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(12) **United States Plant Patent**
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- (54) **CORYLUS PLANT NAMED 'FELIX'**
- (50) Latin Name: *Corylus avellana*
Varietal Denomination: Felix
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(58) **Field of Classification Search**
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(57) **ABSTRACT**

A new and distinct cultivar of *Corylus* plant named 'Felix' characterized by an upright plant habit and high vigor, green developing and fully expanded leaves during the spring and summer, resistance to eastern filbert blight caused by the fungus *Anisogramma anomala* (Peck) E. Wüller, presence of random amplified polymorphic DNA markers 152-800 and AA12-850, expression of incompatibility alleles S₁₅ and S₂₁ in the styles, and DNA fingerprints at 14 of 24 microsatellite marker loci differ from both parents OSU 384.095 and 'Delta', and from one parent at an additional 6 marker loci.

5 Drawing Sheets

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ACKNOWLEDGMENT OF GOVERNMENT SUPPORT

This invention was made with government support under Specific Cooperative Agreement No. 58-5358-4542 awarded by the United States Department of Agriculture. The government has certain rights in the invention.

Botanical denomination: *Corylus avellana*.

Variety designation: 'Felix'.

BACKGROUND

The present invention relates to a new and distinct cultivar of *Corylus* plant, (hazelnut, filbert) botanically known as *Corylus avellana*, and hereinafter referred to by the name 'Felix'. *Corylus avellana* is in the family Betulaceae.

The new *Corylus* resulted from a controlled cross of female parent OSU 384.095 (unpatented) and male parent 'Delta' (unpatented) made in 1998 by Shawn A. Mehlenbacher and David C. Smith. Hybrid seeds from the cross were harvested in August 1998, stratified, and seedlings grown in the greenhouse during the summer of 1999. From this cross, total of 157 seedling trees were planted in the field in Corvallis, Oreg., USA in October, 1999. 'Felix' was discovered and selected by the Inventors as a single plant within the progeny of the stated cross-pollination in a controlled environment in Corvallis, Oreg. 'Felix' was originally assigned the designation OSU 941.016, which indicates the row and tree location of the original seedling. 'Delta' (unpatented) was released by the Oregon Agricultural Experiment Station in 2002. OSU 384.095 (unpatented) is from a cross of 'Casina' x OSU 55.129 (both unpatented). OSU 55.129 is from a cross of 'Tonda Gentile delle Langhe' (unpatented)x'Extra Ghiaghli'

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(unpatented). The pedigree of 'Felix' includes 'Casina' from Asturias, Spain, 'Tonda Gentile delle Langhe' from Piemonte, northern Italy, and 'Extra Ghiaghli', which is a clone of the important Turkish cultivar 'Tombul' (unpatented).

The new cultivar was asexually reproduced by rooted suckers annually for five years (2005-2006 and 2008-2010) in Corvallis, Oreg. The new cultivar was also asexually propagated by whip grafting 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 repeatedly observed and are determined to be the unique characteristics of 'Felix'. These characteristics in combination distinguish 'Felix' as a new and distinct cultivar:

1. Upright plant habit and high vigor.
2. Green developing and fully expanded leaves during the spring and summer.
3. Resistance to eastern filbert blight caused by the fungus *Anisogramma anomala* (Peck) E. Müller.
4. Presence of random amplified polymorphic DNA markers 152-800 and AA12-850 in DNA of 'Felix' 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).
5. Expression of incompatibility alleles S₁₅ and S₂₁ in the styles.
6. DNA fingerprints at 14 of 24 microsatellite marker loci differ from both parents OSU 384.095 and 'Delta', and from one parent at an additional 6 marker loci. DNA

fingerprints of standard cultivars 'Barcelona', 'Tonda Gentile delle Langhe' and 'Extra Ghiaghli', and 'Gas-away', the source of eastern filbert blight resistance, are also shown in the attached table.

In comparisons in two replicated trials conducted in Corvallis, Oreg., plants of the new *Corylus* differed from plants of the *Corylus avellana* cultivar Barcelona (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 blank nuts (nuts lacking kernels), time of pollen shed, time of nut maturity, length of the husk or involucre, and plant size.

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 shows a tree of the new cultivar 'Felix' growing in a field in the summer, in Corvallis, Oreg.

FIG. 2 shows the tree of the new cultivar 'Felix' growing in a field in January, in Corvallis, Oreg.

FIG. 3 shows typical nuts, raw kernels, and blanched kernels of 'Felix' hazelnut compared to those of 'Jefferson' hazelnut.

FIG. 4 shows the husks of 'Felix' hazelnut.

FIG. 5 shows the typical nuts, raw kernels, and blanched kernels of 'Felix' hazelnut compared to those of 'Barcelona' hazelnut and other hazelnut cultivars.

DETAILED PLANT DESCRIPTION

The cultivar Felix 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 about five 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 Felix.

Parentage:

Female, or seed, parent.—*Corylus avellana* selection OSU 384.095 (unpatented).

Male, or pollen, parent.—*Corylus avellana* cultivar 'Delta' (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:

Type.—Perennial shrub. Upright plant habit.

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

Size.—Plant height is about 6 meters; plant diameter or spread is about 5 meters.

Vigor.—Vigorous growth.

Lenticels.—6 circular within 1 square centimeter (counted on dormant scions).

Lateral branch description:

Length.—About 43 cm.

Diameter.—About 6 mm.

Internode length.—About 2.8 cm.

Texture.—Smooth, glabrous.

Strength.—Strong.

Color.—Immature — 152B; mature — 152B.

Foliage description:

Arrangement.—Alternate, simple.

Length.—About 10.6 cm.

Width.—About 10.1 cm.

Shape.—Oblong to ovate.

Apex.—Obtuse to acute.

Base.—Cordate.

Margin.—Serrate.

Texture, upper and lower surfaces.—Slightly pubescent.

Venation pattern.—Pinnate.

Leaf bud shape.—Ovid.

Time of leaf bud burst.—Late, 15 days after 'Barcelona'.

Color.—Developing foliage, upper surface 144A, lower surfaces: 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. Leaf bud, 178C.

Petiole description:

Length.—About 2.7 cm.

Diameter.—About 1.8 mm.

Texture.—Upper and lower surfaces — pubescent.

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

Flower description:

Male inflorescences.—Catkins, color prior to elongation 194C in shade, 176D where exposed to sun.

Female inflorescence.—Style color 047B.

Stigma coloration.—047B.

Time of female flowering.—Late, 2.5 weeks after 'Barcelona'.

Time of pollen shed.—Late midseason, around the same time as 'Hall's Giant' (unpatented).

Involucre description:

Involucre constriction.—Absent.

Involucre length.—About 60% longer than nuts.

Strength of serration of indentation.—Deeply serrated.

Pubescence.—Little.

Thickness of callus at base.—Moderate callus at base similar to 'Barcelona'.

Description of jointing of bracts.—About 75% of involucre slit to the base on one side, and about 25% are entire and tubular. Involucre adheres to a few of the nuts after drop, at the side of the basal scar. About 15% are loosely held in tubular husks when the nuts fall.

Nut description:

Length.—About 18.7 mm.

Width.—About 18.9 mm.

Depth.—About 16.7 mm.

Nut shape.—Round.

*Nut shape index [(width+depth)/2*length].*—0.95.

Nut compression index (width/depth).—1.13.

Nut shell color.—167A.

Nut weight.—About 2.65 grams to 2.74 grams.

Predominant number of fruits per cluster.—Average 2 nuts per cluster.

Stripes on shell.—About 30, color slightly darker than 167A.

Fruit apex.—Moderately prominent.

Size of the fruit pistil scar.—Very small (0.5 mm×1 mm).

Nut curvature of the basal scar.—Flat (plane).

Frequency of blank nuts.—4.2%.

Time of nut maturity.—About 4 days earlier than 'Barcelona'.

Husk length.—About 50% longer than the nuts.

Kernel weight.—About 1.32 grams to 1.37 grams.

Kernel percentage (kernel weight/nut weight).—About 50%.

Kernel shape.—Globular.

Kernel cross section shape.—Circular.

Kernel base shape.—Flat.

Lateral grooves.—None.

Disease/pest resistance: Plants of the new *Corylus* are highly resistant to eastern filbert blight caused by the fungus *Anisogramma anomala* (Peck) E. Müller. Plants of the new *Corylus* are moderately resistant to bud mites (*Phytopotus avellanae* Nal.), while plants of 'Tonda Gentile delle Langhe' are highly susceptible, and plants of 'Barcelona' are highly resistant.

Temperature tolerance: Tolerates temperatures from -10 to 38° C. in the field in Corvallis, Oreg.

TABLE 1

| Primers and annealing temperatures for the 24 microsatellite marker loci used to fingerprint 'Felix' and other hazelnut cultivars. | | | | | | |
|--|---------------------------------------|---------|----------------|----|------|------|
| Locus | Repeat motif | Size | T _a | n | He | Ho |
| A613 | (TC) ₁₃ (CA) ₁₂ | 149-177 | 60 | 14 | 0.85 | 0.85 |
| A614 | (TC) ₁₇ (CA) ₁₀ | 125-156 | 60 | 14 | 0.85 | 0.85 |
| | NNN(CA) ₆ | | | | | |
| A616 | (AC) ₁₁ | 136-162 | 60 | 13 | 0.85 | 0.85 |
| A640 | (CT) ₁₅ | 354-378 | 67 | 11 | 0.80 | 0.73 |
| | (CA) ₁₃ | | | | | |
| B107 | (CT) ₁₄ | 112-151 | 55 | 14 | 0.85 | 0.80 |
| B617 | (GA) ₁₅ | 280-298 | 60 | 9 | 0.80 | 0.78 |
| B619 | (TC) ₂₁ | 146-180 | 60 | 14 | 0.88 | 0.88 |
| B634 | (AG) ₁₅ | 218-238 | 60 | 9 | 0.76 | 0.76 |
| B657 | (AG) ₁₅ | 210-228 | 60 | 8 | 0.84 | 0.98 |
| B671 | (AG) ₆ NN | 221-249 | 60 | 13 | 0.86 | 0.88 |
| | (GA) ₁₇ | | | | | |
| B709 | (GA) ₂₁ | 219-233 | 60 | 8 | 0.74 | 0.76 |
| B733 | (TC) ₁₅ | 161-183 | 60 | 8 | 0.68 | 0.68 |
| B741 | (GT) ₅ (GA) ₁₂ | 176-194 | 60 | 10 | 0.77 | 0.78 |

TABLE 1-continued

| Primers and annealing temperatures for the 24 microsatellite marker loci used to fingerprint 'Felix' and other hazelnut cultivars. | | | | | | |
|--|---------------------------------------|---------|-----|--------------------|-------|------|
| Locus | PIC | r | LG | Primers | 5'-3' | |
| B749 | (TC) ₁₂ | 200-210 | 60 | 6 | 0.60 | 0.64 |
| B751 | (GA) ₁₅ | 141-153 | 60 | 7 | 0.80 | 0.80 |
| B774 | (AG) ₁₅ | 195-213 | 60 | 8 | 0.80 | 0.80 |
| B776 | (GA) ₁₇ | 134-148 | 60 | 7 | 0.71 | 0.60 |
| B795 | (TC) ₈ Ns(CT) ₇ | 296-332 | 60 | 12 | 0.76 | 0.74 |
| | Ns(CT) ₁₀ | | | | | |
| | Ns(TC) ₅ | | | | | |
| C115 | (TAA) ₅ | 167-226 | 60 | 14 | 0.80 | 0.80 |
| | (GAA) ₁₂ | | | | | |
| KG809 | (AGG) ₆ | 333-345 | 55 | 5 | 0.66 | 0.64 |
| KG811 | (GA) ₁₇ | 240-278 | 58 | 12 | 0.83 | 0.82 |
| KG827 | (CT) ₁₃ AA | 264-282 | 67 | 9 | 0.78 | 0.84 |
| | (CA) ₇ | | | | | |
| KG830 | (CT) ₁₄ | 279-311 | 67 | 9 | 0.79 | 0.78 |
| | GTATT | | | | | |
| | (CA) ₈ | | | | | |
| Soman-G | (AAT) ₅ | | | | 54 | 3 |
| | | | | | 0.60 | 0.98 |
| | | | | | | |
| Locus | PIC | r | LG | Primers | 5'-3' | |
| A613 | 0.85 | 0.00 | 11 | Ned-CACACGCCTT | | |
| | | | | GTCACTCTTT | | |
| | | | | (SEQ ID NO: 1) | | |
| A614 | 0.84 | 0.00 | 6 | Hex-TGGCAGAGCT | | |
| | | | | TTGTCAGCTT | | |
| | | | | (SEQ ID NO: 3) | | |
| A616 | 0.83 | 0.00 | 8 | Fam-CACTCATACC | | |
| | | | | GCAAACCTCCA | | |
| | | | | (SEQ ID NO: 5) | | |
| A640 | 0.7 | 0.04 | 10 | F-TGCCCTTGCA | | |
| | | | | GTTAGTCATC | | |
| | | | | AAATGTAGG | | |
| | | | | (SEQ ID NO: 7) | | |
| B107 | 0.83 | 0.02 | 10 | Ned-GTAGGTGCAC | | |
| | | | | TTGATGTGCTT | | |
| | | | | TAC (SEQ ID NO: 9) | | |
| B617 | 0.78 | 0.01 | 8 | Fam-TCCGTGTTGA | | |
| | | | | GTATGGACGA | | |
| | | | | (SEQ ID NO: 11) | | |
| B619 | 0.7 | 0.00 | 3 | Fam-AGTCGGCTCC | | |
| | | | | CCTTTTCTC | | |
| | | | | (SEQ ID NO: 13) | | |
| B634 | 0.73 | 0.00 | 4 | Hex-CCTGCATCCA | | |
| | | | | GGACTCATTA 60 | | |
| | | | | (SEQ ID NO: 15) | | |
| B657 | 0.82 | -0.08 | 11 | Ned-GAGAGTGCCT | | |
| | | | | CTTCCTCTGG | | |
| | | | | (SEQ ID NO: 17) | | |
| B671 | 0.84 | -0.01 | 9 | Hex-TTGCCAGTGC | | |
| | | | | ATACTCTGAT G | | |
| | | | | (SEQ ID NO: 19) | | |
| B709 | 0.70 | -0.01 | 5 | Ned-CCAAGCACGA | | |
| | | | | ATGAACTCAA | | |
| | | | | (SEQ ID NO: 21) | | |
| B733 | 0.63 | 0.00 | 7.2 | Ned-CACCCCTTTCA | | |
| | | | | CCACCTCAT | | |
| | | | | (SEQ ID NO: 23) | | |
| B741 | 0.74 | 0.00 | 5 | Fam-GTTCACAGGC | | |
| | | | | TGTTGGGTTT | | |
| | | | | (SEQ ID NO: 25) | | |
| B749 | 0.51 | -0.03 | 1 | Hex-GGCTGACAAC | | |
| | | | | ACAGCAGAAA | | |
| | | | | (SEQ ID NO: 27) | | |
| B751 | 0.77 | 0.01 | 7.2 | Fam-AGCTGGTTCTT | | |
| | | | | CGACATTCC | | |
| | | | | (SEQ ID NO: 29) | | |
| B774 | 0.77 | 0.01 | 5 | Ned-GTTTTGCGAG | | |
| | | | | CTCATTGTCA | | |
| | | | | (SEQ ID NO: 31) | | |
| B776 | 0.67 | 0.07 | 6 | Fam-TGTATGTACA | | |
| | | | | CACGGAGAGA | | |
| | | | | GAGA (SEQ | | |
| | | | | ID NO: 33) | | |
| | | | | | | |

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TABLE 1-continued

| Primers and annealing temperatures for the 24 microsatellite marker loci used to fingerprint 'Felix' and other hazelnut cultivars. | | | | | | |
|--|--|-------|--|---|--|---|
| B795 | 0.74 | 0.01 | NA | Fam-GACCCACAAA CAATAACCTA TCTC (SEQ ID NO: 35) | 5 | |
| C115 | 0.77 | 0.00 | 4 | Fam-ATTTCCGCA GATAATACAGG (SEQ ID NO: 37) | 10 | B774 R-TGTGTGTGGTCT GTAGGCAC (SEQ ID NO: 32) |
| KG809 | 0.60 | 0.01 | 4 | Hex-AGGCATCAGT TCATCCAA (SEQ ID NO: 39) | B795 R-TGGGCATCATCC AGGTCTA (SEQ ID NO: 36) | Gurcan et al. 2010 |
| KG811 | 0.81 | 0.01 | 2 | Ned-AAGCGGCAC TCGCTCAC (SEQ ID NO: 41) | C115 GTTCAGATCT GCCTCCATATAA T (SEQ ID NO: 38) | Bassil et al. 2005b, Gokirmak et al. 2009 |
| KG827 | 0.75 | -0.04 | 9 | Fam-AGAACTCCGA CTAATAATCC TAACCCTTGC (SEQ ID NO: 43) | KG809 F-GGAAGGTGAGA GAAATCAAGT (SEQ ID NO: 40) | Gurcan and Mehlenbacher 2010 |
| KG830 | 0.76 | 0.00 | 9 | Ned-TGGAGGAAGT TTTGAATGGT AGTAGAGGA (SEQ ID NO: 45) | KG811 F-GAACAACTGAA GACAGCAAAG (SEQ ID NO: 42) | Gurcan and Mehlenbacher 2010 |
| Soman-G | 0.51 | -0.27 | NA | Hex-TGGCGTTGCA ACATATTCTC (SEQ ID NO: 47) | KG827 GAGGGAGCAAQ TCAAAGTTGAGA AGAAA (SEQ ID NO: 44) | Gurcan and Mehlenbacher 2010 |
| Locus | Primers 5'-3' | | Reference | | | |
| A613 | R-CCCCTTCACAT GTTTGCTT (SEQ ID NO: 2) | | Gurcan et al. 2010 | | | |
| A614 | R-GCAGTGGAGGA TTGCTGACT (SEQ ID NO: 4) | | Gurcan et al. 2010 | | | |
| A616 | R-ATGGCTTTGCT TCGTTTG (SEQ ID NO: 6) | | Gurcan et al. 2010 | | | |
| A640 | Fam-CGCCATATAATT GGGATGCTTGTT G (SEQ ID NO: 8) | | Gurcan et al. 2010 | | | |
| B107 | R-AACACCATAATTG AGTCTTCAAAG C (SEQ ID NO: 10) | | Boccacci et al. 2005; Gokirmak et al. 2009 | | | |
| B617 | R-TGTTTTGGTGG AGCGATG (SEQ ID NO: 12) | | Gurcan et al. 2010 | | | |
| B619 | R-GCGATCTGACCT CATTTTG (SEQ ID NO: 14) | | Gurcan et al. 2010 | | | |
| B634 | R-GTGCAGAGGTTG CACTCAAA (SEQ ID NO: 16) | | Gurcan et al. 2010 | | | |
| B657 | R-AGCCTCACCTCC AACGAAC (SEQ ID NO: 18) | | Gurcan et al. 2010 | | | |
| B671 | R-ACCAGCTCTGGG CTTAACAC (SEQ ID NO: 20) | | Gurcan et al. 2010 | | | |
| B709 | R-GCGGGTTCTCGT TGTACACT (SEQ ID NO: 22) | | Gurcan et al. 2010 | | | |
| B733 | R-CATCCCCCTGTTG GAGTTTTC (SEQ ID NO: 24) | | Gurcan et al. 2010 | | | |
| B741 | R-CGTGTTGCTCAT GTGTTGTG (SEQ ID NO: 26) | | Gurcan et al. 2010 | | | |
| B749 | R-TCGGCTAGGGTT AGGGTTTT (SEQ ID NO: 28) | | Gurcan et al. 2010 | | | |
| B751 | R-AAACTCAAATA AAACCCCTGCTC (SEQ ID NO: 30) | | Gurcan et al. 2010 | | | |

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TABLE 1-continued

| Primers and annealing temperatures for the 24 microsatellite marker loci used to fingerprint 'Felix' and other hazelnut cultivars. | | | | | | |
|--|---|--|---|--|--|-------------|
| B774 | R-TGTGTGTGGTCT GTAGGCAC (SEQ ID NO: 32) | 5 | Gurcan et al. 2010 | | | |
| B776 | R-TGAGGGGAAGA GGTTTGATG (SEQ ID NO: 34) | 10 | Gurcan et al. 2010 | | | |
| B795 | R-TGGGCATCATCC AGGTCTA (SEQ ID NO: 36) | 15 | Gurcan et al. 2010 | | | |
| C115 | GTTCAGATCT GCCTCCATATAA T (SEQ ID NO: 38) | 20 | Bassil et al. 2005b, Gokirmak et al. 2009 | | | |
| KG809 | F-GGAAGGTGAGA GAAATCAAGT (SEQ ID NO: 40) | KG811 F-GAACAACTGAA GACAGCAAAG (SEQ ID NO: 42) | Gurcan and Mehlenbacher 2010 | | | |
| KG827 | GAGGGAGCAAQ TCAAAGTTGAGA AGAAA (SEQ ID NO: 44) | KG830 AAAGCAACTCAT AGCTGAAGTCCA ATCA (SEQ ID NO: 46) | Gurcan and Mehlenbacher 2010 | | | |
| Soman-G | R-GCCATCTTACA AAGTCGATACAG (SEQ ID NO: 48) | | Soman-G R-GCCATCTTACA AAGTCGATACAG (SEQ ID NO: 48) | | | unpublished |
| Primer fluorescent tags are FAM, HEX, and NED. | | | | | | |
| Ta: 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 | | | | | | |

TABLE 2

| Allele sizes in 'Felix' and other hazelnut cultivars at 24 microsatellite loci. | | | | | | |
|---|-------|---------|-----------|---------|------------------------------|--|
| Tag | Locus | 'Felix' | '384.095' | 'Delta' | 'Tonda Gentile delle Langhe' | |
| NED | A613 | 149/151 | 151/169 | 149/177 | 151/157 | |
| HEX | A614 | 139/143 | 135/139 | 143/158 | 125/135 | |
| FAM | A616 | 150/150 | 150/150 | 150/150 | 148/150 | |
| FAM | A640 | 368/372 | 368/372 | 362/372 | 354/368 | |
| NED | B107 | 130/152 | 130/152 | 122/130 | 134/152 | |
| FAM | B617 | 286/286 | 286/286 | 286/286 | 286/296 | |
| FAM | B619 | 156/164 | 148/164 | 156/164 | 148/164 | |
| HEX | B634 | 226/234 | 226/226 | 226/234 | 226/226 | |
| NED | B657 | 218/226 | 218/222 | 222/226 | 218/226 | |
| HEX | B671 | 227/235 | 227/247 | 235/247 | 237/241 | |
| NED | B709 | 227/231 | 225/231 | 227/227 | 227/227 | |
| NED | B733 | 173/179 | 171/173 | 173/179 | 171/173 | |
| FAM | B741 | 177/186 | 177/186 | 177/186 | 177/184 | |
| HEX | B749 | 206/206 | 206/208 | 206/208 | 206/208 | |
| FAM | B751 | 151/153 | 143/153 | 143/151 | 149/153 | |
| NED | B774 | 203/213 | 203/203 | 207/213 | 203/211 | |
| FAM | B776 | 148/150 | 137/148 | 137/150 | 137/137 | |
| FAM | B795 | 330/330 | 310/330 | 314/330 | 312/330 | |
| FAM | C115 | 197/215 | 173/197 | 197/215 | 173/173 | |
| HEX | KG809 | 336/345 | 336/336 | 345/345 | 336/339 | |
| NED | KG811 | 248/264 | 242/248 | 254/264 | 254/264 | |
| FAM | KG827 | 270/282 | 276/282 | 270/270 | 266/268 | |
| NED | KG830 | 291/303 | 289/303 | 291/297 | 291/295 | |
| HEX | SMNG | 196/200 | 196/200 | 196/196 | 196/200 | |

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TABLE 2-continued

| Allele sizes in 'Felix' and other hazelnut cultivars at 24 microsatellite loci. | | | | |
|---|-------|-------------|------------------|-----------|
| Tag | Locus | 'Barcelona' | 'Extra Ghiaglia' | 'Gasaway' |
| NED | A613 | 151/159 | 167/169 | 159/161 |
| HEX | A614 | 125/131 | 125/150 | 143/158 |
| FAM | A616 | 142/150 | 150/158 | 148/148 |
| FAM | A640 | 354/374 | 374/374 | 362/368 |
| NED | B107 | 112/134 | 116/116 | 122/128 |
| FAM | B617 | 286/290 | 294/296 | 292/296 |
| FAM | B619 | 156/170 | 164/174 | 170/174 |
| HEX | B634 | 226/226 | 226/226 | 220/232 |
| NED | B657 | 218/222 | 210/222 | 224/228 |
| HEX | B671 | 223/227 | 227/247 | 235/247 |
| NED | B709 | 225/233 | 225/227 | 227/227 |
| NED | B733 | 171/173 | 171/171 | 173/173 |
| FAM | B741 | 177/186 | 177/184 | 186/188 |
| HEX | B749 | 208/208 | 208/208 | 206/208 |
| FAM | B751 | 143/153 | 143/147 | 143/143 |
| NED | B774 | 203/207 | 195/203 | 203/209 |
| FAM | B776 | 135/137 | 135/137 | 146/150 |
| FAM | B795 | 330/330 | 296/310 | 314/316 |
| FAM | C115 | 173/194 | 182/194 | 215/218 |
| HEX | KG809 | 336/336 | 336/339 | 336/345 |
| NED | KG811 | 258/264 | 240/242 | 254/258 |
| FAM | KG827 | 280/282 | 276/282 | 270/280 |
| NED | KG830 | 291/295 | 291/295 | 291/305 |
| HEX | SMNG | 196/200 | 196/200 | 196/196 |

References:

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- Gürçan, K., S. A. Mehlenbacher and V. Erdogan. 2010a. Genetic diversity in hazelnut cultivars from Black Sea countries assessed using SSR markers. Plant Breeding (available on-line) doi:10.1111/j.1439-0523.2009.01753.x).
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- Gürçan, K. and S. A. Mehlenbacher. 2010. Development of microsatellite marker loci for European hazelnut (*Corylus avellana* L.) from ISSR fragments. Molecular Breeding (available on-line).

SEQUENCE LISTING

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We claim:

1. A new and distinct cultivar of *Corylus* plant named 'Felix', as illustrated and described.

* * * * *



FIG. 1



FIG. 2

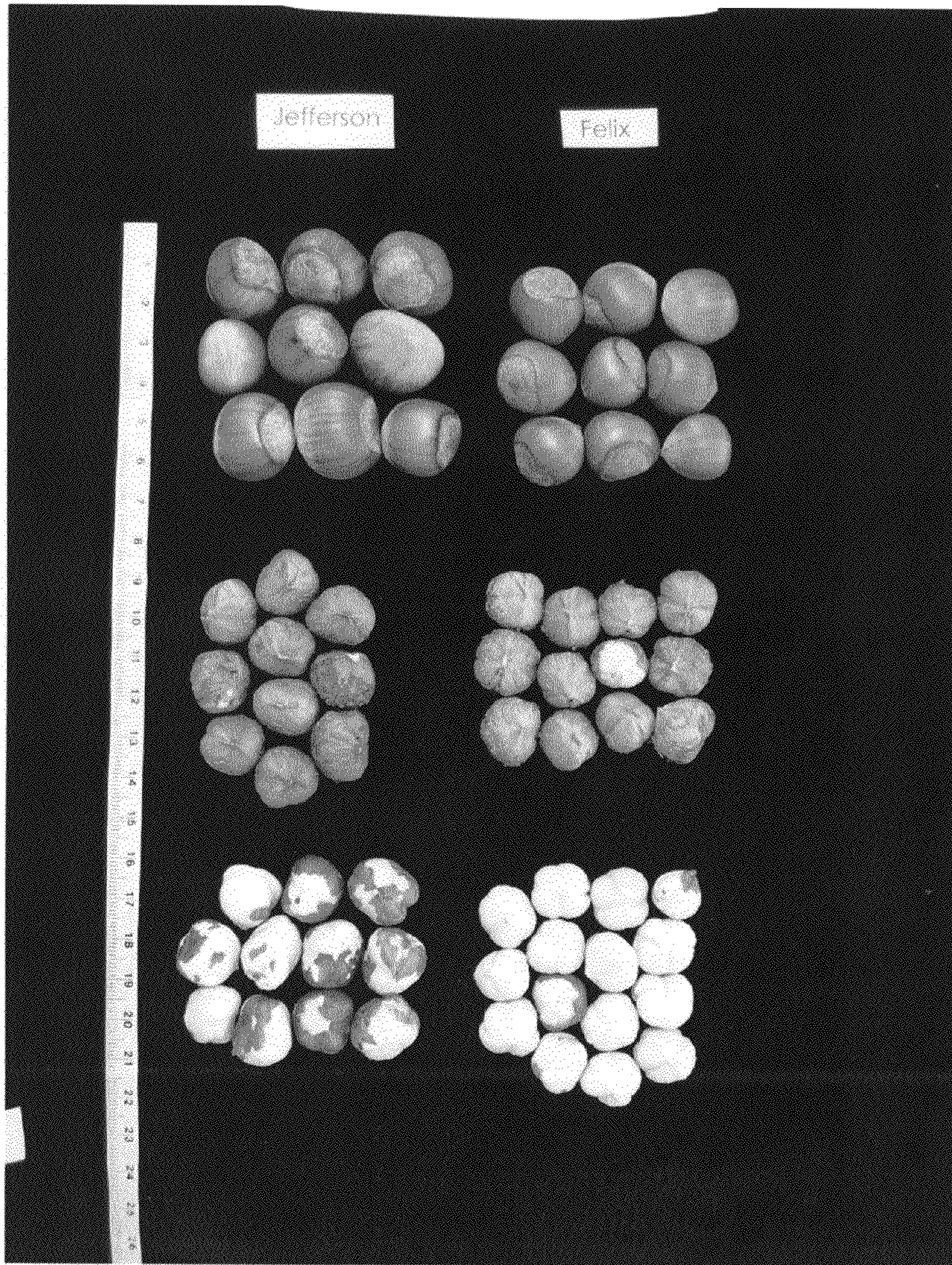


FIG. 3



FIG. 4

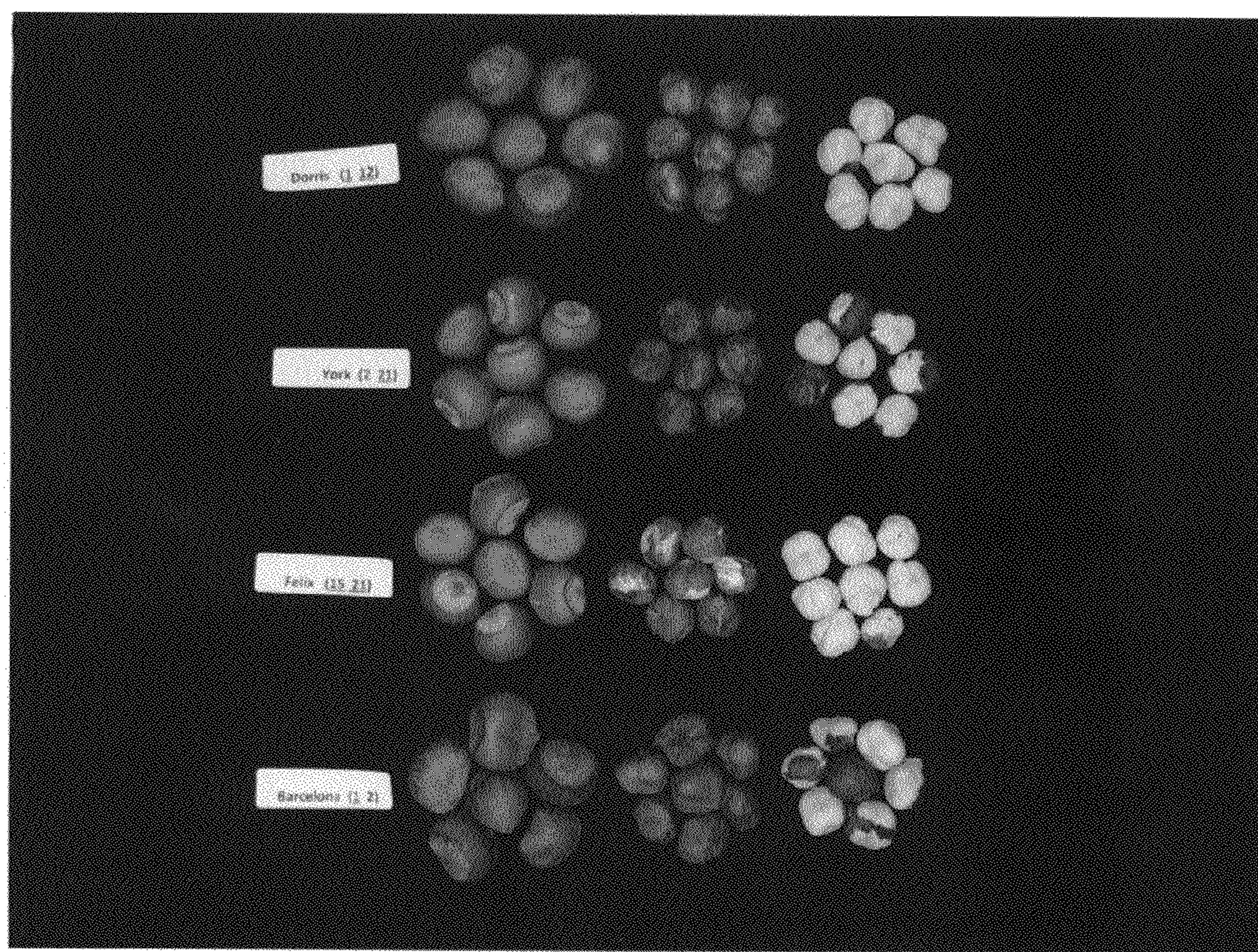


FIG. 5