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

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(45) **Date of Patent: Dec. 9, 2003**

(54) **MAHALEB ROOTSTOCK NAMED 'UCMH 59'**

(50) Latin Name: ***Prunus mahaleb***
Varietal Denomination: **UCMH 59**

(75) Inventor: **Stephen M. Southwick**, Davis, CA (US)

(73) Assignee: **The Regents of the University of California**, Oakland, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 31 days.

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(22) Filed: **Dec. 28, 2001**

(65) **Prior Publication Data**

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(52) **U.S. Cl.** **Plt./180**
(58) **Field of Search** Plt./183, 180

Primary Examiner—Anne Marie Grunberg
(74) *Attorney, Agent, or Firm*—Burns, Doane, Swecker & Mathis, L.L.P.

(57) **ABSTRACT**

A new and distinct cultivar of *Prunus mahaleb* is provided. The new cultivar is particularly well suited for serving as an understock during cherry production. A number of advantages are provided when compared to the standard Mahaleb rootstock. The cultivar is readily amenable to vegetative propagation (e.g., by the use of softwood cuttings), and exhibits some improved resistance to Phytophthora spp. When used with a 'Bing' cherry scion, increased yields and yield efficiency have been observed without reduced fruit size. Improved precocity in bearing is displayed when compared to the standard Mahaleb rootstock. The new cultivar when grown without use as an understock forms a larger and more vigorous tree than the 'UCMH 55' and 'UCMH 56' cultivars that were products of the same research program. When used as a rootstock, the new cultivar produces a compact tree with a size reduction of approximately 20 to 25 percent compared to that produced when using a standard Mahaleb rootstock. Few suckers are produced.

5 Drawing Sheets

Botanical/commercial classification: *Prunus mahaleb*/ Mahaleb Rootstock.

Varietal denomination: cv. 'UCMH 59'.

SUMMARY OF THE INVENTION

Mahaleb rootstocks (i.e., *Prunus mahaleb* rootstocks) are widely used during both sweet and sour cherry production throughout the world. It has been the common practice to form such rootstock plants from seed following the random outcrossing of parent plants. Accordingly, cherry production encountered when using such plants as an understock has tended to be somewhat variable due to differences in the genotype of the understock. Such variation often has led to reduced field performance on some cherry trees on a random and unpredictable basis. Mahaleb rootstocks in the past have generally been found to be incapable of vegetative propagation on a reliable basis, such as through the use of softwood and hardwood cuttings. Also, such rootstocks in the past have been susceptible to root and crown fungal diseases generally known as Phytophthora spp.

SUMMARY OF THE NEW CULTIVAR

It was an object of my research to provide *Prunus mahaleb* rootstocks that possess characteristics that overcome shortcomings of the Mahaleb rootstock presently being used during cherry production. More specifically, it was my goal to provide cherry rootstocks that could be vegetatively propagated in an expeditious and reliable manner so that cherry growers can eliminate crop variation that can be traced to lack of uniformity in the rootstock. Also, it was a goal of my research to provide new Mahaleb rootstocks that inherently display needed resistance to disease and thereby make possible a satisfactory cherry crop on a more consistent basis combined with a reduction in the need to replant because of tree loss that is traceable to disease.

The original tree of the new *Prunus mahaleb* cultivar of the present invention was discovered through detailed evaluation and selection while growing in a cultivated area at the Experimental Orchards at the University of California located at Davis, Calif., U.S.A. The exact parentage of the new cultivar is unknown. The seeds used to form the planting where the discovery took place came from a random collection of wild *Prunus mahaleb* germplasm that had been collected from around the world. The large number of seedlings present in the planting were carefully studied and evaluated and a single plant possessing the combination of characteristics of the new cultivar of the present invention was selected and was preserved. Had this plant not been discovered and preserved, it would have been lost to mankind.

Other *Prunus mahaleb* cultivars resulting from the same research are 'UCMH 55' (U.S. Plant patent application Ser. No. 10/028,771, filed concurrently herewith), and 'UCMH 56' (U.S. Plant patent application Ser. No. 10/028,772, filed concurrently herewith).

It was found that the new *Prunus mahaleb* cultivar of the present invention exhibits the following combination of characteristics:

(a) readily is amenable to vegetative propagation,

(b) performs well as an understock for cherry production,

(c) forms a larger and more vigorous tree than the 'UCMH 55' cultivar and the 'UCMH 56' cultivar,

(d) when used as an understock produces a compact tree with a size reduction of approximately 20 to 25 percent,

(e) displays some improved resistance to Phytophthora spp.,

(f) makes possible increased 'Bing' sweet cherry scion yield and yield efficiency without reduced fruit size when comapred to the standard Mahaleb rootstock,

(g) demonstrates improved precocity in bearing when compared to the standard Mahaleb rootstock, and

(h) produces few suckers.

In the past there have been no compact or dwarfing selections of *Prunus mahaleb* available in the world and dwarf trees are preferred in cherry culture worldwide.

In view of the above combination of characteristics, the new cultivar of the present invention well meets the needs of cherry producers for use as an improved rootstock. Cherry scion characteristics are no longer influenced by variation in the Mahaleb rootstock resulting from the random outcrossing of parental plants. Also, the disease resistance made possible by the new cultivar is a major advantage for cherry producers.

The new cultivar of the present invention has been repeatedly reproduced through the use of softwood and hardwood cuttings at Davis, Calif., U.S.A. Such propagation has confirmed that the characteristics of the new cultivar are stable and are firmly fixed and are transmitted to subsequent generations on a reliable basis.

The new cultivar of the present invention initially was designated 'UC MAHALEB 159-5', and subsequently has been named 'UCMH 59'.

BRIEF DESCRIPTION OF THE PHOTOGRAPHS

The accompanying photographs show specimens of the plant and plant parts, and also provide DNA information concerning the new cultivar of the present invention. Color is shown as nearly true as is possible to make the same in color illustrations of this character. The trees of the new cultivar were grown at the Experimental Orchards of the University of California located at Davis, Calif., U.S.A.

FIG. **1** shows a tree of approximately 5 to 7 years of age during December. The tree is a mother plant that was being used to make propagules for additional testing and evaluation. Most of the leaves had dropped by the end of the preceding October.

FIG. **2** shows a specimen of a current season's shoot with leaves collected during mid-October. Such shoot was suitable for use to make a hardwood or semi-hardwood cutting.

FIG. **3** shows specimens of typical branches with buds and dried fruit of the new cultivar during the winter. Dimensions in inches and centimeters are included.

FIG. **4** shows specimens of typical stones of the new cultivar during the winter. Dimensions in centimeters and inches are included.

FIG. **5** shows the DNA fingerprint of the new cultivar of the present invention as well as that of the 'UCMH 55' and 'UCMH 56' cultivars for comparative purposes. Three microsatellite markers were used during the DNA determinations (i.e., PMS30, PMS40 and PMS15). Data with respect to the plants of the new cultivar of the present invention is designated "159-5". Data with respect to the plants of the 'UCMH 55' cultivar is designated "155-1", and data with respect to the 'UCMH 56' cultivar is designated "159-5".

FIG. **6** shows typical inflorescences of the new cultivar.

The primer (SEQ ID NOS.: 1–6) used in this determination are as follows:

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PMS 30    Forward CTG TCG AAA TGC CTA TGC
          Reverse ATG AAT GCT GTG TAC ATG AGGC.
PMS 40    Forward TCA CTT TCG TCC ATT TTC CC
          Reverse TCA TTT TGG TCT TTG AGC TCG.
PMS 15    Forward TCC GCT TCT CTG TGA GTG TG
          Reverse CGA TAG TTT CCT TCC CAG ACC.
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When preparing the DNA fingerprints, a total of six leaf samples were randomly collected from two different but replicate trees. Accordingly, each genotype was sampled and replicated twice. The two samples are distinguished during the presentation of data by the final digit shown in FIG. **5** (i.e., by "−1" or by "−2"). DNA was extracted using Dneasy Plant Kit from Qiagene, Inc. (Valencia, Calif., U.S.A.) following the manufacturer's protocol. The extracted DNA was purified by adding 1/10 volume 3M sodium acetate and 2 volumes 100 percent ethanol and subsequent storage at −20° C. for an hour. The samples were centrifuged at 13,000 rpm for 15 minutes and the pellets were washed two times with 70 percent ethanol. The pellets were air dried and resolved in 50 μl TE buffer. Quantification of DNA was performed with ethidium bromide agarose gel plates. PCR was carried out under the following conditions: 100–150 ng of template DNA, 250 nM of each primer, 200 μM of dNTPs, 0.5 U of Taq Polymerase, and 1.5 mM of $MgCl_2$. The reaction was run for 45 cycles (denaturing at 94° C. for 1 minute, annealing at 60° C. for 1 minute, with a two minute extension at 72° C.), followed by a single extension at 72° C. for 60 minutes. The amplification products were detected on 5.5 percent polyacrylamide gels using a Li-Cor IR^2 4200 DNA sequencer (Li-Cor, Nebr., U.S.A.). The three microsatellite markers clearly distinguished the three cultivars. Both repeats of each rootstock showed identical fingerprints. The marker PMS30 produced two bands for rootstock 'UCHM 55' at 132 bp (base pair) and 159 bp, two bands for 'UCMH 56' at 132 bp and 168 bp, and one band for 'UCMH 59' at 142 bp. Marker PMS40 produced two bands for 'UCMH 55' at 92 bp and 111 bp, and one band for 'UCMH 56' at 92 bp, and two bands for 'UCMH 59' at 92 bp and 129 bp. Marker PMS15 produced two bands for 'UCMH 55' at 118 bp and 128 bp, two bands for 'UCMH 56' at 112 bp and 123 bp, and two bands for 'UCMH 59' at 105 bp and 115 bp.

FIG. **6** shows a typical inflorescence.

DETAILED DESCRIPTION

The following is a detailed description of the new cultivar. The tree was grown at the Experimental Orchards of the University of California at Davis, Calif., U.S.A. Color designations are presented with reference to the "Dictionary of Color" by Maerz and Paul, First Edition (1930).

Tree:

Size.—More vigorous than the 'UCMH 55' and 'UCMH 56' cultivars. An eight year-old tree of the 'UCMH 59' cultivar that has undergone some pruning commonly will display a height of approximately 4 meters and a width of approximately 3 meters. Trunk girth at 30 cm above the soil line commonly will possess a cross-sectional area of approximately 400 cm^2.

Growth.—Spreading, with shoots in the upper canopy being upright or perpendicular to the ground and shoots of varying age in the lower canopy being very pendulous.

Wood.—Both the current season and the previous season wood is fine and commonly approximately 0.5 to 1 cm in diameter.

Bark.—Possesses a rough raised surface and an Iron grey (24 A 2) coloration.

Branches:

Shoot growth form.—Straight to pendulous, laterals are highly branched and secondaries are mostly branched, and laterals commonly arise at approximately 45 to 70 degrees.

Size.—Both current and previous season wood is fine and varies in diameter from approximately 0.5 to 1 cm. There commonly is very long current season growth of approximately 1 m in length.

Spurs.—Commonly 3 to 9 spurs are present per 85 cm of previous season shoot that measure approximately 0.5 to 4.5 cm in length. Spurs are largely borne on very pendulous long shoots in the lower canopy. The coloration is Chickadee gray (47A 1) underlaid with Malaga (7 L 1).

Internode length.—Approximately 2 to 3 cm in length. Internodes of mixed shoots commonly vary in length from 0.2 to 3.8 cm.

Shoot bark.—Smooth in texture, and the coloration is green-olive (14 K 1), and Arabian brown (14 A 11) to silvery brown (14 A 1).

Main scaffold bark.—Platinum (45 A 3) in coloration with an underlay of Rubient (55 L 8). The same coloration also is present on lower large limbs.

Lenticels.—Prominent, densely distributed, and under magnification are raised. The size on subsidiary branches commonly ranges from 1 to 3 mm in length with approximately 15 lenticels being present per square inch. The coloration is Parchment (12 B 3).

Axillary buds.—Vegetative buds are borne on entirely lateral shoots and within mixed shoots bearing inflorescences. They are imbricate, sessile, and single. The bud tips are pointed and the bud pose is adpressed on dormant new wood. The bud support is small.

Leaves:

Bearing.—Simple, spiraled around the shoot, and petiolate.

Pose.—Curved outward and downward.

Size.—Approximately 5 to 6 cm in length excluding the petiole and approximately 3 to 4.5 cm in width on the upper canopy and the lower canopy.

Width.—Approximately 3 to 4.5 cm on the upper canopy and on the lower canopy.

Form.—Oval-elliptic to oval with an acuminate tip and a truncate base on the upper canopy and on the under canopy.

Margins.—Crenate and glandular between rounded teeth.

Surfaces.—Glabrous on the dorsal and ventral surfaces with short stiff hairs along the midrib of the ventral surface that are visible with magnification.

Petiole.—Commonly with glands that are Russet brown (14 I 12) at the leaf-petiole juncture, approximately 1.5 to 2 cm in length, and Russet green (20 K 1) in coloration. Such glands commonly are less than 1 mm in length and less than 0.5 mm in width.

Venation.—Pinnate, with the midrib and other venation being Russet green (20 K 1) in coloration.

Color.—21 L 6 (Parrot green) to 21 L 9 on the upper surface and Piquant green (20 K 6) on the under surface.

Leaf drop.—On Dec. 11, 2002 there was approximately 95 percent leaf fall.

Flowers:

Bloom time.—Full bloom on Apr. 6, 2002.

Floral buds.—Approximately 2 mm in length and approximately 1 mm in width, and Burmese ruby (7 H 6) in coloration.

Type.—Single or inflorescent in panicles.

Form.—The paniculate inflorescence commonly has 5 to 10 flowers, with a peduncle (rachis subtending the first flower) of approximately 3 mm to 1.8 cm in length and a pedicel of approximately 0.8 to 1 cm in length. The overall length of the inflorescence commonly is 2 to 3.5 cm excluding the peduncle. Anthesis proceeds acropetally within the inflorescence. The paniculate inflorescence commonly bears two bracts at the base of or on the peduncle and a single bract at the base of each pedicel. Single flowers commonly are borne on a pedicel having a length of approximately 1 to 1.3 cm, and a coloration of Cossak green (23 L 11). The bracts and peduncles are also Cossak green (23 L 11) in coloration.

Bearing.—On previous season laterals and commonly in clusters of three to seven blossoms. Inflorescences are mostly borne on pendulous long (approximately 40 to 100 cm) mixed shoots throughout the canopy. Fruit-bearing wood is one year-old wood and may be a 1 or 2 degree lateral, a mixed shoot in that the proximal portion (½ to ¾ of the shoot) is vegetative with axillary shoots that break after flowering, and with the distal portion of one year-old wood that bears inflorescences directly on the fruit wood in the absence of spurs. Current season shoot growth begins at the terminus after bloom. Inflorescences are whorled along the shoot. The terminus bud is a mixed vegetative bud (leaves and shoot).

Pollination required.—Any Mahaleb rootstock that is producing flowers which overlap with the bloom period.

Color.—White.

Petal number.—Five consistent with the genus Prunus.

Petal size.—Approximately 8 mm in length and approximately 7 mm in width.

Sepals.—Five.

Carpel.—Single with two ovules (one of which usually aborts).

Pistil.—Approximately 5 to 6 mm in length with the stigma and style being Marguerite yellow (10 C 1) in coloration.

Stamen.—Commonly ten to eleven per flower, and approximately 6 to 8 mm in length.

Anthers.—Sulphur yellow (10 J 1) in coloration when indehiscent.

Filaments.—Marguerite yellow (10 C 1) in coloration.

Pollen.—Sulphur yellow (10 J 1) in coloration.

Scent.—Mildly fragrant and similar to that of almond flowers.

Fruit:

Chilling requirement.—Approximately 750 to 1,000 hours less than or equal to 45° F.

Bearing.—Drupe.

Maturity date.—Late June to early July.

Skin color.—Dark purple-mahogany (56 A 12) to near black (48 A 12).

Flesh color.—Dark purple-mahogany (56 A 12) to near black (48 A 12).

Flesh firmness.—Soft when fully ripe and juicy.
Cracking susceptibility.—None observed during observations to date.
Eating quality.—Astringent and bitter taste renders unsuitable for eating.
Shape.—Substantially round.
Size.—Approximately 0.8 to 1.2 cm in diameter.
Juice color.—Dark purple-mahogany (56 A 12) to black (48 A 12).
Fruit drop.—Susceptibility is moderate (approximately 20 to 50 percent).
Fruit stalk.—Short, approximately 1 to 1.5 cm in length. Very small bracts may persist at the base of the inflorescence and some pedicels. Such bracts are Paradise green (22 L 11) in coloration.
Stone shape.—Variable and intermediate between round and oval (as illustrated in FIG. **4**).
Stone size.—Small and approximately 7 to 8 mm in length.
Seed color.—Oyster white (10 B 1).

Disease resistance: The new cultivar has shown over a 90 percent survival rate in field trials at sites that are heavily infested with Phytophthora spp. and stem pitting virus. At the same sites, approximately 50 percent of the standard Mahaleb plants died.

Vegetative propagation: The new cultivar asexually reproduces well through the rooting of softwood and hardwood cuttings. The use of softwood cuttings is preferred.

Use as a scion rootstock: Field testing has been conducted using a scion of 'Bing' cherry following budding. Full bloom appeared slightly earlier than when utilizing a standard Mahaleb rootstock. This may lead to earlier ripening fruit or suggest a lower chill requirement for the rootstock compared to standard Mahaleb. The new cultivar has been found to yield a considerably smaller scion tree than that formed on the standard Mahaleb rootstock. For instance, a size reduction of approximately 20 to 25 percent has been observed. Precocious flowering and cropping are facilitated when using the new cultivar as a rootstock. For instance, flower and fruit production can begin easily in the 4th or 5th growing season with the flowers opening earlier in the season. During observations to date yield efficiency has been improved five-fold when using the new cultivar as a rootstock. Accordingly, the new variety has been found to provide greater productivity per unit of land occupied. Fruit harvest during 2001 showed a lower number of abnormally shaped 'Bing' cherry fruit compared to the standards. This is considered to be surprising since dwarf or compact trees commonly yield higher numbers of abnormally shaped fruit leading to reduced pack-out of saleable fruit. The fruit size has been found to be comparable to that formed with standard Mahaleb rootstock. To date the new cultivar produced low numbers of root and crown suckers.

SEQUENCE LISTING

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cgatagtttc cttcccagac c 21

I claim:

1. A new and distinct cultivar of *Prunus mahaleb* plant that exhibits the following combination of characteristics:

(a) readily is amenable to vegetative propagation,

(b) performs well as an understock for cherry production,

(c) forms a larger and more vigorous tree than the 'UCMH 55' cultivar and the 'UCMH 56' cultivar,

(d) when used as understock produces a compact tree with a size reduction of approximately 20 to 25 percent,

(e) displays improved resistance to Phytophthora spp.,

(f) makes possible increased 'Bing' sweet cherry scion yield and yield efficiency without reduced fruit size when compared to the standard Mahaleb rootstock,

(g) demonstrates improved precocity in bearing when compared to the standard Mahaleb rootstock, and

(h) produces few suckers;

substantially as illustrated and described.

* * * * *

FIG. 1

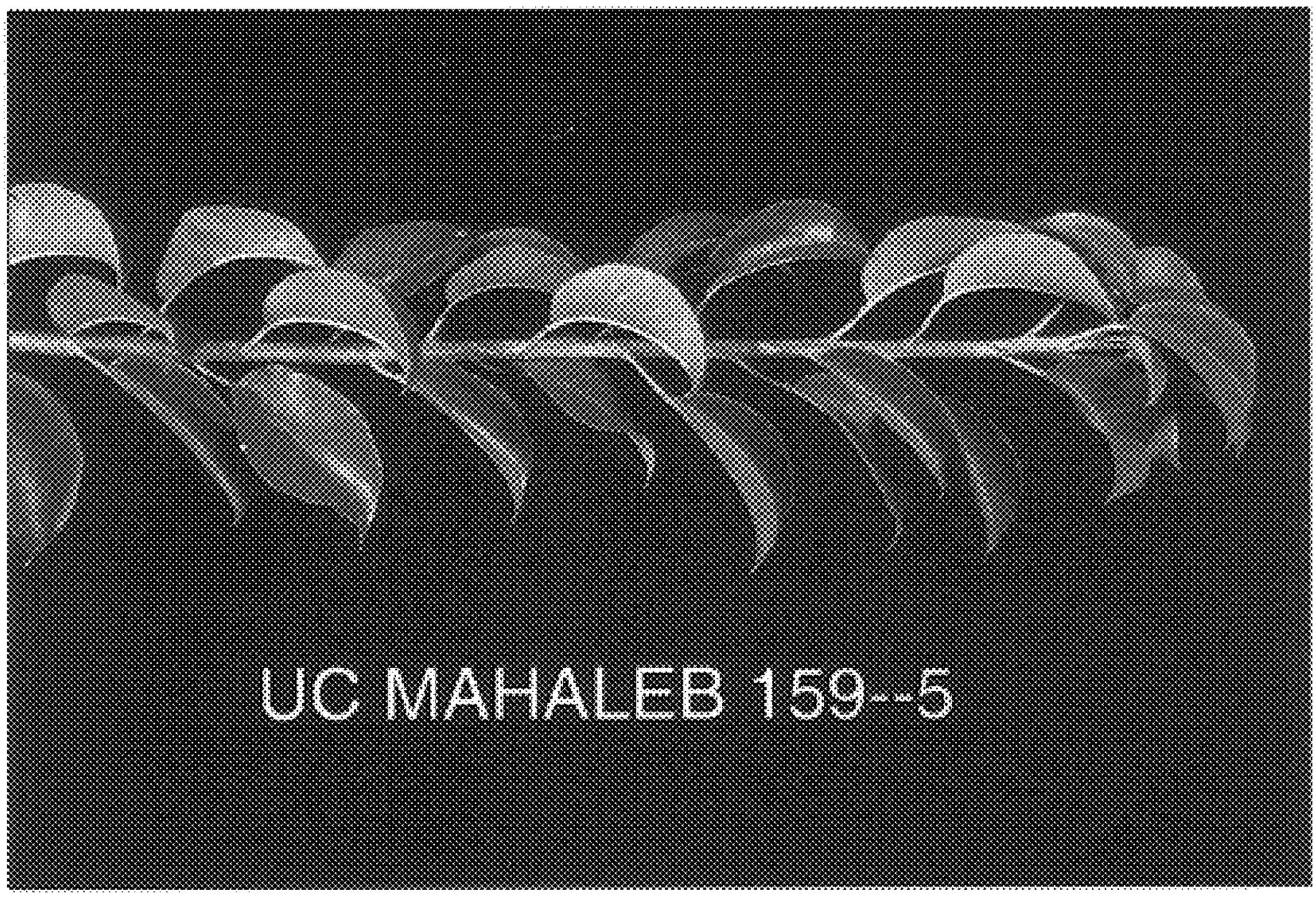

FIG. 2

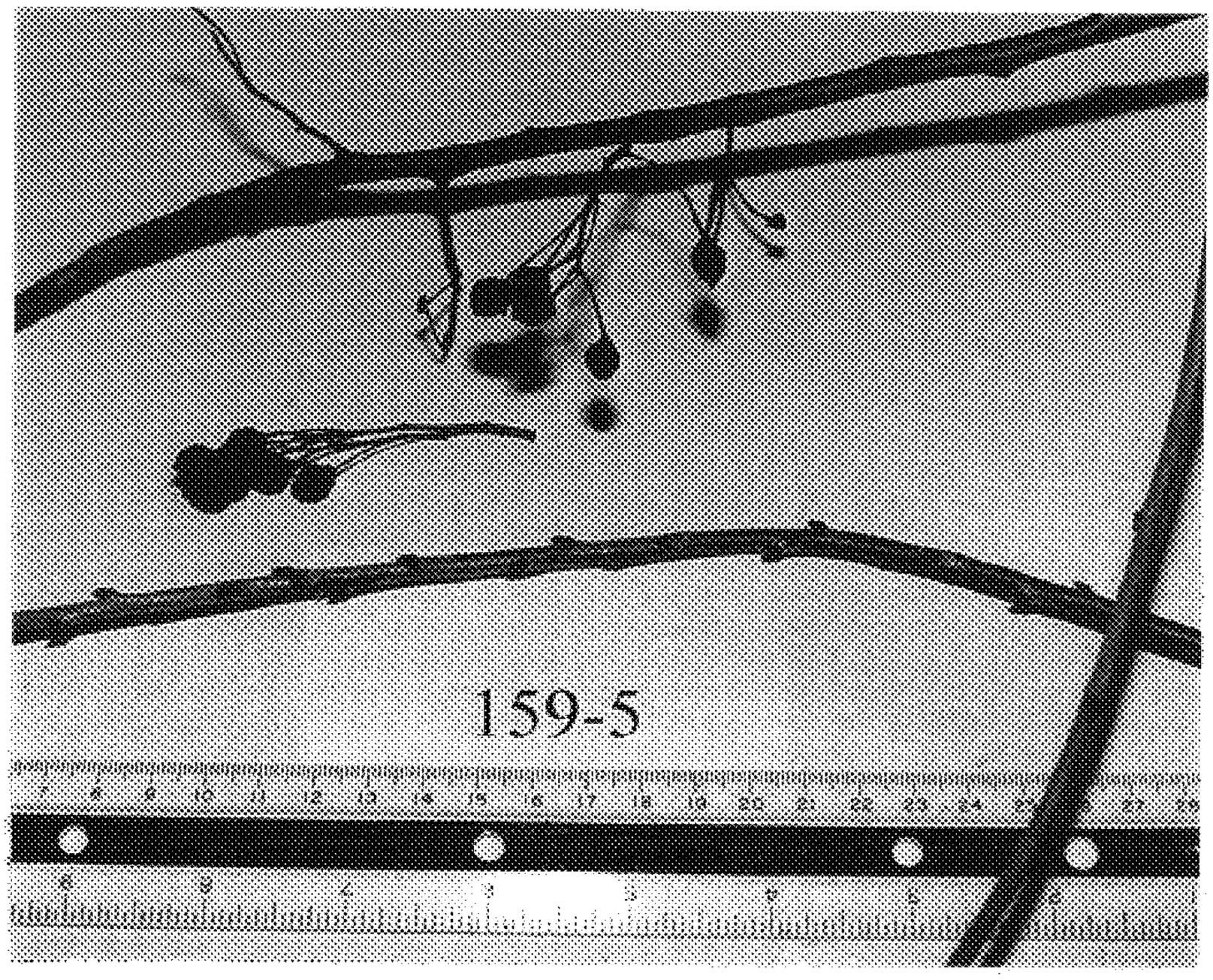

FIG. 3

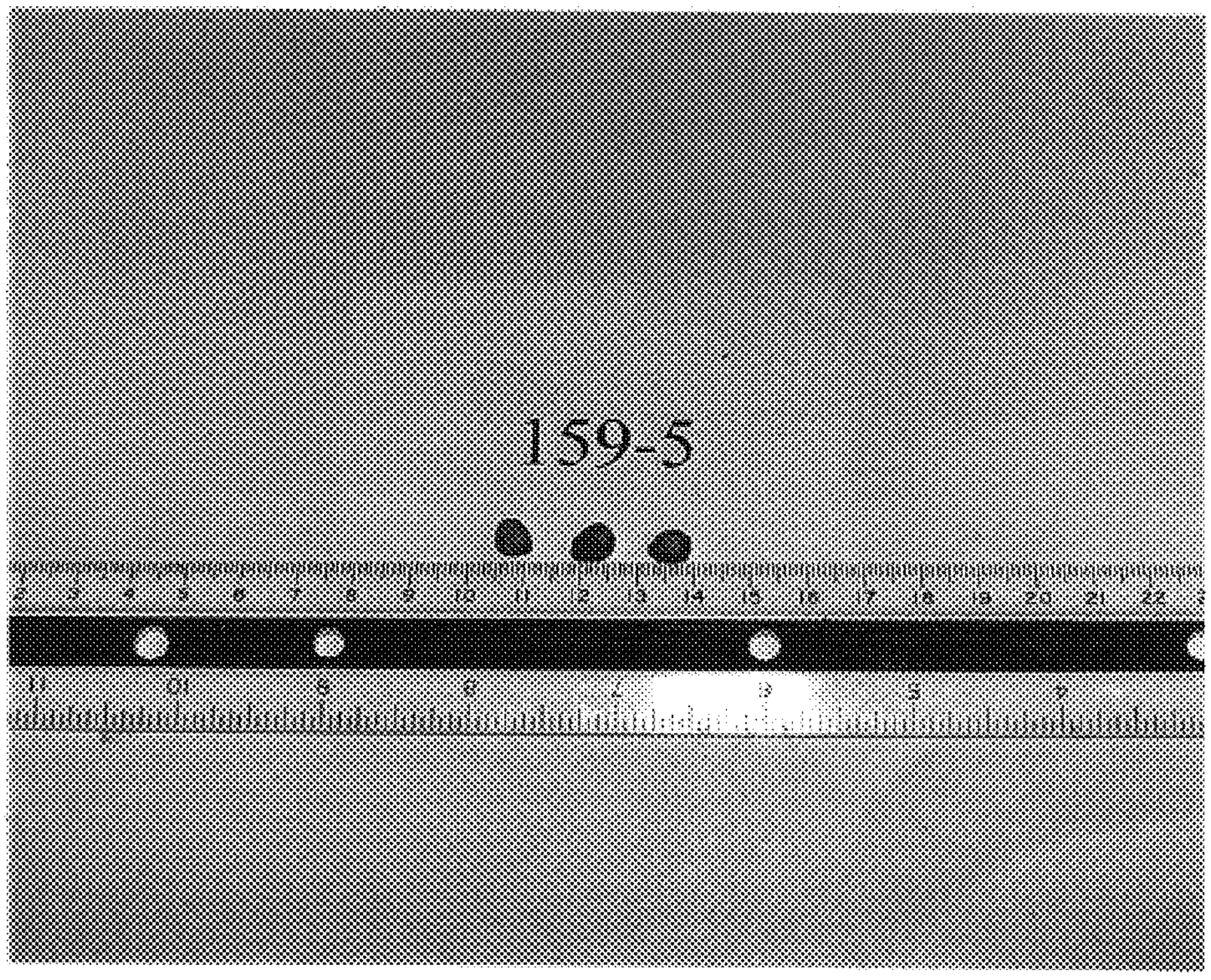

FIG. 4

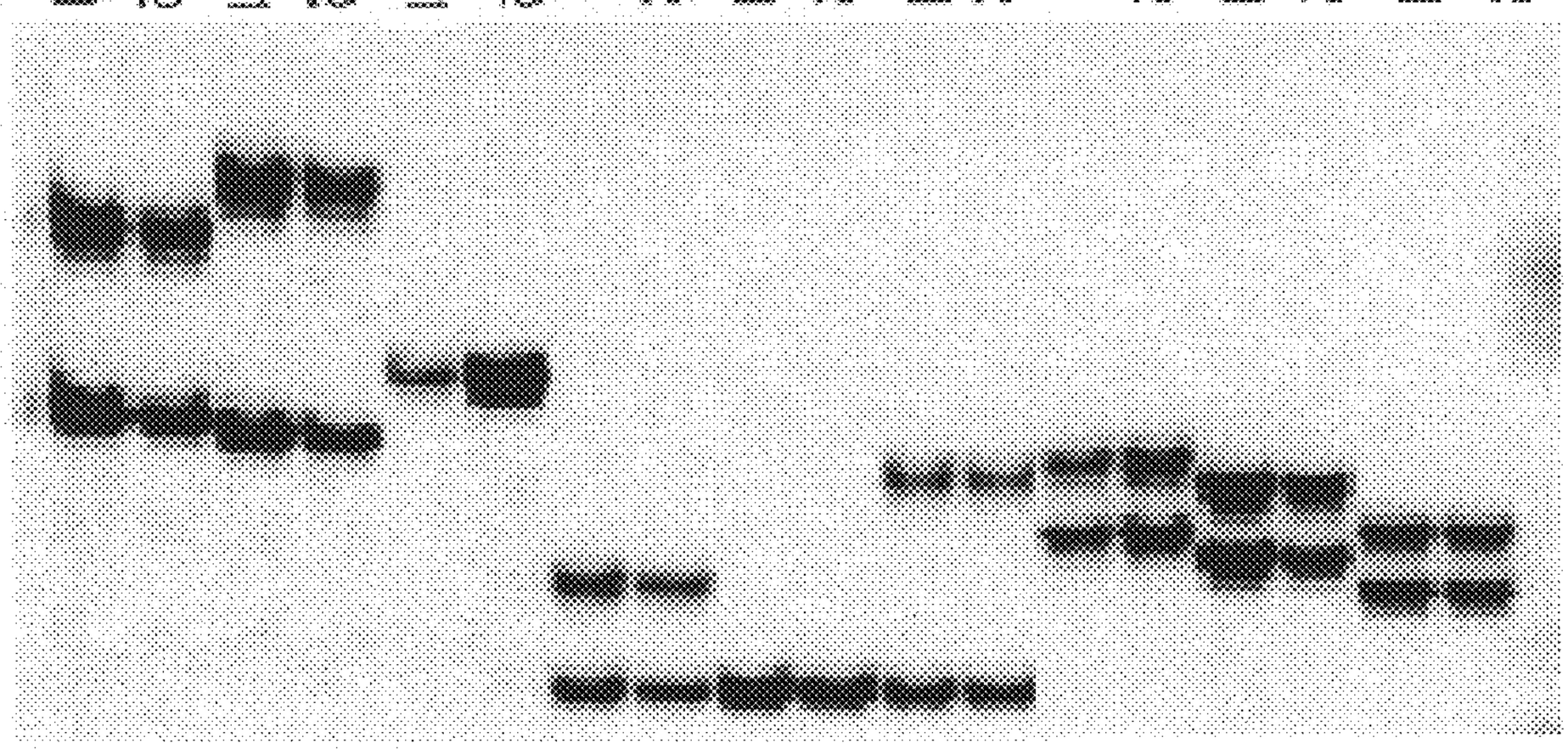

FIG. 5

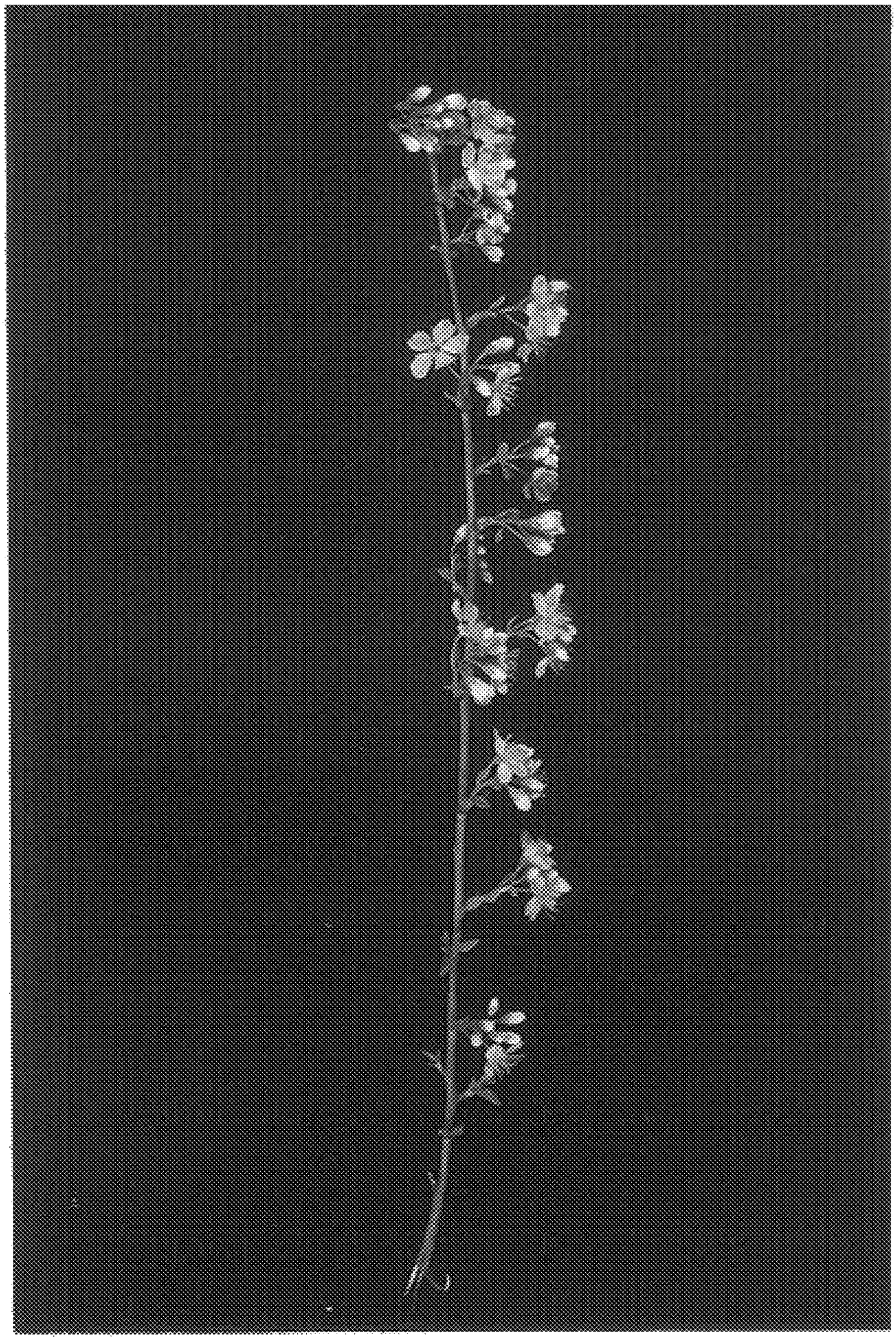

FIG. 6

Disclaimer & Dedication

PP. 14,359 P3 — Stephen M. Southwick, Davis, CA (US). MAHALEB ROOTSTOCK NAMED 'UCMH 56'. Patent dated December 9, 2003. Disclaimer filed September 29, 2009, by the assignee, The Regents of the University of California.

Hereby disclaims and dedicates to the Public, all claims and the entire term of said patent.

(*Official Gazette, January 26, 2010*)