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Dai et al.

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(54) **STRAWBERRY PLANT NAMED 'BARAK'**

(50) Latin Name: ***Fragaria×ananassa Duch.* (*Fragaria* L.)**
Varietal Denomination: **BARAK**

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Oct. 29, 2009 (IL) 4223/09

(51) **Int. Cl.**
A01H 5/00 (2006.01)

(52) **U.S. Cl.** **Plt./208**

(58) **Field of Classification Search** Plt./208
See application file for complete search history.

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(57) **ABSTRACT**

This invention relates to a new and distinct variety of strawberry plant named 'BARAK'. This new strawberry plant named 'BARAK' is primarily adapted to the climate and growing conditions of the Sharon coastal plain, at 32° latitude, located in Israel, and is primarily characterized by high quality fruit with an attractive brilliant appearance, regular consistent conical shape, high total soluble solids, long shelf-life and fruit appearing out of the canopy facilitating harvest.

8 Drawing Sheets

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Latin name of the genus and species of the plant claimed: *Fragaria×ananassa* Duch. (*Fragaria* L.).

Variety denomination: 'BARAK'.

PRIORITY CLAIM

This application claims priority under 35 U.S.C. § 119(f) of the Israeli Plant Breeders' Rights Application No. 4223/09 filed Oct. 29, 2009.

BACKGROUND OF THE INVENTION

The present invention relates to a new and distinct strawberry variety named 'BARAK'. The variety is botanically known as *Fragaria×ananassa* Duch.

The new strawberry 'BARAK' is a product of a planned breeding program conducted by the inventors, Nir DAI, Zecharia TANAMI, Sara SLOTZKY and Ahuva DAOS in Bet-Dagan, Israel. The objective of the breeding program was to develop high quality fruit with high eating qualities and long shelf life.

This new strawberry 'BARAK' is a result of a controlled cross made by the inventors in 2004, in a greenhouse in Bet-Dagan, Israel. The female or seed parent is the strawberry variety designated 'TAMIR' (U.S. Plant Pat. No. 20,647, granted Jan. 19, 2010, Israel PBR (plant breeders' rights) application No. 4029/07 filed Oct. 04, 2007, European Community PBR application No. 2008/2105 filed 24 Sep. 2008, South Africa PBR application No. PT 5701, filed Jun. 5, 2009). The male or pollen parent is strawberry breeding line designated 'ARO 730', selected in ARO breeding program, Israel. The new strawberry 'BARAK' was observed and selected by the inventors as a single plant within the progeny of the stated cross in April of 2006, in an experimental greenhouse in Bet-Dagan, Israel. After its selection, the new variety

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was asexually propagated by stolons (runners) in a nursery located in Bet-Dagan, Israel. The new variety 'BARAK' was intensively tested over the following years in a few small trial plots in Moshav Tsofit, Kadima and Qalansawa, Israel. This propagation has demonstrated that the combination of characteristics as herein disclosed for the new cultivar are firmly fixed and retained through successive generations of asexual propagation. The new variety propagates true-to-type.

BRIEF SUMMARY OF THE INVENTION

'BARAK' is primarily adapted to the climate and growing conditions of the Sharon Coastal Plain, at 32° latitude, located in Israel and to similar climatic regions. This region provides suitable growing conditions in autumn with high temperatures that promote initial plant growth and early fruit production, mild winter with moderate temperatures and many sunny days with low humidity, maintaining plant vigor and fruit quality during fruit production months.

The following traits have been repeatedly observed and are determined to be characteristics of 'BARAK', which in combination distinguishes this strawberry plant as a new, unique and distinct variety:

1. Very uniform consistent conical fruit shape and size, without fruit malformation;
2. Excellent fruit firmness with excellent shelf-life;
3. Glossy deep red external color and deep red internal color;
4. Juicy fruit with desirable flavor;
5. Early fruit production from the end of November in Israel;
6. No chilling requirement for flower induction;
7. Moderate plant size with open, globose appearance;
8. Long fruiting trusses makes picking easier;

9. Large number of runners (stolons) production in the propagation nursery;

10. Good field tolerance to Powdery Mildew.

Plants of the new strawberry variety 'BARAK' differs from the female parent 'TAMIR' (U.S. Plant Pat. No. 20,647 granted Jan. 19, 2010, Israel PBR (plant breeders' rights) application No. 4029/07 filed Oct. 4, 2007, European Community PBR application No. 2008/2105 filed 24 Sep. 2008, South Africa PBR application No. PT 5701 filed Jun. 5, 2009) and from the male parent ARO breeding selection 'ARO 730' in the characteristics described in Table 1.

TABLE 1

Characteristic	'BARAK'	'TAMIR' Registered	'ARO 730'
Average fruit weight (gm)	21 gram	22 gram	22 gram
Unevenness of fruit surface	Absent	Absent or very weak	Weak
Insertion of achenes	moderately sunken	Level with surface	Level with surface
Attitude of calyx	slightly reflexed	Clasping or detached	Clasping or detached
Firmness of the fruit	Firm	Firm	Vary firm
Plant size	Medium	Medium	Large
Average number of stolons	Very many	Few	Many
Foliage color (upper surface)	Medium	Medium to dark	Medium to dark
Fruit color	Red to dark red	Orange-red	Dark red
Vigor	medium to strong	Medium	Strong
Inflorescence position relative to foliage	Above	Level with	Level with

Of the numerous commercial cultivars known to the present inventors, the most similar to the new strawberry variety 'BARAK' is the commercial strawberry variety 'YAEL' (registered for PBR in Israel, no. 1542, September 1996). Plants of the new strawberry variety 'BARAK' differ from plants of strawberry variety 'YAEL' in the characteristics described in Table 2.

TABLE 2

Characteristic	'BARAK'	'YAEL' Registered
Average fruit weight (gm)	21 gram	23 gram
Insertion of achenes	moderately sunken	Below surface
Attitude of calyx	slightly reflexed	Clasping or detached
Firmness of the fruit	Firm	Firm
Plant size	Medium	Large
Average number of stolons	Very many	Many
Fruit color	Red to dark red	Red to dark red
Sweetness	Strong	Medium
Foliage color	Dark green	Green
Inflorescence position relative to foliage	Above	Level with

For identification, a series of molecular markers have been developed. The genetic polymorphic pattern of two Cleavage Amplified Polymorphic Sequence (CAPS) markers (A. MSR-AluI and B. APX- MluI (Kunihisa et al., 2003) that differ between the new strawberry variety 'BARAK' and the main commercial Israeli strawberry varieties, as well as, other widely known strawberry varieties is shown in FIG. **7**.

BRIEF DESCRIPTIONS OF THE PHOTOGRAPHS

The accompanying color photographs illustrate the overall appearance of typical specimens of the new strawberry variety 'BARAK', at various stages of development as true as it is reasonably possible with color reproductions of this type. Color in the photographs may differ slightly from the color value cited in the botanical description which accurately describes the color of 'BARAK'. The depicted plant and plant parts of the new strawberry variety 'BARAK' were taken in Moshav Tsofit and Volcani Center, Bet Dagan, Israel, at the age of 3 months after planting in September.

FIG. **1** shows typical fruiting field characteristics of 'BARAK' taken in Moshav Tsofit in January of 2009.

FIG. **2**A shows a close-up view of the typical leaf of 'BARAK' taken in Volcani Center, Bet Dagan in June of 2010.

FIG. **2**B shows unique heat sensitivity symptoms of 'BARAK' leaves, at high temperatures during the Israeli summer (July-September) taken in Moshav Tsofit in July of 2010.

FIG. **3** shows typical mature and immature fruit of 'BARAK' taken in Moshav Tsofit in March of 2009.

FIG. **4** shows a close-up external and internal view of mature fruit of 'BARAK' taken in Moshav Tsofit in March of 2009.

FIG. **5** shows typical fruit shape and other characteristics of 'BARAK' taken in Moshav Tsofit in March of 2009.

FIG. **6**. Shows the average maximum and minimum temperatures (° C.) and rainfall at the location where observations were made.

FIG. **7**. Shows the genetic polymorphic pattern of 'BARAK' (right line) in comparison to 11 other strawberry accessions at two CAPS markers: A. MSR-AluI and B. APX-MluI, (following Kunisha et al, 2003).

DETAILED BOTANICAL DESCRIPTION

'BARAK' has not been observed under all possible environmental conditions. The characteristics of the new variety may vary in detail, depending upon variations in environmental factors, including weather (temperature, humidity and light intensity), day length, soil type and location.

The aforementioned photographs, together with the following observations, measurements and values describe the new strawberry variety 'BARAK', unless otherwise noted, taken during the winter of the growing season 2008-2009 in Moshav Tsofit Israel. The observations, measurements and values were taken from plants of 'BARAK' dug from a low-elevation nursery located in Moshav Tsofit, Israel, during September, 2008 and planted directly, without any chilling, on the same day, in the field in Moshav Tsofit, Israel. Plants of the new strawberry variety 'BARAK' were grown under conditions which closely approximate those generally used in commercial practice.

Growing conditions at the nursery:

Mother plants provided from an authorized nursery are planted in the beginning of May, in the nursery at 2.5 m×2.5 m distance. Combination of overhead and drip irrigation with addition of fertilizers is used. The average day/night temperatures during the establishment of the daughter plants, between June to August, are 29° C./22° C. Runners appear from June, which produce young daughter plants up till mid September. These are then collected and planted directly in the field.

Growing conditions at the fruit production field as is typically used in agricultural practice.

The plants are washed from soil and dipped in Octav (Prochloraz manganese) 2 g/Liter solution to avoid anthracnose. These bare rooted plants are then planted in raised beds with overhead irrigation in 4 rows at 30 cm apart. Distance

between plants within rows is 32 cm. During the first month, no fertilizers are added, due to the addition of 60-100 m^3/hectare compost during field preparation. About 4 weeks after planting the beds are covered with silvery-black, 30 micron polyethylene. The young plants are pulled out through the pre-prepared holes. From this point on, the plants are irrigated with a drip system with a supply of additional fertilizers, as is typically used in agricultural practice. By the end of October the beds are covered with transparent, 80 micron thick polyethylene tunnels. The average day (max) and night (minimum) temperatures during the cultivation season are shown in FIG. **6**.

During winter in Israel, most days have full sunlight and only an average of 82 rainy days from August to June, producing about 520 mm precipitation. The fields are not treated with growth regulators and regularly are irrigated and fertilized according to need during fruit production.

Yield observations and fruit quality characteristics are averaged from 2 years of data collected from the 2008 to 2009 and 2009 to 2010 growing seasons. Flower measurements and characteristics are from secondary flowers unless otherwise noted. Fruit characteristics and measurements are from secondary fruit unless otherwise noted.

Color references are made to The Royal Horticultural Society Colour Chart (R.H.S.) (year of edition 1986), except where general colors of ordinary significance are used. Color values were taken under daylight conditions between 10:00 a.m. to noon in Bet-Dagan, Israel. The approximate age of the observed plants is 4 to 6 months.

The following Tables 3 to 9 describe fruit, plant, stolon, foliage, fruiting truss, flower and pest/disease characteristics of the new strawberry 'BARAK'.

TABLE 3

FRUIT CHARACTERISTICS

Characteristic	'BARAK'
Difference in shapes between primary and secondary flowers	Slight
Length	55-67 mm
Maximum diameter	34-41 mm
Ratio of length/maximum width	Much longer than broad
Weight	19-24 g, 21 g average
Size	Medium to large
Predominant shape	Conical
Primary secondary and tertiary fruit	No difference in shape for all three positions
Band without achenes	Medium broad (not medium to broad)
Unevenness of surface	Even
Color	Dark red RHS 45 A
Evenness of color	Even
Glossiness	Strong
Insertion of achenes	Moderately sunken
Insertion of calyx	At level
Color of achenes	Light yellow green RHS 145 B
Density of achenes	Medium to dense
Weight of achenes	Not recoded
Number of achenes	Number 280-420
Pose of the calyx segments	Slightly reflexed
Size of calyx in relation to fruit diameter	Larger
Length of calyx segment	24-30 mm
Width of calyx segment	14-18 mm
Color of upper side of calyx segment	Light green 137 C
Color of lower side of calyx segment	Dark green RHS 137 A
Adherence of calyx	Very strong
Firmness	Firm

TABLE 3-continued

FRUIT CHARACTERISTICS

Color of flesh	Medium red RHS 45 C
Evenness of color of flesh	Even
Sweetness	Strong
Acidity	Weak
Marketable yield (gm/pit)	Monthly yield

	Year analyzed:	
	2008-2009	2009-2010
November	8 gram/plant	29 gram/plant
December	143 gram/plant	48 gram/plant
January	130 gram/plant	145 gram/plant
February	246 gram/plant	309 gram/plant
March	217gram/plant	245 gram/plant
Total:	744 gram/plant	776 gram/plant

TABLE 4

PLANT CHARACTERISTICS

Characteristic	'BARAK'
Habit	Globose
Height	About 35 cm
Diameter	About 40-45 cm
Density	Medium
Vigor	Medium to strong
Time of flowering	Early
Time of ripening	Early
Type of bearing	Partly remontant

TABLE 5

STOLON CHARACTERISTICS

Characteristic	'BARAK'
Number	Numerous
Anthocyanin coloration	Weak
Thickness	2-4 mm
Pubescence	Medium to strong
Green color	Light green RHS 144 C

TABLE 6

FOLIAGE CHARACTERISTICS

	Characteristic	'BARAK'
Leaf	Green color of upper side	Dark RHS 137 A
	Green color of lower side	Grey green RHS 138 B
	Length	20-24 cm
	Width	14-16 cm
	Cross section	Concave
	Blistering	Medium
	Number of leaflets	Sometimes more than three
Terminal leaflet	Length	7-9 cm
	Width	7-9 cm
	Ratio length/width	As long as broad
	Shape of base	Rounded
	Shape of teeth	Rounded
Side leaflet	Length	7-8.5 cm
	Width	7-10 cm
	Ratio length/width	Broader than long
	Shape of base	Right angle
Petiole	Pose of hairs	Outwards
	Length	9-17 cm

TABLE 6-continued

FOLIAGE CHARACTERISTICS

	Characteristic	'BARAK'
Stipule	Thickness	About 3 mm
	Green color	Yellow green RHS 144 C
	Anthocyanin coloration	Absent or very weak
	Length	18-25 mm
	Width	5-8 mm
	Anthocyanin coloration	Absent or very weak
	Green color	Light yellow green RHS 144 D inner and outer side

TABLE 7

FRUITING TRUSS CHARACTERISTICS

Characteristic	'BARAK'
Attitude	Prostrate
Thickness	2-3 mm
Green color	Yellow green RHS 144 C
Pubescence	Medium dense

TABLE 8

FLOWER CHARACTERISTICS

	Characteristic	'BARAK'
Inflorescence	Position relative to foliage	Above
	Attitude	Prostrate
Flower	Diameter	32-36 mm
	Size of calyx relative to corolla	Same size
	Size of inner calyx relative to outer calyx	Smaller
	Spacing of petals	Touching
	Length of sepal	13-18 mm
	Width of sepal	9-13 mm
	Green color of upper side of sepal	Light green 137 C
	Green color of lower side of outer whorl of sepal	Medium green RHS 138 B
flower base	Pubescence	Strongly pubescent
flower base	Color	Yellow green RHS 1 A
Petal	Length	11-15 mm
	Width	12-15 mm

TABLE 8-continued

FLOWER CHARACTERISTICS

Characteristic	'BARAK'
Shape	Broader than long
Color of upper side	White RHS 155 A
Color of lower side	White RHS 155 A

TABLE 9

REPRODUCTIVE ORGANS

	Characteristic	'BARAK'
Stamen	Number per flower	Numerous
	Length	About 2-4 mm
Filament	Length	About 2-4 mm
	Color	Light yellow green RHS 145 C
Anther	Length	About 0.1 mm
Pollen	Amount	Moderate
	Color	Dark yellow RHS 14 A
Pistils	Number per flower	Numerous
	Shape	Too small to observe
	Length	Too small to observe
Stigma	Length	Too small to observe
	Color	Too small to observe
Style	Color	Too small to observe

TABLE 10

PEST AND DISEASE REACTIONS

Characteristic	'BARAK'
Two spotted spider mite	No testing/observations
Lygus bug	No testing/observations
Flower thrips	No testing/observations
Powdery mildew	moderately tolerant
Botrytis fruit rot	moderately tolerant
Angular leaf spot	No testing/observations

We claim:

1. A new and distinct strawberry variety named 'BARAK', as illustrated and described herein.

* * * * *

FIG. 1

FIG. 2A

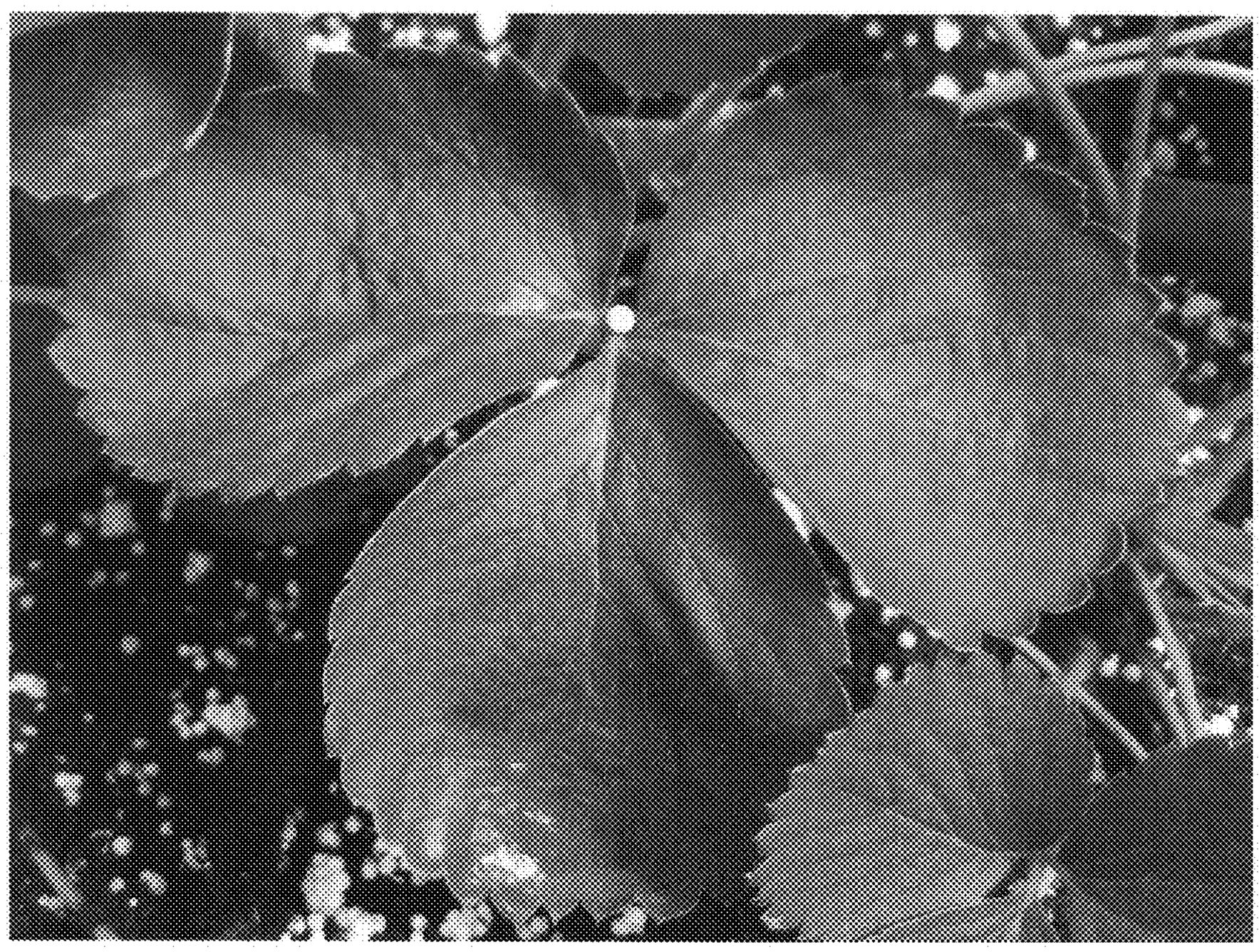


FIG. 2B

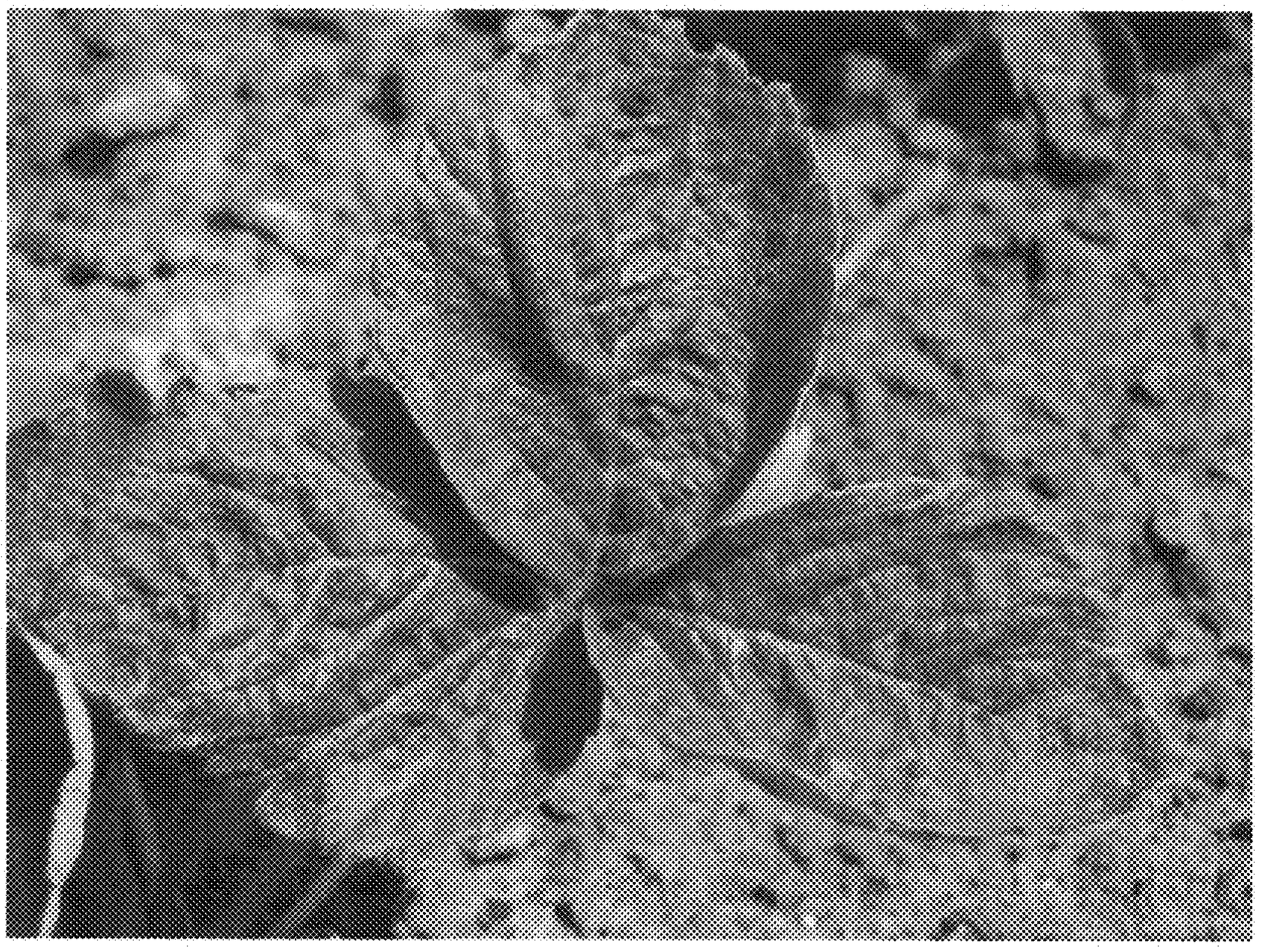


FIG. 3

FIG. 4

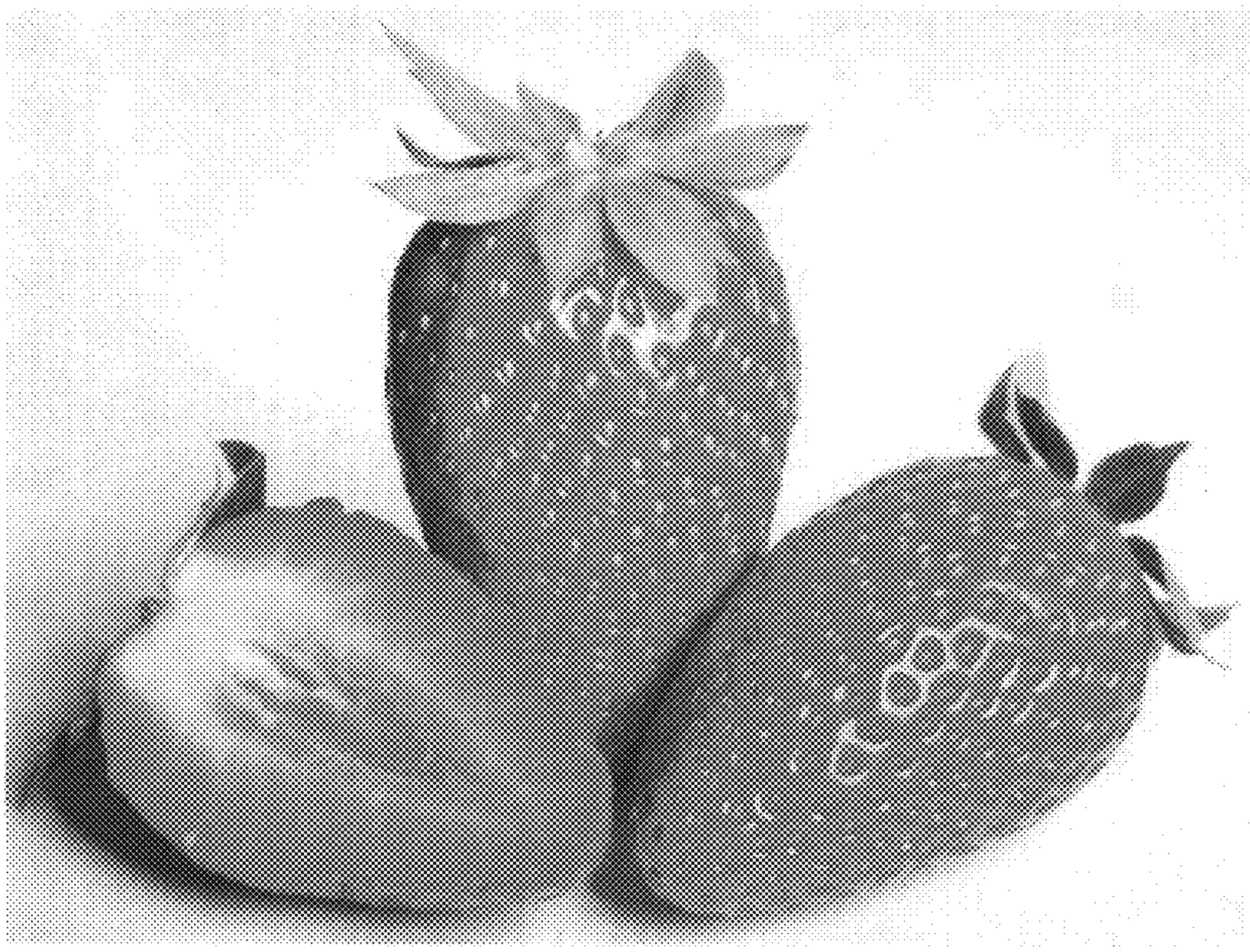


FIG. 5

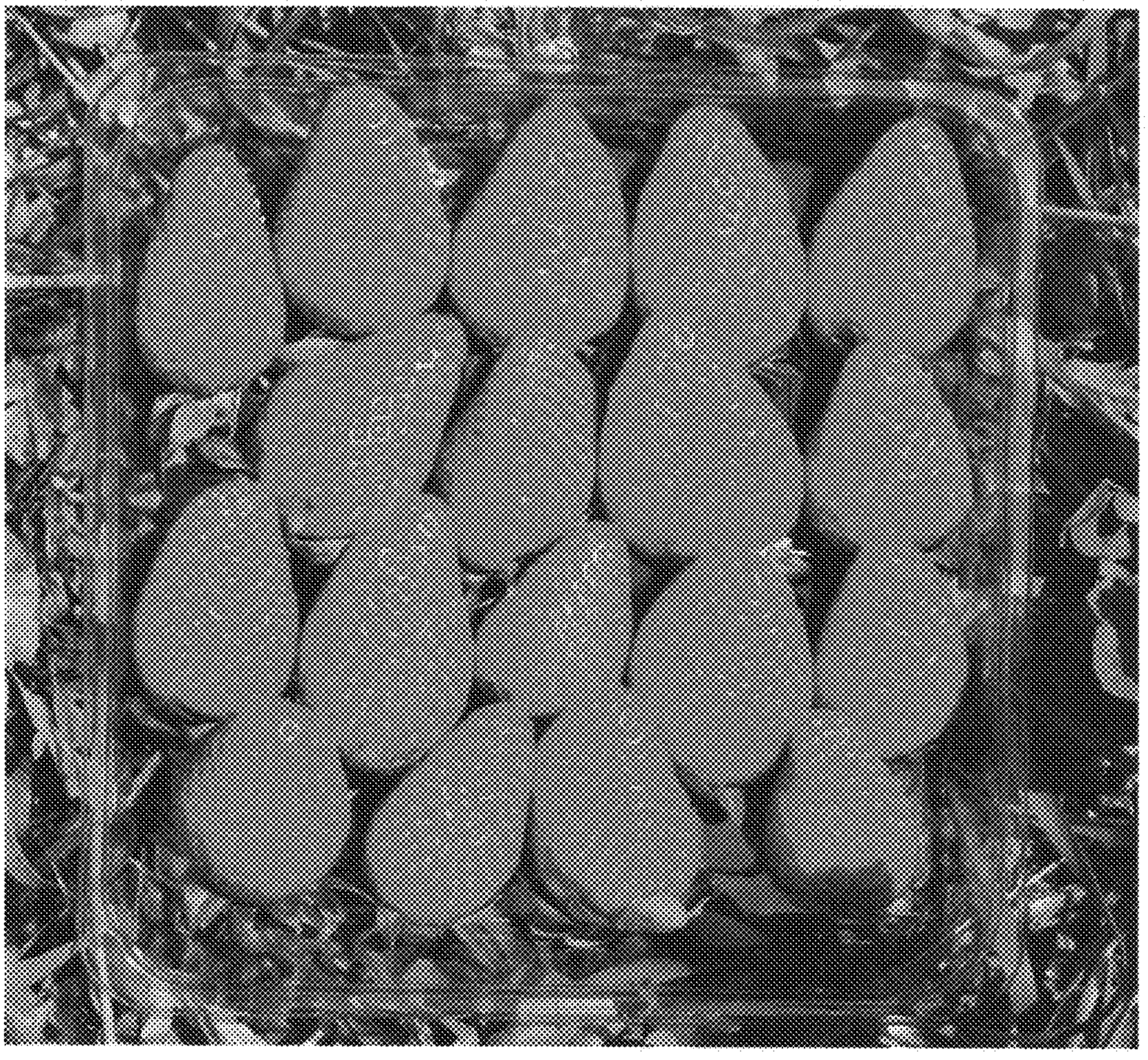
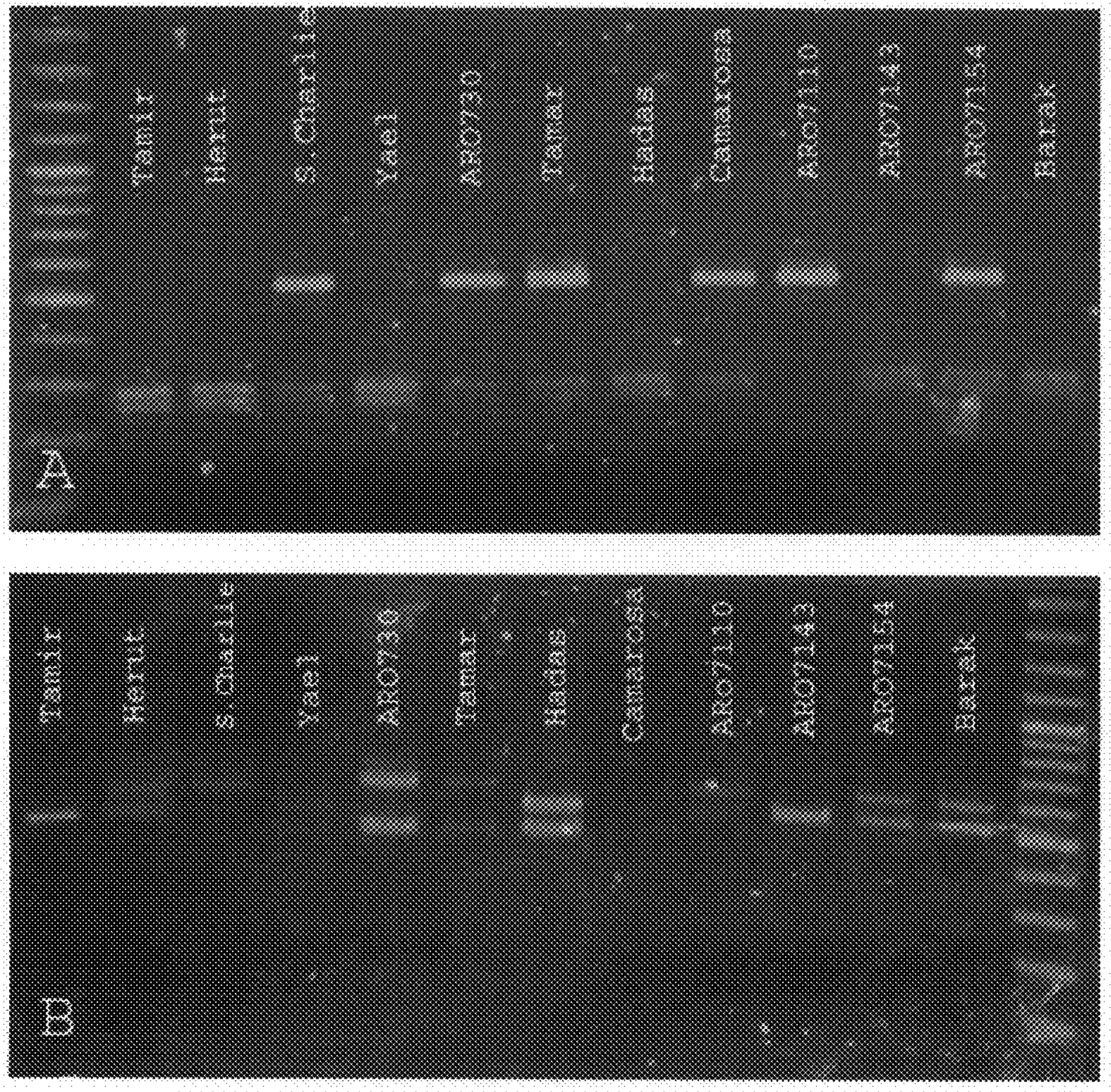


FIG. 6

Tel Aviv Station height: 4 meters above sea level

Elements	Jan	Feb	March	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Mean maximum air temperature (deg C)	17.5	17.7	19.2	22.8	24.9	27.5	29.4	30.2	29.4	27.3	23.4	19.2
Mean minimum air temperature (deg C)	9.6	9.8	11.5	14.4	17.3	20.6	23	23.7	22.5	19.1	14.6	11.2
Mean rainfall (mm)	126.9	90.1	60.6	18	2.3	-	-	-	0.4	26.3	79.3	126.4

FIG. 7


A
Tamir
Hertz
S.Charlie
Yael
AR0730
Tamar
Hadas
Camross
AR0110
AR0140
AR0154
Barak
B
Tamir
Hertz
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