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(12) **United States Plant Patent**
Trigiano et al.

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(45) **Date of Patent: Dec. 29, 2020**

(54) ***CORNUS KOUSA* TREE NAMED 'MELISSA'S MOUNTAIN SNOWFALL'**

(50) Latin Name: ***Cornus kousa***
Varietal Denomination: **Melissa's Mountain Snowfall**

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(73) Assignee: **UNIVERSITY OF TENNESSEE RESEARCH FOUNDATION**, Knoxville, TN (US)

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

(21) Appl. No.: **16/602,154**

(22) Filed: **Aug. 15, 2019**

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A01H 5/02 (2018.01)
A01H 6/00 (2018.01)
A01H 5/04 (2018.01)

(52) **U.S. Cl.**
USPC **Plt./220**
CPC ***A01H 5/02*** (2013.01); ***A01H 5/04*** (2013.01); ***A01H 6/00*** (2018.05)

(58) **Field of Classification Search**
USPC Plt./220
CPC ... A01H 5/02; A01H 5/00; A01H 5/04; A01H 6/00
See application file for complete search history.

(56) **References Cited**

PUBLICATIONS

Wadl, P. A. et al. "Three New Cultivars of *Cornus kousa*: Empire, Pam's Mountain Bouquet, and Red Steeple" *HortScience*, Sep. 2014, pp. 1230-1233, vol. 49, No. 9.

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(74) *Attorney, Agent, or Firm* — Saliwanchik, Lloyd & Eisenschenk

(57) **ABSTRACT**

A new and distinct cultivar of flowering dogwood tree, which has fused bracts is provided. This dogwood tree is botanically known as *Cornus kousa* and referred to by the following cultivar name: 'Melissa's Mountain Snowfall'.

3 Drawing Sheets

Specification includes a Sequence Listing.

This invention was made with Government support under Contract No. NACA-58-6062-6 awarded by the U.S. Department of Agriculture. The Government has certain rights in the invention.

Latin name of the genus and species: *Cornus kousa.*

Variety denomination: 'Melissa's Mountain Snowfall'.

The Sequence Listing for this application is labeled "Seq-List.txt" which was created on Nov. 1, 2019 and is 4 KB. The entire content of the sequence listing is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

The present invention relates to a new and distinct dogwood cultivar, which has fused bracts. This dogwood is botanically known as *Cornus kousa* 'Melissa's Mountain Snowfall', hereinafter referred to as 'Melissa's Mountain Snowfall'. The unique characteristic of this variety is the non-overlapping fusion of the bracts, shape of the tree, and bark characteristics.

This new dogwood cultivar was discovered in a planting of seedlings in the University of Tennessee Arboretum in Oak Ridge, Tenn. 'Melissa's Mountain Snowfall' is a half-sibling of 'Pam's Mountain Bouquet' (U.S. Plant Pat. No. 25,575; Wadl et al., 2014, HortScience 49(9):1230-1233).

Asexual reproduction of 'Melissa's Mountain Snowfall' in Belvidere, Tenn. was by axillary bud grafting onto a generic *Cornus kousa* seedling rootstock and has shown that the unique features of this new dogwood cultivar are stable and reproduced true-to-type in successive vegetative generations.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**. Photograph of a 'Melissa's Mountain Snowfall' tree that is approximately 30 years old. The spread of this tree is about 7 meters. Colors in the photograph may differ from actual colors due to lighting and light reflectance.

FIG. **2**. Photograph of enlarged view of bracts on 'Melissa's Mountain Snowfall'.

FIG. **3**. Photograph of the unripe fruit of 'Melissa's Mountain Snowfall'. Also shown are the paper collars of the dried bracts that remain on the petioles and around the fruit.

FIG. **4**. Photograph of the ripe fruit of 'Melissa's Mountain Snowfall'.

FIG. **5**. Photograph showing the exfoliating bark on the trunk of older specimens of 'Melissa's Mountain Snowfall'.

DETAILED DESCRIPTION OF THE NEW VARIETY

A new and distinct cultivar of flowering dogwood having fused bracts is provided. This dogwood tree cultivar is

botanically known as *Cornus kousa* and referred to by the cultivar name: 'Melissa's Mountain Snowfall'. This cultivar exhibits insect resistance and disease resistance, particularly to powdery mildew caused by *Erysiphe pulchra*. Dogwood anthracnose caused by *Discula destructiva* has never been observed on 'Melissa's Mountain Snowfall'.

The subject cultivar is different compared to the *Cornus kousa* varieties 'Red Steeple' and 'Empire'. The following Table 1 sets forth the difference between these cultivars and 'Melissa's Mountain Snowfall':

TABLE 1

Characteristics of 'Melissa's Mountain Snowfall' compared with two similar cultivars

'Melissa's Mountain Snowfall'	'Red Steeple'	'Empire'
Habit Spreading	Narrow Linear - short columnar	Narrow linear Tall Columnar
Fused Bracts	Non-fused bracts	Non-fused bracts
Large Bracts white	Small bracts - some pink margin	Small bracts

This new and distinct dogwood tree cultivar was discovered in a planting of seedlings within the Arboretum at the University of Tennessee located in Oak Ridge, Tenn. The subject dogwood tree cultivar is a half-sibling of the *Cornus kousa* dogwood cultivar known as 'Pam's Mountain Bouquet'. Table 2 shows the observed phenotypic similarities and differences between the two cultivars.

TABLE 2

General phenotypic differences between the dogwood cultivars 'Melissa's Mountain Snowfall' and 'Pam's Mountain Bouquet'.

'Melissa's Mountain Snowfall'	'Pam's Mountain Bouquet'
About 80% of all bracts on the cultivar exhibit some degree of fusion	About 82% of all bracts on the cultivar exhibit some degree of fusion
Resistance to Disease and Insect Damage	Resistance to Disease and Insect Damage
Exfoliating bark in older specimens**	No exfoliating bark
Inverted pyramidal growth habit**	Spreading growth habit
Multiple leaders**	Single leader
Six meters in height**	3-4 meters in height

(** = Key differences)

In addition to the phenotypic differences listed above, it has also been observed that the alleles of the two cultivars differ at 5 of 8 selected loci. Asexual reproduction of 'Melissa's Mountain Snowfall' by grafting of axillary buds onto generic *Cornus kousa* seedling rootstocks has shown that the unique features of this new dogwood cultivar are stable and reproduced true-to-type in successive generations.

DETAILED BOTANICAL DESCRIPTION

The following observations, measurements and comparisons describe the cultivar 'Melissa's Mountain Snowfall' grown in Oak Ridge, Tenn. Trees used for this description were about thirty (30) years old. Plant hardiness is expected to be zones 3-9. The color characteristic descriptions use color references to The Royal Horticultural Society (R.H.S.) Colour Chart, The Royal Horticultural Society, London, UK, 4th Edition, 2001, except where general terms of ordinary dictionary significance are used. It has been determined that alleles differ at 5 of 8 loci shared by 'Melissa's Mountain Snowfall' and 'Pam's Mountain Bouquet', as shown in Table 3.

TABLE 3

Allelic Comparison of 'Melissa's Mountain Snowfall' and 'Pam's Mountain Bouquet' at specified loci

Locus	'Melissa's Mountain Snowfall' (bp size for each allele)	'Pam's Mountain Bouquet' (bp size for each allele)
CK005*	228:228	222:247
CK072*	113:122	113:117
CK058*	152:152	148:148
CK031	140:140	140:140
CK040*	102:102	94:94
CK029	90:102	90:102
CK015*	119:122	130:136
CK047	128:128	128:128

Table 4 indicates the primer sequences and microsatellite markers (or single sequence repeats—SSR) in 'Melissa's Mountain Snowfall' compared with the same microsatellite markers (SSR) in 'Pam's Mountain Bouquet.' Those loci indicated with an asterisk (*) differ between the two cultivars.

TABLE 4

Primer Sequences and Microsatellite markers compared between 'Melissa's Mountain Snowfall' and 'Pam's Mountain Bouquet'

GenBank Accession No.	Locus	Microsatellite Repeat Sequences: Primer Sequence (5'-3')	Repeat Motif
EU544308	CK005*	F:GCATTTGTCCTTTGTTTGACAT (SEQ ID 1) R:TTTTTCGCGAAGTGTTCTCTAC (SEQ ID 2)	$(AC)_{20}$
EU125523	CK015*	F:GTCAAATTTTTGATCTTTCTCTCT (SEQ ID 3) R:GGAGAGACAGAGTACAGTAGAGGT (SEQ ID 4)	$(CT)_{10}$
EU125524	CK029	F:AATTTAGGTTAAGGTTTTGATTTG (SEQ ID 5) R:AGAGAGAATAGGTTACAGCATCAT (SEQ ID 6)	$(TC)_{8}$
EU125525	CK031	F:TGTCACTGCTTACAGAAACAAT (SEQ ID 7) R:TATGACGAGATTGTATAAGTTGCT (SEQ ID 8)	$(CT)_{7}$
EU125526	CK040*	F:CCAAGTCAGTTTGGTAGTAATTC (SEQ ID 9) R:AGTGCAACTTTTACTTGCTATGT (SEQ ID 10)	$(GT)_{16}$
EU544309	CK058*	F:CTTAAGTCACAAAGACAATGAAAT (SEQ ID 11) R:AAGAGAGTTCAGATTTATCTTTGC (SEQ ID 12)	$(GT)_{10}$
EU544312	CK072*	F:AGCACTCATAGTCCTTGCAC (SEQ ID 13) R:GTTAAAACGAAGAAGATACAACAA (SEQ ID 14)	$(GT)_{10}$

TABLE 4-continued

Primer Sequences and Microsatellite markers compared between 'Melissa's Mountain Snowfall' and 'Pam's Mountain Bouquet'

GenBank Accession No.	Locus	Microsatellite Repeat Sequences: Primer Sequence (5'-3')	Repeat Motif
EU125528	CK047	F:GAAAGAGATAAAAGATGGTTCAAT (SEQ ID 15) R:CTTATAGAGTAAGCCCACCATC (SEQ ID 16)	$(AC)_6$

The cultivar 'Melissa's Mountain Snowfall' has some similarity in phenotypic characteristics to the cultivar 'Pam's Mountain Bouquet' (Wadl et al., 2014). The following Table 5 provides a comparison of each cultivar for those characteristics that have been observed. Measurements are provided as an average (with ranges also provided as indicated):

TABLE 5

Characteristics of 'Melissa's Mountain Snowfall' and Pam's Mountain Bouquet'
Color Descriptions are based upon the Royal Horticultural Society's (RHS) colour chart, 4th Edition 2001.

	Character	'Melissa's Mountain Snowfall'	'Pam's Mountain Bouquet'
1	Tree form (observation)	Inverted pyramidal	spreading
2	Tree height (observation)	5-6 meters height and about a 7 meter spread	low (about 3-4 meters; spread about 4-5 meters, and dependent on age and environment)
3	Branch thickness (measurement) Thickness in the middle portion of a plant	Medium Variable, dependent on age	medium (age dependent)
4	Color of current Shoot (observation) Current shoot color in the middle portion of a plant	Green 144A turning Greyed-Green 197A	Green 143B
5	Branch color (observation) Current branch color in the middle portion of a plant by second year	Mixture of 156A, 197B, 198B, 200C and 200D	Greyed-Green 198B
6	Dark spots on Branch (observation) Presence of dark spots on the branch	Absent	Absent
7	Branching (observation) Density of branching	High	High
8	Internode length (measurement) Internode length in the middle portion of a plant	Mostly short, but some intermediate (variable + 6-9 cm)	Short

TABLE 5-continued

Characteristics of 'Melissa's Mountain Snowfall' and Pam's Mountain Bouquet'
Color Descriptions are based upon the Royal Horticultural Society's (RHS) colour chart, 4th Edition 2001.

	Character	'Melissa's Mountain Snowfall'	'Pam's Mountain Bouquet'
9	Whole shape of leaves (observation) see FIGS. 2, 3 and 4 Whole shape of a leaf in the middle portion of a plant	Obovate	Obovate
10	Shape of leaf tip (observation) see FIG. 2 Tip shape of a leaf in the middle portion of a plant	Acuminate	Acuminate
11	Shape of leaf Base (observation) see FIG. 2 Base shape of a leaf in the middle portion of a plant	Truncate	Truncate
12	Shape of leaf Margin (observation) Shape of a leaf margin in the middle portion of a plant	Entire	Entire
13	Leaf rolling (observation) see Fig. 4	Typically none, but some inward	Rolling inward
14	Leaf curvature (observation)	Mostly flat	Flat
15	Leaf margin Undulation (observation)	Some leaves undulating	None
16	Leaf length (measurement) Length from the tip to the base of mature leaf	Averages 87.1 mm	Long (about 100-400 mm)
17	Leaf width (measurement) The maximum width of mature leaf	Mean 44.4 mm	Narrow (about 40-50 mm)
18	Leaf thickness (observation) Thickness of mature leaf	Medium	Medium
19	Bud color (observation) Color of bud just after sprouting	Green 138B, unopened; Green 132D, opened; infrequently Yellow-Green 151C	Greyed-red 179A
20	Immature leaf color (observation)	Not observed	Green 135B
21	Presence of anthocyanin (observation) Coloration by anthocyanin on the immature leaf upperside	Absent	Absent
22	Color of leaf upperside (observation) Color of mature leaf upperside	Green 143A	Green 143B
23	Color of leaf Lower side (observation) Color of mature leaf lower side	Green 143B; Green 143C	Yellow-Green 146B

TABLE 5-continued

Characteristics of 'Melissa's Mountain Snowfall' and Pam's Mountain Bouquet'
Color Descriptions are based upon the Royal Horticultural Society's (RHS) colour chart, 4th Edition 2001.

	Character	'Melissa's Mountain Snowfall'	'Pam's Mountain Bouquet'
24	Seasonal change of a mature leaf (observation)	Changed	Changed
25	Color of leaves in autumn (observation)	Yellow to Red (Variable) Changes in Leaf Fall Color 10C-46A	Red 10C-46A
26	Leaf variegation (observation) Variegation on leaf upper side	Not variegated	Not variegated
27	Variegation pattern (observation) Pattern of variegation on a leaf upperside	NA	NA
28	Variegation color (observation)	NA	NA
29	Seasonal change of variegation color (observation)	NA	NA
30	Hair on leaf upperside (observation) Hair density on a mature leaf upperside	None	None
31	Hair on leaf lowerside (observation) Hair density on a mature leaf lowerside	None	None
32	Petiole length (measurement) Length from the base of blade to the base petiole	Short about 10.4 mm; unequal at base, about 5-7 mm longer on one side	Short (about 15-25 mm)
33	Petiole width (measurement) The maximum width of a mature leaf petiole	Medium (<7 mm)	Medium (<8 mm)
34	Petiole color (observation)	Green 143A-143C	Green 143B
35	Inflorescence type (observation)	Umbel	Umbel
36	Inflorescence direction (observation)	Upright	Upright
37	Inflorescence diameter (observation)	Average about 31.7 mm	Medium (diagonal mean length = 74 mm; mean width = 53 mm)
38	Flower diameter (measurement)	Small; Each about 5-7 mm	Small
39	Floret color (observation)	Yellow-Green 151A	Yellow-Green 150C
40	Bract type (observation)	80% are fused, but variable (See Table 6)	83% are fused, but variable (See Table 2)
41	Uniformity of bract size (observation)	Not uniform	Not uniform
42	Bract overlapping (observation)	No overlap of unfused bracts	No overlap of unfused bracts
43	Bract orientation (observation)	Recurved, Reflexed, or Flat	Recurved, Reflexed, or Flat
44	Bract rolling (observation)	Varies (may roll inward or outward)	Varies (may roll inward or outward)
45	Degree of bract rolling (observation)	Medium	Strong
46	Bract curvature (observation)	Varies (can be recurved, flat, or reflexed)	Varies (can be recurved, flat, or reflexed)

TABLE 5-continued

Characteristics of 'Melissa's Mountain Snowfall' and Pam's Mountain Bouquet'
Color Descriptions are based upon the Royal Horticultural Society's (RHS) colour chart, 4th Edition 2001.

	Character	'Melissa's Mountain Snowfall'	'Pam's Mountain Bouquet'
47	Bract twisting (observation)	None	None
48	Whole shape of bracts (observation)	Ovate	Ovate
49	Shape of bract apex (observation)	Acuminate	Acuminate
50	Unfused bract length (measurement)	Inner Bract Average 48 mm; Outer Bract Average 43 mm	Medium
51	Unfused Bract width (measurement)	Inner Bract Average 27 mm; Outer Bract Average 28 mm	
52	Number of bracts (measurement)	4 FUSED; Diameter average 89.5 mm, all four bracts fused, after flowering remains as a papery collar (Grey-Brown 199D) at base of the petiole	FUSED, but 4
53	Bract color (measurement)	Green-White 157B	White 155A (immature: Green-White 157A)
54	Bract variegation (observation)	Not variegated	Not variegated
55	Variegation pattern (observation)	NA	NA
56	Variegation color (measurement)	NA	NA
57	Pistil color (observation)	Yellow green 148C	Yellow green (Not coded)
58	Stigma color (observation)	Green (N138B)	Dark Green (Not Coded)
59	Peduncle thickness (measurement)	Medium	Medium
60	Peduncle length (measurement)	Average 69 mm	Long (mean of 68 mm)
61	Peduncle color (observation)	Green 143C	Yellow-Green 144B
62	Fruit shape (observation)	Globose	Globose
63	Fruit length (measurement)	About 28.7-29.3 mm	Medium (about 40 mm)
64	Fruit width (measurement)	About 28.7-29.3 mm	Medium (about 4.0 mm)
65	Fruit color (observation)	Green 134N, Fall; Red-Purple 60D-61A, when ripe in October	Unripe: Green 143B; Ripe: Orange-Red 33B to 43A. Highly variable depending on ripeness
66	Fragrance (observation)	None	Absent
67	Seed fertility (observation)	Not observed	High
68	Time to the first flowering (observation)	Medium (Mid-April-late May)	Medium (April-mid-May)
69	Blooming habit (observation)	Prolific	Many
70	Flowering season (observation)	One season	One season flowering
71	Flowering time (observation)	About 5-6 weeks	About 5-6 weeks
72	Deciduous or evergreen (observation)	Deciduous	Deciduous
73	Cold hardiness (observation)	To −20° C.	Medium (to −20° C.-no effect)

TABLE 5-continued

Characteristics of 'Melissa's Mountain Snowfall' and Pam's Mountain Bouquet'
Color Descriptions are based upon the Royal Horticultural Society's (RHS) colour chart, 4th Edition 2001.

	Character	'Melissa's Mountain Snowfall'	'Pam's Mountain Bouquet'
74	Heat tolerance (observation)	Strong (to 40° C.-no effect)	Strong (to 40° C.-no effect)
75	Pest resistance (observation)	No specific pests noted spots of brown anthracnose (Unidentified etiology - no control measures necessary) Brown N200A	Strong some leaf (no specific pests noted)
76	Disease resistance (observation)	Strong resistant to dogwood anthracnose and powdery mildew; some spot anthracnose especially on bracts	Strong resistant to dogwood anthracnose and powdery mildew; some spot anthracnose especially on bracts
77	Bark color	Exfoliating bark Greyed-Orange 177B and Green 143C; exfoliating areas Greyed-Brown 199C-199D	Greyed-Green 198B
78	Bark texture	Exfoliating	Smooth
79	Angle of emerging branches	20°-35° from vertical stem	20°-30° from vertical stem
80	Time to first leaf bud burst	Mid- to late-April	Mid- to late-April
81	Leaf Vein color (bottom side)	Yellow-Green 145B	Greyed-Green 192A
82	Immature Leaf color	Similar to fully expanded leaf color	Similar to fully expanded leaf color
83	Bract base	Truncate	Truncate
84	Bract margin	Entire	Entire
85	Vestiture	Puberulous, reticulate	Puberulous, reticulate
86	Flower/ inflorescence number	Mean = 31	Mean = 34
87	Seed shape	Flattened along length	Flattened along length
88	Seed color	Greyed Yellow 162D	Greyed Yellow 162D
89	Seed number	0-17 per fruit	0-17 per fruit
90	Bloom duration	3-5 weeks (dried, dead bracts are retained as a "collar" on peduncle until fruit fall in Autumn)	3-5 weeks (dried, dead bracts are retained as a " collar" on peduncle until fruit fall in Autumn)

TABLE 5-continued

Characteristics of 'Melissa's Mountain Snowfall' and Pam's Mountain Bouquet'
Color Descriptions are based upon the Royal Horticultural Society's (RHS) colour chart, 4th Edition 2001.

	Character	'Melissa's Mountain Snowfall'	'Pam's Mountain Bouquet'
91	Time of fruit ripening	Begins mid-August and Ripe in October	Begins mid- to late-August through October
92	Trunk diameter (at base)	Multiple stem variable. About 10-14 cm; numerous lenticels	18 cm at 15 years of age
93	Anther color	Purple N79B	Greyed-purple N186A
94	Flower petal color	Yellow-green 145C	Yellow-green 145C
95	Style/Stigma description	Inconspicuous	Inconspicuous

Botanical classification: *Cornus kousa* 'Melissa's Mountain Snowfall'.

Unique features: This tree features prolific flowering and exhibits fused bracts. About 80% of all bracts on the cultivar exhibit some degree of fusion (one side, two sides or three to four sides being fused), as shown in Table 6.

TABLE 6

Types of fused bracts observed on 'Melissa's Mountain Bouquet'

Year	Not fused	Two sides fused	3 sides fused	Fully Fused
2016 (n = 101)	29 (29%)	23 (23%)	17 (17%)	32 (32%)
2017 (n = 145)	39 (27%)	28 (19%)	33 (23%)	45 (31%)
2019 (n = 123)	7 (6%)	12 (10%)	14 (11%)	90 (73%)
Mean	25 (20.7%)	21 (17.3%)	21 (17.0%)	55.7 (45.3%)

Disease susceptibility: None noted. Powdery mildew caused by *Erysiphe pulchra* was not observed. There was some minor occurrence of spot anthracnose on bracts caused by *Elsinoe cornii* observed in 2017-2019. Most spots were discrete, less than 1 cm in diameter and various hues in the red-purple group N74C-D. Cold damage may also result in discoloration of bracts similar to spot anthracnose or over larger areas. Dogwood anthracnose caused by *Discula destructiva* has never been observed on 'Melissa's Mountain Snowfall'.

Insect damage: Minor insect damage on leaves.

REFERENCES

Wadl, P. A., M. T. Windham, R. E. Evans, and R. N. Trigiano. 2014. Three new cultivars of *Cornus kousa*: Empire, Pam's Mountain Bouquet, and Red Steeple. HortScience 49(9):1230-1233.

SEQUENCE LISTING

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The invention claimed is:

1. A new and distinct cultivar of Dogwood tree, *Cornus kousa*, named 'Melissa's MOUNTAIN Snowfall', as illustrated and described.

* * * * *

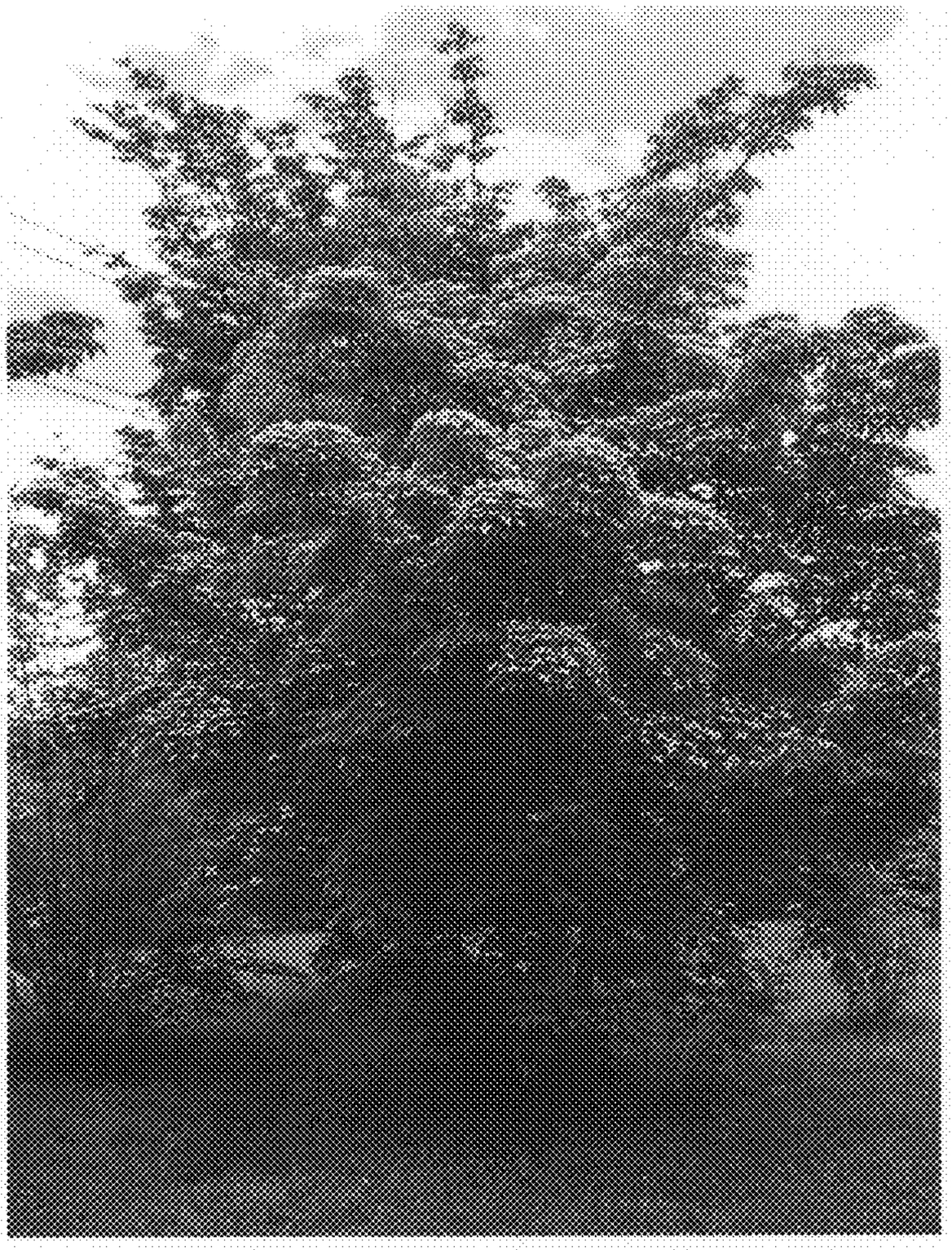

FIG. 1

FIG. 2

FIG. 3

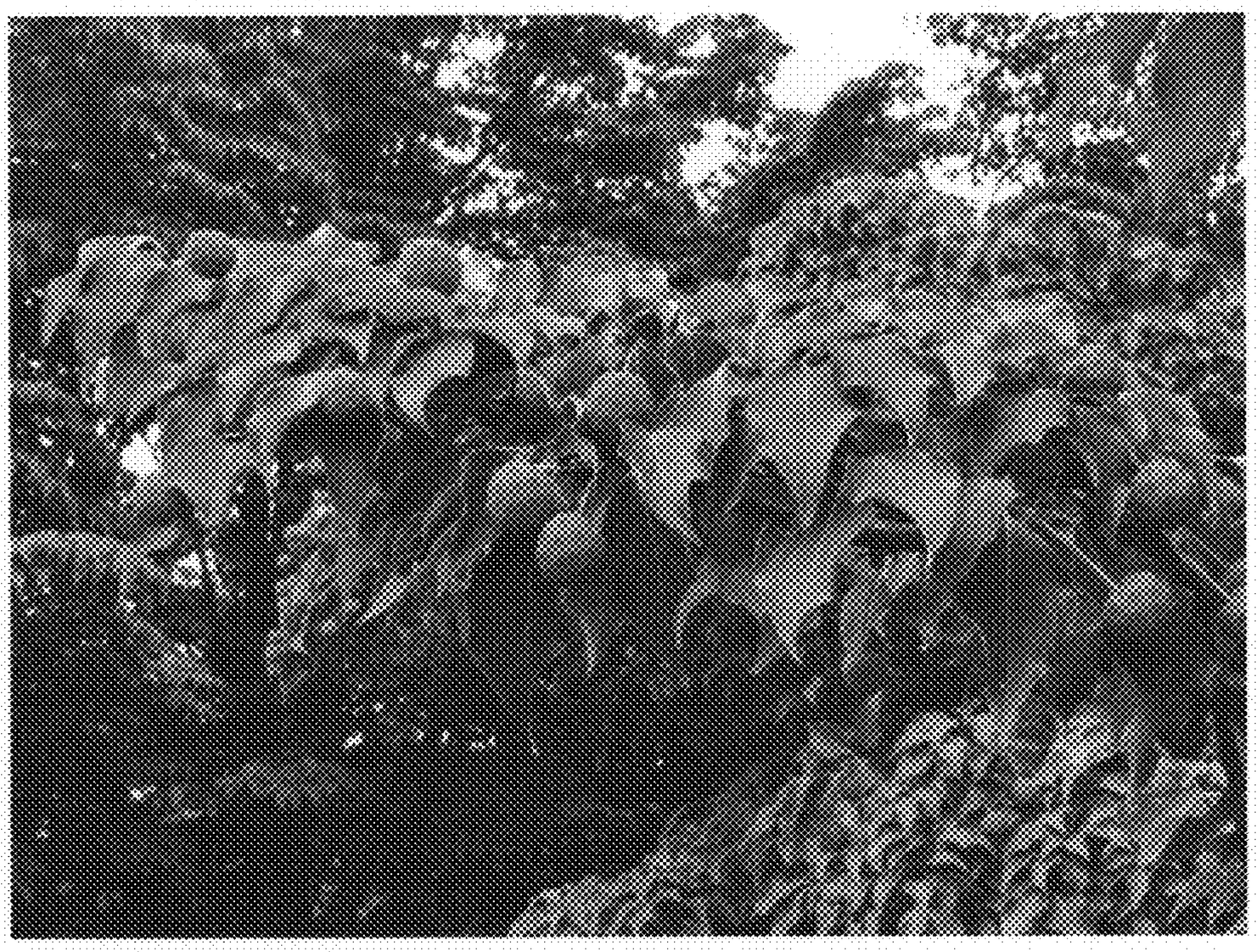

FIG. 4

FIG. 5

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : PP32,706 P3
APPLICATION NO. : 16/602154
DATED : December 29, 2020
INVENTOR(S) : Robert N. Trigiano and Sarah Lynn Boggess

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

In the Specification

Column 8,
Line 47, Row 65, 'Melissa's Mountain Bouquet' column, "Green 134N" should read
--Green N134A--.
Line 48, Row 65, 'Pam's Mountain Bouquet' column, "33B to 43A" should read
--33B to Red 43A--.

Column 9,

Lines 12-15, Row 75,	"No specific pests noted spots of brown anthracnose	Strong some leaf (no specific pests noted)" should read
	--No specific pests noted some leaf spots of brown anthracnose--.	Strong (no specific pests noted)

Signed and Sealed this
Third Day of August, 2021

Drew Hirshfeld
Performing the Functions and Duties of the
Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office