



US00PP15146P3

(12) **United States Plant Patent**
Hancock

(10) **Patent No.:** **US PP15,146 P2**

(45) **Date of Patent:** **Sep. 14, 2004**

(54) **BLUEBERRY PLANT DENOMINATED**
'LIBERTY'

(52) **U.S. Cl.** **Plt./157**

(58) **Field of Search** **Plt./157**

(50) Latin Name: *Vaccinium corymbosum*
Varietal Denomination: **Liberty**

Primary Examiner—Anne Marie Grunberg

Assistant Examiner—S B McCormick-Ewoldt

(75) Inventor: **James F. Hancock**, East Lansing, MI
(US)

(74) *Attorney, Agent, or Firm*—Harness, Dickey & Pierce,
P.L.C.

(73) Assignee: **Board of Trustees operating Michigan**
State University, East Lansing, MI
(US)

(57) **ABSTRACT**

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

Liberty is a new blueberry variety of *Vaccinium corymbo-*
sum. It is a productive, very late ripening variety with high
fresh market quality intended for areas where northern
highbush varieties are grown successfully. Plants of Liberty
are vigorous and upright. Canes are numerous, moderately
branched and the fruit are well exposed. Its berries are
moderately large, have small, dry picking scars, excellent
powder-blue color, delicious flavor and excellent firmness.
Liberty has a harvest season that begins about 5 days before
the variety known as 'Elliott'.

(21) Appl. No.: **10/350,343**

(22) Filed: **Jan. 23, 2003**

(65) **Prior Publication Data**

US 2004/0148669 P1 Jul. 29, 2004

(51) **Int. Cl.**⁷ **A01H 5/00**

2 Drawing Sheets

1

2

Latin name and variety denomination:

The present invention relates to a new and distinct variety
of *Vaccinium corymbosum*, which is hereby denominated
'Liberty.'

CROSS-REFERENCE TO RELATED
APPLICATIONS

This application is related to the present inventor's United
States Patent Applications entitled "Blueberry plant denomi-
nated 'Aurora,'" U.S. patent application Ser. No. 10/350,
345, filed Jan. 23, 2003, and entitled "Blueberry plant
denominated 'Draper,'" U.S. patent application Ser. No.
10/350,344, filed Jan. 23, 2003. Both of these applications
are also assigned to the assignee of the present application.
The disclosures of the above applications are hereby incor-
porated herein by reference.

SUMMARY OF THE INVENTION

The present invention relates to a new and distinct variety
of highbush blueberry plant, denominated 'Liberty.' Liberty
is a new blueberry variety of *Vaccinium corymbosum* from
the Michigan State University breeding program. It is a
productive, very late ripening variety with high fresh market
quality that is intended for areas where northern highbush
varieties are grown successfully. Plants of Liberty are vig-
orous and upright. Canes are numerous, moderately
branched and the fruit are well exposed. Its berries are
moderately large, have small, dry picking scars, excellent
powder-blue color, delicious flavor and excellent firmness.
Liberty has a harvest season that begins about 5 days before
the variety known as 'Elliott.' Blueberry growers often
receive their highest profits in the late season. Liberty will
provide two new late ripening options with high quality
fruit.

Emasculated flowers of the 'Brigetta' highbush blueberry
from Australia were pollinated in 1991 with pollen from the
northern highbush variety Elliott. The seeds were
germinated, grown in a greenhouse for 1 year and then field
planted at Benton Harbor, Mich. Liberty was selected from
a group of 54 siblings in 1997. The original selection has
been evaluated at Benton Harbor, Mich. annually for 11
years. Asexual reproduction took place at East Lansing,
Mich. and Lowell, Oreg. Liberty has been propagated by
hardwood cuttings that produced over a hundred shoots that
were rooted in the greenhouse and then planted in the field.
Initiation of root development from hardwood cuttings takes
about two to about three months. In addition, Liberty has
been propagated by softwood cuttings that have been rooted.
Furthermore, generation of micro-shoots in the greenhouse
using established tissue culture methods has produced thou-
sands of clones of Liberty. Initiation of root development
from hardwood cuttings takes about three to about four
weeks. Such methods are discussed in the following
references, which are incorporated by reference in their
entirety: Doran, W. L. and Bailey, J. S. "Propagation of the
high bush blueberry by softwood cuttings," Bulletin Mas-
sachusetts Agricultural Experiment Station; no. 410.
Amherst, Mass. Massachusetts State College, 1943;
Doehlert, C. A. "Propagating blueberries from hardwood
cuttings," Circular (New Jersey Agricultural Experiment
Station) 490. New Brunswick, N.J. New Jersey Agricultural
Experiment Station, 1945; Doehlert, C. A. "Propagating
blueberries from hardwood cuttings," Circular (New Jersey
Agricultural Experiment Station) 551. New Brunswick,
N.J.: New Jersey Agricultural Experiment Station, 1953; El
Shiekh, A.; Wildung, D. K.; Luby, J. J.; Sargent, K. L.; Read,
P. E. "Long term effects of propagation by tissue culture or
softwood single node cuttings on growth habit, yield, and
berry weight of 'Northblue' blueberry," Journal of the
American Society for Horticultural Science. 1996, 121: 2,

339 342; Galletta, G. J.; Ballington, J. R.; Daubeney, H. A.; Brennan, R. M.; Reisch, B. J.; Pratt, C.; Ferguson, A. R.; Seal, A. G.; McNeilage, M. A.; Fraser, L. G.; Harvey, C. F.; Beatson, R. A.; Hancock, J. F.; Scott, D. H.; Lawrence, F. J.; Janick, J. (ed.); Moore, J. N. "Fruit breeding. Volume II. Vine and small fruits," Department of Horticulture, Purdue University, West Lafayette, Ind. 1996 John Wiley and Sons; New York; USA; Strik, B.; Brun, C.; Ahmedullah, M.; Antonelli, A.; Askham, L.; Barney, D.; Bristow, P.; Fisher, G.; Hart, J.; Havens, D. Draper A. D. and Chandler C. K. "Accelerating highbush blueberry selection evaluation by early propagation," Journal of the American Society for Horticultural Science. 1986 111(2): 301–303; Pritts M. P. and Hancock J. F. (Eds.) "Highbush blueberry production guide," Northeast Regional Agricultural Engineering Service, Ithaca, N.Y., USA 1992.

Clones of Liberty have been tested for four years at Grand Junction, Mich., and for two years at South Haven, Mich., Lacota, Mich., Corvallis, Oreg., and Lowell, Oreg. In all cases all resulting plants have stably displayed characteristics of the variety. Consistent high yields at Benton Harbor and Grand Junction, Mich. indicate that the buds and wood of Liberty are tolerant to fluctuating late fall and spring temperatures. Liberty also has excellent winter hardiness, as it has routinely been challenged with mid-winter temperatures below –20 C. Probable areas of adaptation and markets include blueberry growers in Michigan and across the USA, Canada, Argentina, Australia, Chile, France, Germany, and New Zealand.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

FIG. 1 is a photographic print in full color of exemplary 4-year-old Liberty blueberry plants. Two plants are shown, one in the left foreground and a portion of a second plant in the right foreground. The plants appearing in the background are of a different variety and are not part of the Aurora blueberry plants, nor is the grass appearing in the picture part of the Aurora blueberry plants.

FIG. 2 is a photographic print in full color illustrating exemplary fruit clusters of a 4-year-old Liberty blueberry plant. Some of the fruit is not yet mature and does not show the characteristic mature color.

DETAILED BOTANICAL DESCRIPTION

The following is a detailed botanical description of the new and distinct variety of blueberry, its flowers, fruit and foliage, based on observations of specimens grown at Benton Harbor, Mich. and Grand Junction, Mich. over four years, and at South Haven, Mich., Lacota, Mich., Corvallis, Oreg., and Lowell, Oreg., over a two year period. The taxonomic characteristics chosen in the detailed description are standard in the practice (R E Gough, R J Hindle, and V G Shutak, "Identification of Ten Highbush Blueberry Cultivars using Morphological Characteristics," *HortScience* 11(5): 512–4, 1976). Color descriptions, except those given in common terms, are presented in Royal Horticultural Society Colour Chart designations. In cases where the color descriptions cited from The Royal Horticultural Society Colour Chart differ from the colors shown in the drawings, the colors cited from The Royal Horticultural Society Colour Chart should be considered accurate. Any deviation from these colors in the drawings is due to failure of the photo-

graphic process to exactly duplicate the colors of nature. In addition, fruit color designations in Table I are applicable only to mature fruit.

Liberty requires pollination for fruit development; it is self-fertile but pollen from any highbush blueberry species will initiate fruit development.

TABLE I

Liberty Characteristics	
Characteristic	Liberty
<u>Bush</u>	
Mature height	1.5 m
Mature width	1.2 m
Diameter/width ratio	1.4
Growth habit	Upright to semi-spreading
Annual renewal canes	5–6
Internode length on spring shoots	2.5 cm
Mature cane color	Greyed-Green (198A)
Mature cane length	1.5 m
Mature can width	2 cm–4 cm
Fall color-new shoots	Patches of Red-Purple (60A)
<u>Foliage</u>	
Leaf shape	Elliptic-ovate
Apex shape	Acute
Base shape	Cuniate to Truncate
Leaf length	3.0 cm–4.5 cm
Leaf width	1.4 cm–2.4 cm
Leaf length/width ratio	2.1
Leaf serration	Serrated
Pubescence	None
Color-top	Green (137A)
Color-bottom	Green (138A)
Venation	Palmete
Vein color	Green (138B)
Petiole length	4 mm
Petiole color	Green (138B)
<u>Blossoms</u>	
Shape of corolla	Elongate-urceolata
Calyx	5 lobed
Style length	At edge of corolla
Color of open flower	Mostly white (155D)
Flower # per cluster	8–10
Flower diameter	5 mm–7 mm
<u>Reproductive Organs</u>	
Type	Berries with seeds
Seed Size	1 mm × 2 mm
Number of seeds	10–50 per fruit
<u>Mature Fruit</u>	
Shape	Globose, uniform
Length	1.1 cm–1.3 cm
Width	1.4 cm–1.8 cm
Color	156D
Color with bloom	Violet Blue (98A)
Color without bloom	Blue (103A)
Pediceal scar size	1.44 mm
Pediceal length	2 mm–3 mm
Pediceal color	Green (143B)
Average weight	1.5 gm

In trials in Michigan and Oregon, Liberty has consistently had better color, was firmer and had a better picking scar than Elliott (Tables II and III). They also had greatly improved flavor. In several post-harvest trials, the relative fruit rot susceptibility of the Elliott and Liberty genotypes was similar and good (Table IV). Liberty proved to have a dramatically longer storage life than Elliott in 2000 and a slightly longer one in 2001. It is not known why Liberty stored so much better in 2000 than 2001 and 2002, except

that temperatures during the harvest period were exceptionally hot in the latter two years. The fruit are eaten fresh, frozen or processed into products like jams, jellies and yogurt.

Liberty is distinguishable from Aurora (co-pending application Ser. No. 10/350,345, filed Jan. 23, 2003) in that Liberty is first harvested about 10–14 days before Aurora (mid-August vs. late August to early September in Michigan). Liberty leaves are serrated, while Aurora leaves are entire. The bush height/width ratio of Liberty is about 1.4, while Aurora's is about 1.1.

Liberty is distinguishable from Draper (co-pending application Ser. No. 10/350,344, filed Jan. 23, 2003) in that Liberty is harvested 6–7 weeks after Draper (mid-August vs. late June–early July in Michigan) Liberty has a bush height/ratio of about 1.4, while Draper's is about 2.2. Liberty's leaves are elliptic-ovate (leaf/length ratio is >2), while Draper leaves are narrow elliptic (leaf/length ratio is <2) Liberty leaves are serrated, while Draper leaves are entire.

TABLE II

Characteristics of mature 'Liberty' in comparison to 'Elliott' at Benton Harbor, MI in 2001 and 2002. All values were the same in both years, except for harvest date. The rating scale was 1–9, with 1–4 = inferior, 5–6 = acceptable, 7 = good, 8 = very good and 9 = superior.		
Traits	Liberty	Elliott
<u>Horticultural</u>		
Date of first harvest	8/18 and 8/22	8/23 and 8/27
Fruit load	7	8
Size	7	6
Color	8	6
Picking scar	8	7
Firmness	8	7
Flavor	8	5
<u>Taxonomy</u>		
Leaf margin	serrated	entire
Leaf shape	elliptic-ovate	elliptic
Leaf length/width ratio	>2	<2
Bush diameter/width ratio	1.4	1.4
Fall color on 1-year shoots	red and green	solid red
Bark texture-mature wood	rough and flacky	rough

TABLE III

Mean fruit ratings of 'Liberty' and 'Elliott' at Grand Junction, MI, Corvallis, OR and Lowell, OR in 2002. Plants were set as two-year-old rooted cuttings in 2000. Evaluations were made when the bushes were 50% ripe.							
Location	Cultivar	Fruit load	Size	Color	Picking scar	Firmness	Flavor
Grand Junction	Liberty	7 ^z	7	8	8	8	8
	Elliott	8	6	6	7	7	5
Corvallis	Liberty	8	7	8	8	8	8
	Elliott	9	6	7	7	7	6

TABLE III-continued

Mean fruit ratings of 'Liberty' and 'Elliott' at Grand Junction, MI, Corvallis, OR and Lowell, OR in 2002. Plants were set as two-year-old rooted cuttings in 2000. Evaluations were made when the bushes were 50% ripe.							
Location	Cultivar	Fruit load	Size	Color	Picking scar	Firmness	Flavor
Lowell	Liberty	8	7	8	8	8	8
	Elliott	9	6	7	7	7	6

^zThe rating scale 1–9, with 1–4 = inferior, 5–6 = acceptable, 7 = good, 8 = very good and 9 = superior.

TABLE IV

Postharvest storage life and fungal rots of 'Elliott' and 'Liberty' harvested at Benton Harbor, MI. Fruit were picked on the same day, when the bushes were 30–40% ripe.		
Determinations	Liberty	Elliott
<u>Percentage of fruit rotted^x</u>		
2000	4%	12%
2001	16%	12%
2002	11%	10%
<u>Types of fruit rots in 2002^y</u>		
Alternaria	6	6
Colletotrichum	2	4
Botrytis	2	0
<u>Storage life (days)^z</u>		
2000	35	7
2001	14	7
2002	7	7

^xFour pints of fruit were evaluated after being held for 3 weeks at 2 C in zip-lock storage bags. Fungal species were not determined.

^yFifty fruit were randomly selected from 4 pints and held for ten days at room temperature.

^zFour pints of fruit were held at 2 C in plastic zip-lock bags and examined at 7 day intervals. The containers were considered non-salable, if more than a few fruit appeared rotten or >25% were soft to the touch.

Elliott and Liberty have high contents of phenolics and antioxidants relative to other blueberry varieties. A comparison of phenolics and antioxidants of various blueberry varieties is provided in Table V.

TABLE V

Mean values for antioxidant activity, total phenolic content and anthocyanin content of fully ripe, fresh blueberries (Source - Conner, A. M., J. J. Luby, J. F. Hancock, S. Berkheimer and E. J. Hanson. 2002. J. Agric. Food Chem. 50: 893–898.			
Cultivar	Antioxidant activity ^x	Phenolic content ^y	Anthocyanin content ^z
Bluecrop	11.1	402	123
Bluegold	13.1	492	181
Brigetta	9.0	335	132
Elliott	14.3	515	191
Jersey	7.8	336	121
Legacy	12.2	470	143
Liberty	14.2	494	202
Nelson	9.0	376	93
Tukey's HSD	3.7	118	52

^xμmol TE g⁻¹ fresh fruit

^ymg chlorogenic acid equivalents/100 g fresh fruit

^zmg cyanidin 3-glucoside equivalents/100 g fresh fruit

What is claimed is:

1. A new and distinct highbush blueberry plant, substantially as illustrated and described herein.

* * * * *



Fig. 1



Fig. 2

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : PP 15,146 P2
DATED : September 14, 2004
INVENTOR(S) : James F. Hancock

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 3,

Line 46, "a is" should be -- is a --.

Column 5,


Line 44, "flacky" should be -- flaky --.

Column 6,

Line 29, "tor" should be -- for --.

Signed and Sealed this

First Day of February, 2005

A handwritten signature in black ink on a light gray dotted background. The signature reads "Jon W. Dudas" in a cursive style.

JON W. DUDAS

Director of the United States Patent and Trademark Office