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(54) **CORYLUS PLANT NAMED ‘BURGUNDY LACE’**

(50) Latin Name: ***Corylus avellana cultivar***
Varietal Denomination: **Burgundy Lace**

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(57) **ABSTRACT**

A new and distinct *Corylus* plant named ‘Burgundy Lace’
characterized by rich dark burgundy-colored developing
leaves and burgundy-colored fully expanded leaves during
the spring and summer; deeply dissected leaves; burgundy
color of the catkins and leaf buds; moderate vigor and
upright-spreading plant habit; resistance to eastern filbert
blight (EFB) caused by the fungus *Anisogramma anomala*
(Peck) E. Müller; presence of random amplified polymor-
phic DNA markers 152-800 and 258-580 in DNA; expres-
sion of incompatibility alleles S₆ and S₂₀ in the styles;
catkins that are abnormal and small, and produce little
pollen; and DNA fingerprints at 14 of 24 microsatellite
marker loci differ from ‘Cutleaf’.

9 Drawing Sheets

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SUPPORT**

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awarded by the United States Department of Agriculture.
The government has certain rights in the invention.

Botanical denomination: *Corylus avellana* cultivar.
Variety designation: ‘Burgundy Lace’.

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BACKGROUND

The present disclosure relates to a new and distinct
cultivar of *Corylus* plant, botanically known as *Corylus
avellana*, and hereinafter referred to by the name ‘Burgundy
Lace’.

The new *Corylus* resulted from a controlled cross of
female parent OSU 562.034 (unpatented)×OSU 562.062
(unpatented) made in 1998 to create a new ornamental
cultivar (FIG. 1). OSU 562.034 is from a cross of ‘Cutleaf’×

VR6-28 (unpatented), and OSU 562.062 is from a cross of 'Cutleaf' x Redleaf #3 (unpatented). The grandparent 'Cutleaf' (unpatented) is known as *Corylus avellana* f. *heterophylla*, for which the form names *laciniata*, *urticifolia*, *quercifolia* and *incisa pinnatifida* are also used. VR6-28 is from a cross of 'Riccia di Talanico' x 'Gasaway', and carries a dominant allele for a very high level of resistance to eastern filbert blight (EFB) from 'Gasaway' (unpatented). OSU 562.062 and Redleaf #3 carry a dominant allele for leaf anthocyanin. Redleaf #3 is an open-pollinated seedling of 'Barcelona' (unpatented). The pollen parent is believed to be the Redleaf 'Rode Zeller' (syn. 'Rote Zellernuss') (unpatented).

Hybrid seeds from the controlled cross were harvested in August 1998, stratified, and the resulting seedlings grown in a glasshouse during the summer of 1999. Seedlings that combined red leaf color and the 'Cutleaf' trait were preferred, and 38 of the 40 seedlings planted in the field in October 1999 combined these two traits. 'Burgundy Lace' was discovered and selected as a single plant within the progeny of the stated cross-pollination in a controlled environment in Corvallis, Oreg., USA. The new variety was originally assigned the designation OSU 954.076, which indicates the row and tree location of the original seedling.

The new cultivar was asexually reproduced by rooted suckers annually for five years (2005, 2006, 2008, 2011 and 2013) in Corvallis, Oreg. The unique features of this new *Corylus* are stable and reproduced true-to-type in successive generations of asexual reproduction.

SUMMARY

The following traits have been observed and are determined to be the unique characteristics of 'Burgundy Lace'. These characteristics in combination distinguish 'Burgundy Lace' as a new and distinct cultivar:

1. Rich dark burgundy-colored developing leaves and burgundy-colored fully expanded leaves during the spring and summer.
2. Deeply dissected leaves.
3. Burgundy color of the catkins and leaf buds.
4. Moderate vigor and upright-spreading plant habit.
5. Resistance to eastern filbert blight (EFB) caused by the fungus *Anisogramma anomala* (Peck) E. Müller.
6. Presence of random amplified polymorphic DNA markers 152-800 and 268-580 in DNA of 'Burgundy Lace' amplified by the polymerase chain reaction. These two markers are linked to a dominant allele for resistance to eastern filbert blight from the cultivar 'Gasaway' (unpatented).
7. Expression of incompatibility alleles S₆ and S₂₀ in the styles.
8. Catkins that are abnormal and small, and produce little pollen.
9. DNA fingerprints of 'Burgundy Lace' differ from 'Cutleaf' at 14 of 24 microsatellite marker loci. Additional DNA fingerprints of 'Gasaway' and 'Rode Zeller', which are ancestors of 'Burgundy Lace', and 12 other reference cultivars, are shown in Table 7.

'Burgundy Lace' is well-suited to the ornamental market. 'Burgundy Lace' combines red leaf color, deeply dissected leaves, and resistance to eastern filbert blight (EFB) caused by *Anisogramma anomala* (Peck) E. Müller. Comparisons in two trials conducted in Corvallis, Oreg., plants of 'Burgundy Lace' in the guard rows differed from plants of the *Corylus*

avellana cultivars 'Barcelona' (unpatented) and 'Jefferson' (unpatented), and other cultivars and selections of *Corylus avellana* known to the Inventors primarily in nut size, nut shape, kernel percentage (ratio of kernel weight to nut weight), frequency of defects (blank nuts, moldy kernels, twins, etc.), time of pollen shed, time of nut maturity, length of the husk or involucre, and plant size.

The tree is moderately vigorous, similar in size to 'Jefferson', and has a desirable upright-spreading growth habit that should be easy to manage in a landscape setting. The nuts are small and the kernels are edible, but nut yields are low and quality is not suitable for the kernel market. 'Burgundy Lace' has far fewer blanks (shells lacking kernels) than 'Cutleaf'. 'Burgundy Lace' has intermediate ratings for bud mite (primarily *Phytoptus avellanae* Nal.), similar to 'Clark'. Like its grandparent 'Cutleaf', catkins of 'Burgundy Lace' shed very little pollen. Pollen shed and female receptivity are late.

DNA markers and field observations indicate that 'Burgundy Lace' has resistance to eastern filbert blight (EFB) caused by the fungus *Anisogramma anomala* (Peck) E. Müller. The resistance is conferred by a dominant allele from 'Gasaway'. EFB is now present throughout the Willamette Valley and in the eastern USA where it naturally occurs on the wild American hazelnut (*C. americana*), but causes little damage. Pruning to remove cankers and fungicide applications are currently used to manage the disease in susceptible cultivars. Thus, 'Burgundy Lace' is suitable for planting in areas with high disease pressure.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying colored photographs illustrate the overall appearance of the new cultivar, showing the colors as true as it is reasonably possible to obtain in colored reproductions of this type. Foliage colors in the photographs may differ slightly from the color values cited in the detailed botanical description which accurately describe the colors of the new *Corylus*.

FIG. 1 is a chart showing the pedigree of hazelnut selection 'Burgundy Lace' (OSU 954.076).

FIG. 2 is a chart showing time of pollen shed (green), female receptivity (red) and leaf budbreak for 'Burgundy Lace' and 'Cutleaf' over two years for ornamental hazelnut selection.

FIG. 3 is a digital image taken at end of the 6th growing season of a tree of 'Burgundy Lace' growing in Corvallis, Oreg., in the winter, showing upright-spreading growth habit. Tree was planted in the spring of 2007.

FIG. 4 is a digital image taken in June of the 5th growing season of the original 'Burgundy Lace' tree growing in Corvallis, Oreg.

FIG. 5 is a digital image taken in June of the 5th growing season of a tree of 'Burgundy Lace' growing in Corvallis, Oreg. Tree planted in the spring of 2007.

FIG. 6 is a digital image taken in mid-August of the 5th growing season of the original 'Burgundy Lace' tree growing in Corvallis, Oreg., showing older leaves. Tree planted in the spring of 2007.

FIGS. 7-9 are digital images showing young leaves of 'Burgundy Lace' in Corvallis, Oreg. in late May.

FIG. 10 is a digital image showing nuts and husks of 'Burgundy Lace' on a branch in Corvallis, Oreg. in August of the 4th growing season.

FIG. 11 is a digital image of catkins of ‘Burgundy Lace’ with frost.

FIG. 12 is a digital image showing shoots of ‘Burgundy Lace’ grown in Corvallis, Oreg. with nuts.

FIG. 13 is a digital image showing shoots of ‘Burgundy Lace’ grown in Corvallis, Oreg. showing upper and lower leaf surfaces.

FIGS. 14-15 are digital images showing leaves, husks and nuts of ‘Barcellona’, ‘Cutleaf’ and ‘Burgundy Lace’ varieties. FIG. 14 shows the lower surface of the leaves and nuts, and FIG. 15 shows the upper surface of the leaves and nuts.

FIG. 16 is a digital image of comparing nuts of ‘Barcellona’, ‘Cutleaf’ and ‘Burgundy Lace’.

DETAILED DESCRIPTION

The cultivar ‘Burgundy Lace’ has not been observed under all possible environmental conditions. The phenotype may vary somewhat with variations in environment such as temperature and light intensity, without, however, any variance in genotype. The aforementioned photographs and following observations and measurements describe plants grown in Corvallis, Oreg. under commercial practice outdoors in the field during the fall, winter and spring. Plants used for the photographs and description were propagated by tie-off layerage and growing on their own roots, and seven or eight years old. In the following description, color references are made to The Royal Horticultural Society Colour Chart, 1966 Edition, except where general terms of ordinary dictionary significance are used.

Botanical classification: *Corylus avellana* cultivar ‘Burgundy Lace’.

Parentage:

Female, or seed, parent.—*Corylus avellana* cultivar ‘OSU 562.034’ (unpatented).

Male, or pollen, parent.—*Corylus avellana* cultivar ‘OSU 562.062’ (unpatented).

Propagation (type rooted suckers):

Time to initiate roots.—About 30 days at 20° C.

Time to produce a rooted young plant.—About six months at 22° C.

Root description.—Fine to thick; freely branching; creamy white in color.

Propagation (type whip grafting):

Time to budbreak on the scions.—About 14 days at 25° C.

Time to produce a grafted plant.—About six months at 25° C.

Plant description:

General appearance.—Perennial shrub. Upright-spreading plant habit.

Growth and branching habit.—Freely branching; about 15 lateral branches develop per plant. Pinching, that is, removal of the terminal apices, enhances branching with lateral branches potentially forming at every node.

Vigor.—Moderate vigor growth habit.

Size.—Plant height is about 5 meters; plant diameter or spread is about 5 meters.

Lateral branch description:

Length.—About 51 cm.

Diameter.—About 3.8 mm.

Internode length.—About 3.3 cm.

Texture.—Smooth, glabrous.

Strength.—Strong.

Color, immature.—152B.

Color, mature.—152B.

Foliage description:

Arrangement.—Alternate, simple.

Length.—About 11.4 cm.

Width.—About 7.4 cm.

Shape.—Cutleaf (deeply serrated).

Apex.—Obtuse to acute.

Base.—Cordate.

Margin.—Deeply serrated.

Texture, upper and lower surfaces.—Slightly pubescent.

Venation pattern.—Pinnate.

Color.—Developing foliage, upper surface 144A, lower surface 145A. Fully expanded foliage, upper surface: Spring and summer, 143A; late summer and fall, 143A. Fully expanded foliage, lower surface: Spring and summer, 139C; late summer and fall, 139C. Venation, upper surface: Spring and summer, 139C; late summer and fall, 139C. Venation, lower surface: Spring and summer, 139D; late summer and fall, 139D.

Petiole description:

Length.—About 27 mm.

Diameter.—About 1.8 mm.

Texture, upper and lower surfaces.—Pubescent.

Color, upper surface.—Spring and summer, 139D; late summer and fall, 139D.

Color, lower surface.—Spring and summer, 139D; late summer and fall, 139D.

Flower description: Male inflorescences are catkins, color prior to elongation 194C. Female inflorescence style color 048B.

Nut description:

Length.—About 19.1 mm.

Width.—About 20.7 mm.

Depth.—About 18.2 mm.

Nut shape.—Round. Nut shape index [(Width+Depth)/2*Length]=1.02. Nut compression index (Width/Depth)=1.14.

Nut shell color.—164B. Nut weight: About 1.72 grams.

Kernel weight.—About 0.76 grams.

Kernel percentage (kernel weight/nut weight).—About 44%.

Disease/pest resistance: Plants of the new *Corylus* are highly resistant to eastern filbert blight caused by the fungus *Anisogramma anomala* (Peck) E. Müller, although a few small cankers may develop under high disease pressure. Plants of the new *Corylus* are moderately susceptible to bud mites (*Phytoptus avellanae* Nal.), while plants of ‘Tonda Gentile delle Langhe’ are highly susceptible, and plants of ‘Barcelona’ are highly resistant.

Temperature tolerance: Plants of the new *Corylus* have been observed to tolerate temperatures from -21 to 38° C. in the field in Corvallis, Oreg.

Comparative data:

Tree size, growth habit, yield, and yield efficiency.—

Tree sizes in the trials were estimated by measuring trunk diameters 30 cm above the soil line, at the end of the 7th growing season (December 2013 and 2014, respectively). Trunk cross-sectional area (TCA) was calculated from trunk diameter. Trees of ‘Burgundy Lace’ are moderately vigorous, similar in size to ‘Jefferson’ (Tables 1 & 2). In previous trials, TCAs of ‘Jefferson’ and ‘Lewis’ were about 70% of ‘Bar-

celona'. Their upright-spreading growth habit of 'Burgundy Lace' trees should be easy to manage in a landscape setting. In the 2007 trial, total nut yield per tree averaged 10.04 kg for 'Burgundy Lace', which is less than the other four cultivars (Table 1). Nut yield efficiency for OSU 954.076 (0.122 kg/cm²), which adjusts for differences in tree size, was similar to 'Felix' (0.133 kg/cm²), and lower than 'Jefferson' (0.299 kg/cm²), 'Santiam' (unpatented) (0.267 kg/cm²) and 'McDonald' (0.245 kg/cm²). In the 2008 trial, total nut yield per tree averaged 11.39 kg for 'Burgundy Lace', which is more than 'Eta' (unpatented) (7.78 kg) but less than the other 13 genotypes (Table 2). Nut yield efficiency for OSU 954.076 (0.134 kg/cm²), which adjusts for differences in tree size, was similar to the pollinizer 'Theta' (unpatented) (0.149 kg/cm²), higher than 'Eta' (0.100 kg/cm²) and lower than 'Jefferson' (0.292 kg/cm²) and the others in the trial. Although 'Burgundy Lace' would generally not be planted for nut production, its nuts show a very low frequency of defects (Tables 3 & 4). In the 2007 trial, nut weight was 1.72 g and kernel percentage was 44.1%, the latter being similar to 'Barcelona' (typically 43%). The amount of fiber on the pellicle was rated on a scale of 1 (no fiber) to 4 (heavy fiber) (Table 5). The rating for 'Burgundy Lace' (2.8) was similar to 'Jefferson' (3.0) and indicates a moderate amount of fiber. Kernel blanching, or ease with which the pellicle can be removed with dry heat followed by rubbing, was rated on a scale of 1 (complete pellicle removal) to 7 (no pellicle removal). The rating for 'Burgundy Lace' (6.6) indicates that very little of the pellicle is removed by dry heat. Very few moldy kernels were observed in 'Burgundy Lace' (0.5%), in striking contrast to 'Santiam' (17.3%) (Table 3). The results from the second trial (Table 4) were nearly identical: nut weight 1.71 g, kernel percentage 44%, fiber rating 2.8, blanching rating 6.6, with 87.5% good nuts and very few defects. The kernels, raw or roasted, are not attractive.

Nut maturity date.—Most nuts of 'Burgundy Lace' are borne in clusters of two, in husks about half as long as the nuts. The nuts are slightly long and compressed. The husks open as they dry at maturity, and about 98% of the nuts fall free of the husk. When mature, the shells are medium brown in color and have pubescence at the apical end. Harvest date is estimated to be three days before 'Barcelona'.

Incompatibility and pollinizers.—'Burgundy Lace' has incompatibility alleles S₆ and S₂₀ as determined by fluorescence microscopy. Both alleles are expressed in the females, but only S₆ is expressed in the pollen because of dominance. By convention, alleles expressed in the pollen are underlined. The trees set a moderate number of catkins. The catkins are abnormal and small, as are those of 'Cutleaf', and shed very little pollen. For practical purposes, 'Burgundy Lace' is male-sterile, although collection of a handful of catkins can give a trace of pollen. Time of pollen shed and female receptivity were observed weekly from December 2012 to March 2013 and December 2013 to March 2014 (FIG. 2). Female flower receptivity of 'Burgundy Lace' is late and about one week earlier than 'Cutleaf' and four weeks

later than 'Barcelona'. Time of catkin elongation of 'Burgundy Lace' is also late and about three weeks earlier than 'Cutleaf' and three weeks later than 'Barcelona'. Date of leaf budbreak is about one week later than 'Cutleaf' and 2.5 weeks later than 'Barcelona'. Pollen of the following EFB-resistant cultivars is compatible on females of 'Burgundy Lace': 'Yamhill' (S₈ S₂₆), 'Dorris' (S₁ S₁₂), 'McDonald' (S₂ S₁₅), 'Wepster' (S₁ S₂), 'York' (S₂ S₂₁), 'Gamma' (S₂ S₁₀), 'Jefferson' (S₁ S₂), 'Felix' (S₁₅ S₂₁) and 'Theta' (S₂ S₁₅). Because females of 'Burgundy Lace' are receptive late in the season, the late-shedding pollinizers 'Felix' and 'Theta' are most effective.

Pests and diseases.—Based on DNA marker data, 'Burgundy Lace' has a very high level of resistance to EFB conferred by a dominant allele from 'Gasaway', so fungicide applications are not needed. RAPD markers 152-800 and 268-580 that flank the resistance allele in 'Gasaway', are present in 'Burgundy Lace'. Trees of 'Burgundy Lace' have not yet been challenged with the EFB pathogen in glasshouse or structure inoculations. Susceptibility to bacterial blight caused by *Xanthomonas campestris* pv. *corylina* has not been quantified, but none of the three trees in the two trials were affected. Nevertheless, copper sprays to minimize damage from this pathogen can be performed. Susceptibility to big bud mite (primarily *Phytoptus avellanae* Nal.) was rated in the 2007 trial (Table 3) after leaf fall once per year for five years (December 2009-2013). The scale was from 1 (no blasted buds) to 5 (many blasted buds). The average rating for 'Burgundy Lace' (3.0) is similar to that for 'Clark' and lower than for 'Cutleaf' (4.0), which was rated one year at the Smith Farm and three years (2000-2002) at the nearby USDA National Clonal Germplasm Repository. In the 2008 trial, the rating for 'Burgundy Lace' (3.1) is the same as for the moderately susceptible 'Clark' (3.0). The number of blasted buds for 'Burgundy Lace' is lower than 'Cutleaf' and sprays should not be necessary to control this pest. The other check cultivars in the two trials had lower bud mite ratings.

Propagation.—'Burgundy Lace' was propagated by tie-off layerage of the suckers of the original seedling tree in late June over five years (2005, 2006, 2008, 2011 and 2013). On average, 22 suckers were layered, with rooting rated good on 11 and fair on 7, poor on 3 and no roots on one. The size (caliper) was rated as medium to large in most years. Layers are moderately vigorous and root well, but have lower vigor and caliper than those of 'Jefferson' and 'Barcelona'.

DNA fingerprinting.—Primers used are shown in Table 6, and results shown in Table 7. 'Burgundy Lace' differs from 'Cutleaf' at 14 of 24 loci.

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TABLE 1

Nut yield, trunk cross-sectional area, yield efficiency and bud mite ratings of hazelnut cultivars and selections (including two trees of 'Burgundy Lace' in a guard row) in a trial planted in 2007.										
Cultivar	No. trees	Yield per tree (kg)					Total	TCA ^z (cm ²)	YE ^y (kg · cm ⁻²)	BBM
		Year 3	Year 4	Year 5	Year 6	Year 7				
'McDonald'	4	0.15	1.10	4.85	7.38	7.95	21.43	87.6	0.245	1.8
'Felix'	4	0.06	1.04	2.91	7.93	4.95	16.88	128.4	0.133	2.0
'Jefferson'	4	0.55	1.97	5.63	4.60	10.25	22.99	77.5	0.299	1.2
'Santiam'	4	0.20	1.11	4.09	5.46	6.83	17.68	66.8	0.267	2.2
LSD _{0.05}		0.21	0.43	0.54	2.04	1.18	2.45	13.48	0.029	0.2
'Burgundy Lace'	2	0.09	0.56	2.29	2.87	4.24	10.04	82.2	0.122	3.0

^zTrunk cross-sectional area calculated from trunk diameters measured in late fall at the end of the 7th season.

^yYield efficiency = Total nut yield/TCA.

TABLE 2

Nut yield, trunk cross-sectional area, yield efficiency and bud mite ratings of hazelnut cultivars and selections in two trials planted in 2008.											
Selection	SelNo	No. trees	Nut yield per tree (kg)					Total	TCA ^z	YldEF ^y	BBM ^x
			2010	2011	2012	2013	2014				
EFB-resistant selections											
918.045	1	4	0.233	2.593	3.585	4.513	6.148	17.070	69.0	0.249	1.5
951.086	2	4	0.213	1.718	5.073	7.557	9.510	24.069	92.7	0.258	2.0
964.073	3	4	0.100	1.163	40.998	6.223	8.870	20.453	85.1	0.242	1.0
981.067	4	4	0.027	0.968	2.740	3.630	6.550	13.914	83.3	0.168	1.2
990.035	5	4	0.088	1.258	4.350	4.800	8.420	18.915	72.5	0.259	1.7
992.015	6	4	0.053	0.945	2.068	3.625	6.288	12.978	74.0	0.177	1.4
992.022	7	4	0.040	1.978	4.470	7.338	8.340	22.165	98.8	0.224	1.4
1014.058	8	4	0.210	3.580	3.148	5.538	6.368	18.843	74.0	0.256	2.3
1018.001	9	4	0.105	2.210	2.738	4.695	6.178	15.925	74.1	0.215	1.3
Eta	10	4	0.055	0.665	1.688	1.867	3.503	7.777	77.9	0.100	2.0
Gamma	11	4	0.153	0.780	3.310	5.133	8.240	17.615	97.6	0.181	2.9
Jefferson	12	4	0.223	2.650	4.793	5.875	8.570	22.110	75.9	0.292	1.2
Theta	13	4	0.038	1.240	4.003	4.910	4.560	14.750	101.7	0.149	1.6
Yamhill	14	4	0.218	2.833	4.793	6.805	8.698	23.345	73.7	0.318	1.1
LSD 0.05			0.113	0.524	0.945	1.243	1.552	3.296	14.4	0.038	0.4
Burgundy Lace	h	1	0.020	1.480	2.270	3.110	4.510	11.390	84.9	0.134	3.1

TABLE 2-continued

Nut yield, trunk cross-sectional area, yield efficiency and bud mite ratings of hazelnut cultivars and selections in two trials planted in 2008.											
Selection	SelNo	No. trees	Nut yield per tree (kg)						TCA ²	YldEF ³	BBM ⁴
			2010	2011	2012	2013	2014	Total			
Performance of hazelnut cultivars and selections (including 'Burgundy Lace') in two trials planted in 2008.											
EFB-susceptible selections in nearby trial											
919.031	1	3	0.050	1.547	4.890	5.200	8.057	19.743	102.0	0.195	1.0
961.021	2	3	0.225	1.527	3.507	4.770	7.793	17.821	91.1	0.196	2.5
961.063	3	3	0.153	1.707	2.707	3.937	4.490	12.993	56.4	0.231	1.7
978.057	4	3	0.227	1.553	3.063	5.710	5.037	15.590	83.3	0.189	2.9
978.058	5	3	0.207	1.533	3.297	5.025	7.633	17.695	88.1	0.201	1.7
978.064	6	3	0.190	2.083	2.790	4.270	4.387	13.720	57.7	0.238	1.0
1012.074	7	3	0.127	0.790	1.340	3.937	4.475	10.668	93.6	0.115	3.0
Barcelona	8	3	0.197	1.650	4.670	5.357	8.313	20.187	125.8	0.161	1.0
Clark	9	3	0.483	3.416	1.873	6.130	6.320	18.223	72.5	0.251	3.0
Lewis	10	3	0.370	3.350	2.210	7.643	6.833	20.407	80.0	0.255	2.7
Sacajawea	11	3	0.050	0.857	4.247	6.855	9.060	21.068	99.1	0.214	1.1
LSD 0.05			0.185	0.580	0.866	0.942	1.569	2.811	16.7	0.028	0.4

²Trunk cross-sectional area calculated from trunk diameters measured in late fall at the end of the 7th season.

³Yield efficiency = Total nut yield/TCA.

⁴Susceptibility to bud mite (primarily *Phytoptus avellanae* Nal.) was rated on four trees of each selection on a scale of 1 (no blasted buds) to 5 (many blasted buds). Shown are mean ratings for 5 years (2010-2014). (many blasted buds). Shown are mean ratings for 5 years (2010-2014).

LSD = least significant difference.

TABLE 3

Frequency of good nuts, and of nut and kernel defects in hazelnut cultivars and selections (including two trees of 'Burgundy Lace' in a guard row) in a trial planted in 2007.									
Selection	# trees	Frequency (%) ²							
		Good	Blanks	Brown stain	Moldy	Shrivel	Poor fill	Twins	Black tips
'McDonald'	4	83.5	5.1	0.1	2.1	4.5	4.5	0.1	0.3
'Felix'	4	88.9	4.2	0.2	2.1	0.4	2.9	0.3	1.1
'Jefferson'	4	80.1	4.3	0.3	5.7	0.4	8.9	0.6	0.6
'Santiam'	4	68.8	2.8	0.1	17.3	1.8	9.6	0.1	0.1
LSD 0.05		3.5	2.5	0.3	2.3	1.0	2.5	0.4	0.5
'Burgundy Lace'	2	87.5	6.8	0.0	0.5	0.3	4.8	0.0	0.3

²Means of years 4-7.

LSD = Least Significant Difference

TABLE 4

Frequency of good nuts and of nut and kernel defects in hazelnut cultivars and selections in a trial planted in 2008.															
Selection	SelNo	# trees	10-NutWt	10-KerWt	PctKer	Fib	Blanch	GD	BL	BS	MO	SH	PF	TW	BT
EFB-resistant selections															
918.045	1	4	25.81	11.69	45.31	1.5	3.9	73.26	4.18	0.56	2.18	0.44	18.38	1.06	0.12
951.086	2	4	27.88	12.43	44.54	2.2	5.4	82.92	5.86	0.64	1.78	0.08	11.22	0.58	0.50
964.073	3	4	26.09	12.33	47.20	2.2	4.7	82.20	1.80	0.14	1.34	1.26	13.14	0.00	0.26
981.067	4	4	23.97	11.38	47.53	3.7	3.9	90.62	4.32	0.18	0.56	0.18	2.82	1.26	0.06
990.035	5	4	23.90	11.34	47.56	1.6	4.7	75.11	3.50	0.06	2.94	1.26	15.62	1.32	0.44
992.015	6	4	24.33	12.32	50.71	2.6	4.5	85.06	7.56	0.18	2.06	0.50	4.06	0.12	0.76
992.022	7	4	26.50	12.82	48.41	3.2	3.8	80.32	4.62	0.00	3.18	0.82	10.76	0.18	0.26
1014.058	8	4	25.20	11.73	46.63	1.7	4.9	92.32	1.44	0.32	0.76	0.88	3.76	0.18	0.38
1018.001	9	4	25.60	12.05	47.17	2.9	3.8	83.68	4.88	0.06	4.18	0.18	6.62	0.50	0.12
Eta	10	4	30.21	14.21	47.12	3.1	3.9	85.86	2.80	1.80	2.06	0.40	5.74	1.00	0.66
Gamma	11	4	24.06	12.40	51.66	3.0	6.4	78.76	5.18	0.68	2.18	1.38	11.50	0.26	0.12
Jefferson	12	4	36.51	16.48	45.23	2.9	4.5	75.56	4.06	0.12	5.82	0.38	13.12	0.62	1.18
Theta	13	4	22.73	11.48	50.52	2.2	2.6	89.06	2.38	0.26	1.76	0.32	5.82	0.26	0.26
Yamhill	14	4	23.59	11.13	47.26	1.4	5.1	76.00	2.32	0.12	2.50	0.82	18.44	0.06	0.26
LSD 0.05			0.94	0.34	0.77	0.2	0.4	3.58	2.56	0.56	1.22	0.74	3.38	0.48	0.08
'Burgundy Lace'	1		17.16	7.56	44.08	2.8	6.6	87.50	6.75	0.00	0.50	0.25	4.75	0.00	0.25

TABLE 4-continued

Frequency of good nuts and of nut and kernel defects in hazelnut cultivars and selections in a trial planted in 2008.

Selection	SelNo	NutWt	KerWt	PctKer	Fib	Blanch	GD	BL	BS	MO	SH	PF	TW	BT	
EFB-susceptible selections in nearby trial															
919.031	1	3	26.53	13.55	51.15	2.3	2.1	81.50	4.30	0.40	1.60	0.60	11.20	0.00	0.40
961.021	2	3	25.53	12.00	46.99	1.3	3.5	84.26	4.76	0.16	2.00	3.34	4.76	0.66	0.26
961.063	3	3	25.87	12.25	47.48	1.9	2.6	88.84	2.16	0.76	1.84	0.58	4.34	1.42	0.34
978.057	4	3	29.38	13.91	47.42	3.1	3.0	83.50	8.00	0.00	2.66	1.00	4.16	0.26	0.76
978.058	5	3	30.98	14.78	47.71	2.6	2.6	85.82	4.36	0.36	1.46	1.00	5.18	0.72	1.18
978.064	6	3	25.62	13.13	51.22	2.2	3.3	74.50	7.58	0.08	3.76	6.66	5.92	0.16	1.66
1012.074	7	3	23.17	11.84	51.08	2.1	2.2	89.36	3.64	0.64	1.82	0.64	3.46	0.18	0.36
Barcelona	8	3	38.87	17.08	44.00	2.5	4.3	68.26	5.26	0.16	4.00	1.42	16.00	6.00	0.16
Clark	9	3	24.73	12.41	50.02	2.6	3.1	73.08	2.58	1.00	4.00	0.50	18.34	0.84	0.34
Lewis	10	3	29.41	13.60	46.20	1.3	4.1	65.26	2.00	0.16	11.00	1.26	19.66	2.00	0.76
Sacajawea	11	3	28.07	14.55	51.85	1.3	3.1	82.72	4.90	0.00	4.72	2.10	5.00	0.18	0.54
LSD 0.05			1.64	0.67	0.72	0.3	0.3	5.94	2.02	0.70	1.60	1.10	6.36	0.78	0.50
919.031	1	3	26.53	13.55	51.15	2.3	2.1	81.50	4.30	0.40	1.60	0.60	11.20	0.00	0.40
961.021	2	3	25.53	12.00	46.99	1.3	3.5	84.26	4.76	0.16	2.00	3.34	4.76	0.66	0.26
961.063	3	3	25.87	12.25	47.48	1.9	2.6	88.84	2.16	0.76	1.84	0.58	4.34	1.42	0.34
978.057	4	3	29.38	13.91	47.42	3.1	3.0	83.50	8.00	0.00	2.66	1.00	4.16	0.26	0.76
978.058	5	3	30.98	14.78	47.71	2.6	2.6	85.82	4.36	0.36	1.46	1.00	5.18	0.72	1.18
978.064	6	3	25.62	13.13	51.22	2.2	3.3	74.50	7.58	0.08	3.76	6.66	5.92	0.16	1.66
1012.074	7	3	23.17	11.84	51.08	2.1	2.2	89.36	3.64	0.64	1.82	0.64	3.46	0.18	0.36
Barcelona	8	3	38.87	17.08	44.00	2.5	4.3	68.26	5.26	0.16	4.00	1.42	16.00	6.00	0.16
Clark	9	3	24.73	12.41	50.02	2.6	3.1	73.08	2.58	1.00	4.00	0.50	18.34	0.84	0.34
Lewis	10	3	29.41	13.60	46.20	1.3	4.1	65.26	2.00	0.16	11.00	1.26	19.66	2.00	0.76
Sacajawea	11	3	28.07	14.55	51.85	1.3	3.1	82.72	4.90	0.00	4.72	2.10	5.00	0.18	0.54
LSD 0.05			1.64	0.67	0.72	0.3	0.3	5.94	2.02	0.70	1.60	1.10	6.36	0.78	0.50

Notes (%):

GD = good kernels, BL = blanks, BS = brown stain, MO = moldy kernels, SH = shriveled kernels, PF = poorly filled nuts, TW = twins, BT = black tips.

TABLE 5

Ten-nut and 10-kernel weight, kernel percentage, and ratings for fiber and blanching for hazelnut cultivars and selections (including 'Burgundy Lace') in a trial planted in 2007.

Selection	No. trees	10-nut wt	10-ker wt	Kernel percentage	Fiber ^y	Blanching ^x
McDonald	4	26.2	13.7	52.3	2.6	3.3
Felix	4	27.1	13.7	50.8	3.0	2.2
Jefferson	4	37.6	16.7	44.5	3.0	4.3
Santiam	4	22.8	11.5	50.6	3.0	4.2
LSD 0.05		2.2	0.4	1.0	0.1	0.4

TABLE 5-continued

Ten-nut and 10-kernel weight, kernel percentage, and ratings for fiber and blanching for hazelnut cultivars and selections (including 'Burgundy Lace') in a trial planted in 2007.

Selection	No. trees	10-nut wt	10-ker wt	Kernel percentage	Fiber ^y	Blanching ^x
'Burgundy Lace'	2	17.2	7.6	44.1	2.8	6.6

^yMeans for nuts and kernels are over four years.
^xAmount of fiber on the pellicle was rated in the second trial from 1 (none) to 4 (much).
^yBlanching was rated from 1 (complete pellicle removal) to 7 (no pellicle removal).
LSD = least significant difference.

TABLE 6

Primers, annealing temperatures, and characteristics for the 24 microsatellite marker loci used to fingerprint 'Burgundy Lace' and other hazelnut cultivars.

Locus	Repeat Motif	Allele sizes	Primers (5'-3') (forward above, reverse below)	Tm (° C.)	n	He	Ho	PIC	r	LG	Locus Reference
A613	(TC) ₁₃ (CA) ₁₂	149-177	Ned- CACACGCCTT GTCACCTTT (SEQ ID NO: 1) CCCCTTTCAC ATGTTTGCTT (SEQ ID NO: 2)	60	14	0.86	0.85	0.85	0.00	11R	A613 Gurcan et al. 2010
A614	(TC) ₁₇ (CA) ₁₀ NNN(CA) ₆	125-156	Hex- TGGCAGAGCT TTGTCAGCTT (SEQ ID NO: 3) GCAGTGGAGG ATTGCTGACT (SEQ ID NO: 4)	60	14	0.85	0.85	0.84	0.00	6S, 6R	A614 Gurcan et al. 2010

TABLE 6-continued

Primers, annealing temperatures, and characteristics for the 24 microsatellite marker loci used to fingerprint 'Burgundy Lace' and other hazelnut cultivars.													
Locus	Repeat Motif	Allele sizes	Primers (5'-3') (forward above, reverse below)	T _m (° C.)	n	He	Ho	PIC	r	LG	Locus	Reference	
A616	(AC) ₁₁	136- 162	Fam- CACTCATAACC GCAAACCTCCA (SEQ ID NO: 5) ATGGCTTTTG CTTCGTTTTG (SEQ ID NO: 6)	60	13	0.85	0.85	0.83	0.00	8R	A616	Gurcan et al. 2010	
A640	(CT) ₁₅ (CA) ₁₃	354- 378	F- TGCCTCTGCA GTTAGTCAT (SEQ ID NO: 7) Fam- CGCCATATAAATTG GGATGCTTGTTG (SEQ ID NO: 8)	67	11	0.80	0.73	0.77	0.04	10R	A640	Gurcan et al. 2010	
B617	(GA) ₁₅	280- 298	Fam- TCCGTGTTGA GTATGGACGA (SEQ ID NO: 9) TGTTTTGGT GGAGCGATG (SEQ ID NO: 10)	60	9	0.80	0.78	0.78	0.01	8S, 8R	B617	Gurcan et al. 2010	
B619	(TC) ₂₁	146- 180	Fam- AGTCGGCTCC CCTTTTCTC (SEQ ID NO: 11) GCGATCTGAC CTCATTTTTG (SEQ ID NO: 12)	60	14	0.88	0.88	0.87	0.00	3S, 3R	B619	Gurcan et al. 2010	
B634	(AG) ₁₅	218- 238	Hex- CCTGCATCCA GGACTCATT (SEQ ID NO: 13) GTGCAGAGGT TGCACTCAAA (SEQ ID NO: 14)	60	9	0.76	0.76	0.73	0.00	4R	B634	Gurcan et al. 2010	
B657	(AG) ₁₅	210- 228	Ned- GAGAGTGCCT CTTCCTCTGG (SEQ ID NO: 15) AGCCTCACCT CCAACGAAC (SEQ ID NO: 16)	60	8	0.84	0.98	0.82	-0.08	11S, 1 1R	B657	Gurcan et al. 2010	
B662	(TC) ₁₅	220- 236	Hex- CGAAAGATGGA CTTCCATGAC (SEQ ID NO: 17) CAAGTTGAGAT TCTTCCTGCAA (SEQ ID NO: 18)	60	9	0.74	0.68	0.72	0.04	3R	B662	Gurcan et al. 2010	
B671	(AG) ₆ NN(GA) ₁₇	221- 249	Hex- TTGCCAGT GCATACTC (SEQ ID NO: 19) ACCAGCTCTG GGCTTAACAC (SEQ ID NO: 20)	60	13	0.86	0.88	0.84	-0.01	9S, 9R	B671	Gurcan et al. 2010	

TABLE 6-continued

Primers, annealing temperatures, and characteristics for the 24 microsatellite marker loci used to fingerprint 'Burgundy Lace' and other hazelnut cultivars.												
Locus	Repeat Motif	Allele sizes	Primers (5'-3') (forward above, reverse below)	Tm (° C.)	n	He	Ho	PIC	r	LG	Locus	Reference
B709	(GA) ₂₁	219- 233	Ned- CCAAGCACGA ATGAACTCAA (SEQ ID NO: 21) GCGGGTTCTC GTTGTACACT (SEQ ID NO: 22)	60	8	0.74	0.76	0.70	-0.01	5S, 5R	B709	Gurcan et al. 2010
B733	(TC) ₁₅	161- 183	Ned- CACCCCTCTC ACCACCTCAT (SEQ ID NO: 23) CATCCCCTGT TGGAGTTTTC (SEQ ID NO: 24)	60	8	0.68	0.68	0.63	0.00	7S, 2R	B733	Gurcan et al. 2010
B741	(GT) ₅ (GA) ₁₂	176- 194	Fam- GTTACACAGGC TGTTGGGTTT (SEQ ID NO: 25) CGTGTGCTC ATGTGTGTG (SEQ ID NO: 26)	60	10	0.77	0.78	0.74	0.00	5S, 5R	B741	Gurcan et al. 2010
B749	(TC) ₁₂	200- 210	Hex- GGCTGACAAC ACAGCAGAAA (SEQ ID NO: 27) TCGGCTAGGG TTAGGGTTTT (SEQ ID NO: 28)	60	6	0.60	0.64	0.51	-0.03	1R	B749	Gurcan et al. 2010
B751	(GA) ₁₅	141- 153	Fam- AGCTGGTTCT TCGACATTCC (SEQ ID NO: 29) AAACTCAAATAA AACCCCTGCTC (SEQ ID NO: 30)	60	7	0.80	0.78	0.77	0.01	7S, 2R	B751	Gurcan et al. 2010
B767	(TC) ₁₅ (AT) ₇	198- 238	Fam- CCACCAACTG TTCACACCA (SEQ ID NO: 31) GCGAAATGGA GCTCTTG AAC (SEQ ID NO: 32)	60	16	0.87	0.80	0.86	0.04	8S, 8R	B767	Gurcan et al. 2010
B774	(AG) ₁₅	195- 213	Ned- GTTTTGCGAG CTCATTGTCA (SEQ ID NO: 33) TGTGTGTGGTC TGTAGGCACT (SEQ ID NO: 34)	60	8	0.80	0.80	0.77	0.00	5S, 5R	B774	Gurcan et al. 2010
B795	(TC) ₈ Ns (CT) ₇ Ns (CT) ₁₀ Ns (TC) ₅	296- 332	Fam- GACCCACAAACA ATAACCTATCTC (SEQ ID NO: 35) TGGCATCAT CCAGGTCTA (SEQ ID NO: 36)	60	12	0.76	0.74	0.74	0.01	NA	B795	Gurcan et al. 2010

TABLE 6-continued

Primers, annealing temperatures, and characteristics for the 24 microsatellite marker loci used to fingerprint 'Burgundy Lace' and other hazelnut cultivars.													
Locus	Repeat Motif	Allele sizes	Primers (5'-3') (forward above, reverse below)	Tm (° C.)	n	He	Ho	PIC	r	LG	Locus	Reference	
C115	(TAA) ₅ (GAA) ₁₂	167-225	Fam- CATTTCGCGCA GATAATACAGG (SEQ ID NO: 37) GTTTCCAGATCTG CCTCCATATAAT (SEQ ID NO: 38)	60	10	0.84	0.90	0.82	-0.035	4S, 4R	C115	Bassil 2005b; Gokirmak et al. 2009	
KG807	(TAAA) _{AA} (TAAA) ₂ A(TAAA) ₂	226-248	AAGCAAGAA AGGGATGGT (SEQ ID NO: 39) Fam- CTTACAGATAA ATGGCTCAAA (SEQ ID NO: 40)	54	4	0.67	0.78	0.60	-0.07	11	KG807	Gurcan and Mehlenbacher, 2010	
KG809	(AGG) ₆	333-345	GGAAGGTGAGA GAAATCAAGT (SEQ ID NO: 41) Hex- AGGCATCAG TTCATCCAA (SEQ ID NO: 42)	55	5	0.66	0.64	0.60	0.01	4	KG809	Gurcan and Mehlenbacher, 2010	
KG811	(GA) ₁₇	240-278	GAACAACTGAA GACAGCAAAG (SEQ ID NO: 43) Ned- AAGGCGGCA CTCGCTCAC (SEQ ID NO: 44)	58	12	0.83	0.82	0.81	0.01	2	KG811	Gurcan and Mehlenbacher, 2010	
KG827	(CT) ₁₃ AA(CA) ₇	264-282	Fam- AGAACTCCGACTAAT AATCCTAACCCTTGC (SEQ ID NO: 45) GAGGGAGCAAGTCA AAGTTGAGAAGAAA (SEQ ID NO: 46)	67	9	0.78	0.84	0.75	-0.04	9	KG827	Gurcan and Mehlenbacher, 2010	
KG830	(CT) ₁₄ GTATT (CA) ₈	279-311	Ned- TGGAGGAAGTTTTGA ATGGTAGTAGAGGA (SEQ ID NO: 47) AAAGCAATCATAG CTGAAGTCCAATCA (SEQ ID NO: 48)	67	9	0.79	0.78	0.76	0.00	9	KG830	Gurcan and Mehlenbacher, 2010	

Primers fluorescent tags are FAM, HEX and NED
 Tm annealing temperature (° C.); n number of alleles; He expected heterozygosity;
 Ho observed heterozygosity; PIC polymorphism information content;
 r estimated null allele frequency; LG linkage group; NA = not yet assigned
 Reference for development and characterization

TABLE 7

Marker	Allele sizes in 'Burgundy Lace' and 12 other hazelnut cultivars at 24 microsatellite loci.												
	Burgundy Lace	Cutleaf	Gasaway	Rode Zeller	Tonda G.d. Langhe	Barcelona	Yamhill	Dorris	Wepster	McDonald	York	Felix	Theta
A640	372/372	368/372	362/368	355/355	355/368	355/374	355/368	372/374	368/374	362/368	363/374	368/372	362/368
B662	232/232	228/232	232/238	232/232	232/232	232/232	232/232	228/232	232/232	232/232	232/232	232/232	228/232
KG809	339/339	339/339	339/348	342/345	339/342	339/339	348/348	339/348	342/342	339/339	339/348	339/348	339/348
B774	207/213	207/213	203/209	203/207	203/211	203/207	203/211	203/207	203/207	203/213	203/209	203/213	203/213

TABLE 7-continued

Allele sizes in 'Burgundy Lace' and 12 other hazelnut cultivars at 24 microsatellite loci.													
Marker	Burgundy Lace	Cutleaf	Gasaway	Rode Zeller	Tonda G.d. Langhe	Barcelona	Yamhill	Dorris	Wepster	McDonald	York	Felix	Theta
B619	158/158	158/166	172/176	168/178	150/166	158/172	158/172	158/166	166/172	158/172	158/166	158/166	158/166
B767	214/240	212/214	214/214	212/216	214/218	214/240	214/238	214/218	200/242	200/214	236/238	214/214	212/214
B617	289/293	291/293	291/295	281/291	285/295	285/289	289/295	287/295	293/295	293/293	287/289	287/287	281/285
A614	152/158	152/152	143/158	150/150	125/135	125/132	132/158	132/158	135/158	135/158	124/158	138/143	138/158
B749	205/209	205/205	207/209	207/209	207/209	209/209	209/209	207/207	207/209	207/209	209/209	207/207	209/209
B733	167/167	167/167	175/175	175/175	173/175	173/175	181/185	173/181	173/175	173/175	173/181	175/181	163/181
B709	223/229	223/229	229/229	229/229	229/229	227/235	229/229	229/229	229/235	227/229	229/233	229/233	229/229
KG830	293/303	297/305	291/305	303/303	291/295	291/295	291/295	295/297	295/305	291/295	295/295	293/303	297/297
A616	144/156	152/156	150/150	144/148	150/152	144/152	150/150	150/152	152/160	150/160	144/152	150/152	132/134
C115	216/216	216/216	216/219	194/216	174/174	174/194	197/216	194/216	183/194	174/197	197/197	197/216	197/216
KG827	274/282	272/272	272/282	272/282	268/278	282/284	268/282	272/284	270/282	272/284	268/272	272/284	270/272
B671	241/251	225/237	237/249	249/249	239/243	225/229	225/243	229/249	239/249	229/237	243/249	229/237	229/249
A613	161/179	179/179	161/163	153/167	153/153	153/161	153/163	151/169	167/167	153/169	159/179	151/153	167/179
KG811	257/257	255/257	257/261	255/257	257/267	261/267	251/261	257/267	257/257	245/267	257/257	251/267	257/257
B751	146/152	146/152	144/144	148/152	150/154	144/154	152/152	144/152	144/144	144/144	152/154	152/154	144/152
B741	178/184	184/184	186/188	178/184	176/184	178/186	178/186	178/186	176/186	178/188	178/186	186/186	184/186
KG807	242/252	242/252	242/252	238/238	238/252	238/252	230/252	242/252	252/252	252/252	242/252	238/242	252/252
B795	333/333	333/333	317/319	317/333	315/333	333/333	333/333	333/333	333/333	317/333	333/333	321/333	299/333
B634	228/228	228/228	222/234	220/240	228/228	228/228	236/236	228/228	228/228	222/228	228/236	228/236	228/236
B657	223/227	223/227	225/229	211/227	219/227	219/223	219/229	211/227	227/227	211/219	221/223	219/227	219/223

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We claim:

1. A new and distinct cultivar of *Corylus* plant as herein illustrated and described.

* * * * *

FIG. 1

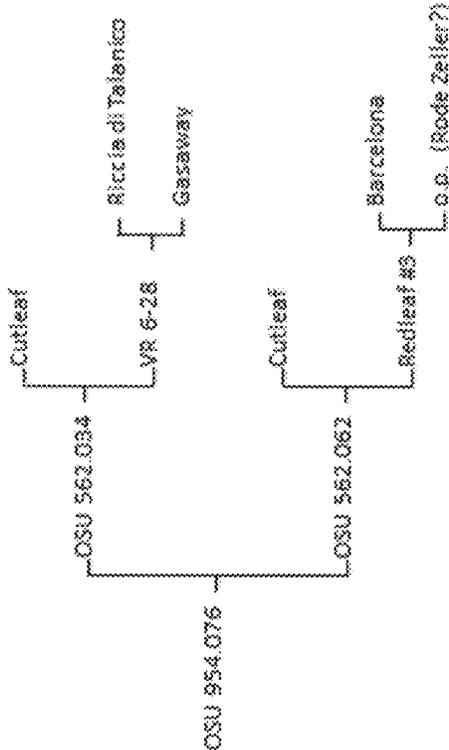


FIG. 2

Cultivar	Jan							Feb							March						
	31-Dec	4-Jan	8-Jan	15-Jan	20-Jan	25-Jan	30-Jan	5-Feb	10-Feb	15-Feb	18-Feb	23-Feb	25-Feb	28-Feb	3-Mar	7-Mar	11-Mar	13-Mar	27-Mar		
Greenleaf Cutleaf																					
Redleaf Cutleaf																					
954-078																					
8150-33																					
Greenleaf Cutleaf																					
373-059																					
small female flowers																					
Bottom (122013 - 32014)																					
Comstock																					
Redleaf Cutleaf																					
030 954-876																					
RL73																					
carries high good																					
Greenleaf Cutleaf																					
CSU 372-629																					
small females																					
886-6888																					
1123																					

S indicate abundance of flowers in each stage.
 Green = Pollen shed; 19 minus sign in front of the number indicates the percent of cells that have already shed out;
 Red = Female flowers; red, blk (black), dk (dark, not quite red, not yet black).



FIG. 4



FIG. 3



FIG. 6



FIG. 5



FIG. 7



FIG. 8



FIG. 9

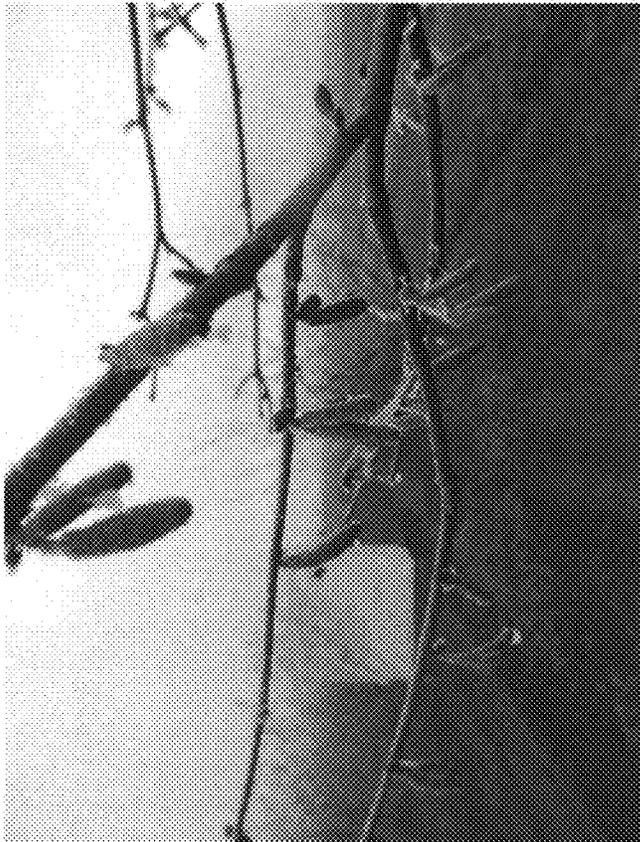


FIG. 11



FIG. 10

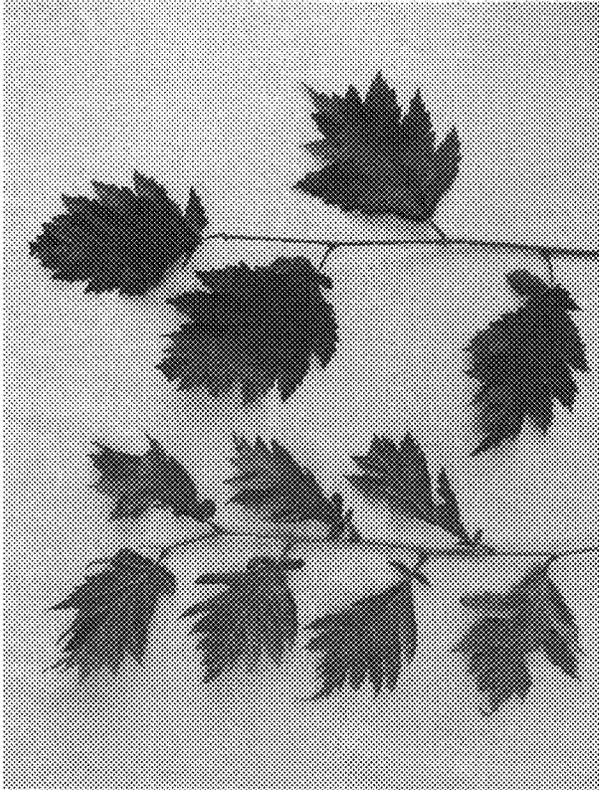


FIG. 13

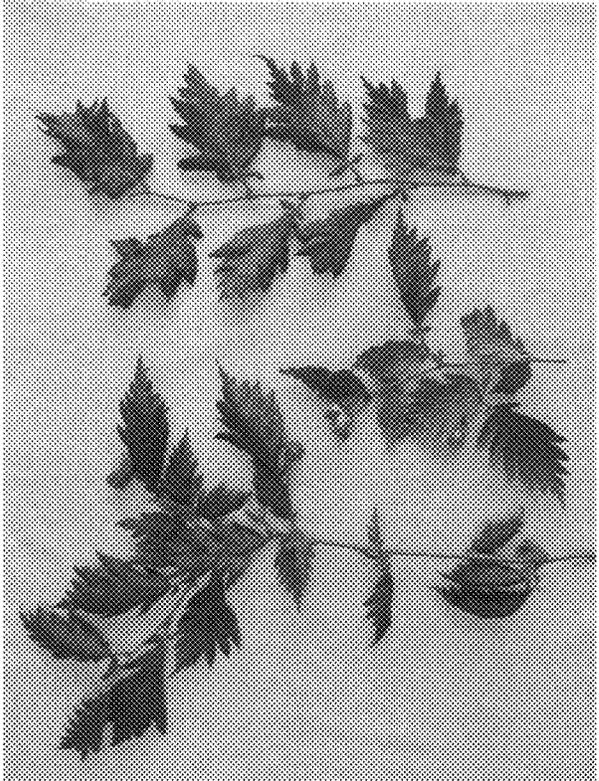


FIG. 12

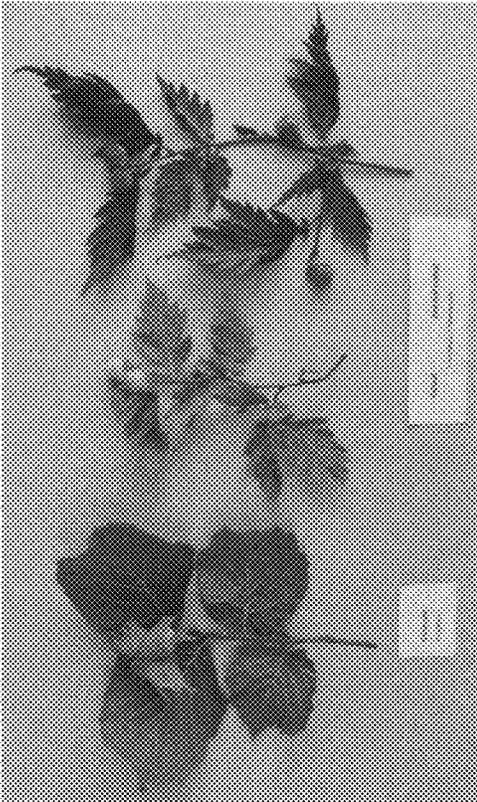


FIG. 14

'Barcelona' 'Cutleaf' 'Burgundy Lace'

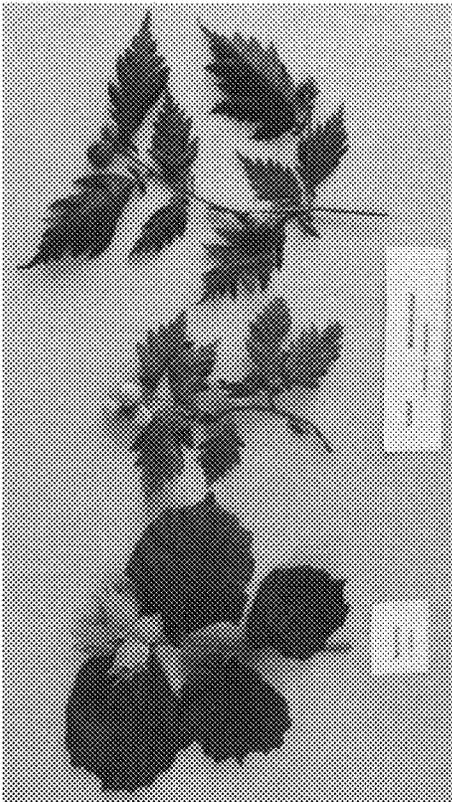


FIG. 15

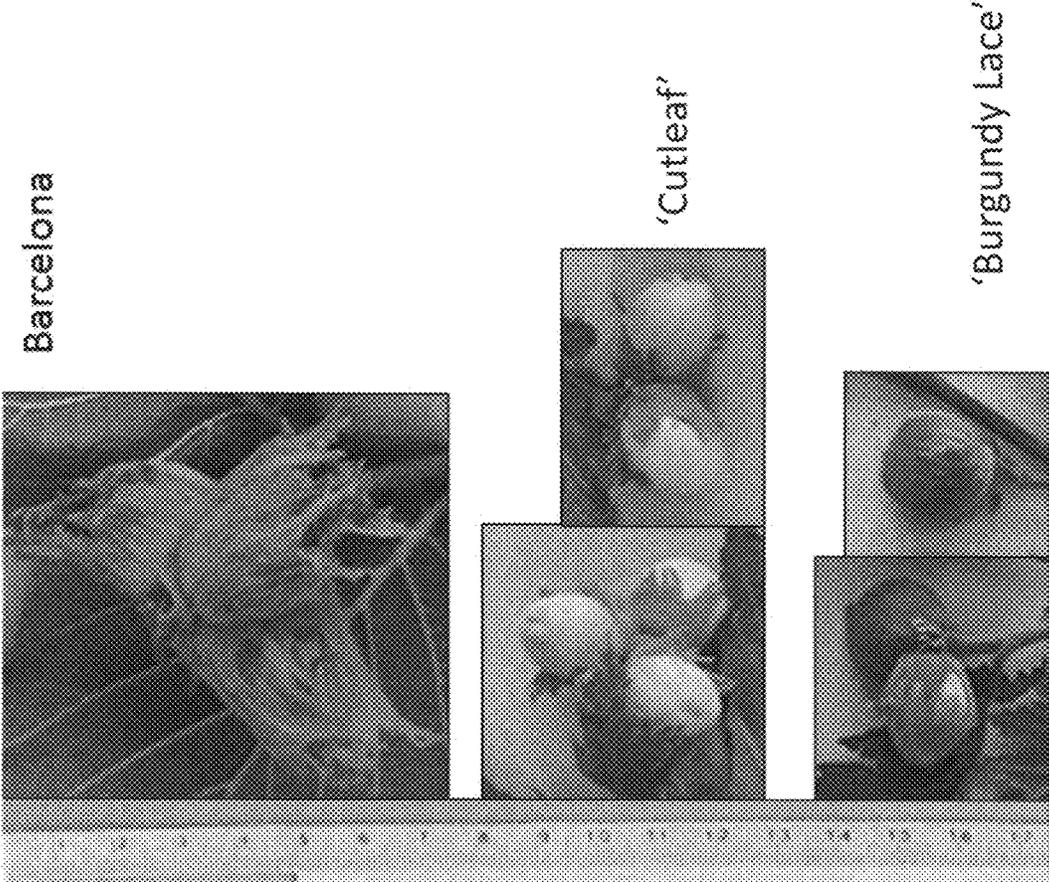


FIG. 16