlie