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Sakurai

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(54) ***VACCINIUM CORYMBOSUM* L. PLANT NAMED 'RYOKU NH-12'**

(50) Latin Name: ***Vaccinium corymbosum* L.**
Varietal Denomination: **RYOKU NH-12**

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(57) **ABSTRACT**

A new and distinct variety of *Vaccinium corymbosum* L. plant named 'RYOKU NH-12', characterized by having more compact plant size, comparatively early fruit ripening time, comparatively large and uniform fruit size, firmer and lower dehiscent fruits, sweeter fruits, better taste balance of sweetness and acidity, and better taste of fruits, as compared to other *Vaccinium corymbosum* L. varieties.

8 Drawing Sheets

The Latin name of the genus and species of the novel variety disclosed herein is: *Vaccinium corymbosum* L.

The novel variety of the *Vaccinium corymbosum* L. disclosed herein has been given the variety denomination: 'RYOKU NH-12'.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to Japanese Plant Breeders' Rights Application No. 31724, filed Jan. 4, 2017, the contents of which are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

The present invention relates to a new and distinct hybrid variety of northern highbush blueberry (*Vaccinium corymbosum* L.) named 'RYOKU NH-12'. This novel variety was found by open pollination of 'Spartan', 'Duke' and 'Denies Blue' in the tests conducted for the period from 2004 to 2008 in Matsumoto-City, Nagano-prefecture, Japan. As stated below, 'RYOKU NH-12' has apparently different characteristics from those of the 'Spartan' and 'Duke', both being widely planted and important varieties in the Chubu district of Japan.

SUMMARY OF THE INVENTION

Blueberry variety 'RYOKU NH-12' exhibits outstanding and distinguishing characteristics when grown under normal

horticultural conditions in the area from Nagano-prefecture to the north of the Kanto in Japan, including:

(1) more compact plant size;
(2) comparatively early fruit ripening time (50% fruit ripening around late June of each year in Matsumoto, Nagano, Japan);
(3) comparatively large and uniform fruit size;
(4) firmer and lower dehiscent fruits;
(5) sweeter fruits with better taste balance of sweetness and acidity; and
(6) better taste of fruits.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying colored photographs (FIGS. **1** to **8**) show typical bush, flower, fruit and leaf characteristics of the new *Vaccinium corymbosum* L. plant, 'RYOKU NH-12'. Colors shown are as accurate as can be reasonably reproduced by photographic means. In some cases, the color might differ slightly from the colors of 'RYOKU NH-12' recited in the description.

FIG. **1** shows a tree body of 'RYOKU NH-12' (photographed date: Jul. 9, 2014; photographed location: Matsumoto-City, Nagano-prefecture, Japan).

FIG. **2** shows a panoramic view of the cultivation area of 'RYOKU NH-12' (photographed date: Sep. 7, 2012; photographed location: same as FIG. **1**).

FIG. **3** shows whole flowers of 'RYOKU NH-12' (photographed date: May 6, 2014; photographed location: same as FIG. **1**).

FIG. **4** shows broken-down parts of a flower of 'RYOKU NH-12' (photographed date: May 6, 2014; photographed location: same as FIG. **1**).

FIG. **5** shows fruits of 'RYOKU NH-12' (photographed date: Jul. 15, 2014; photographed location: same as FIG. **1**).

FIG. **6** shows a cross-section of the fruits of 'RYOKU NH-12' (photographed date: Jul. 15, 2014; photographed location: same as FIG. **1**).

FIG. **7** shows an upper side of the leaves (10 sheets) of 'RYOKU NH-12' (photographed date: Aug. 3, 2012; photographed location: same as FIG. **1**).

FIG. **8** shows a lower side of the leaves (10 sheets) of 'RYOKU NH-12' (photographed date: Aug. 3, 2012; photographed location: same as FIG. **1**).

DETAILED BOTANICAL DESCRIPTION

A. Distinctive Characteristics of 'RYOKU NY-12'

As described above, 'RYOKU NH-12' was obtained by the open pollination of 'Spartan', 'Duke' and 'Denies Blue'. On Apr. 15, 2004, about 1,000 seeds obtained from the mixed fruits of 'Spartan', 'Duke' and 'Denies Blue', all of which were harvested in a field in Matsumoto-City, Nagano-prefecture, Japan, seeded in plant seeding trays, and then transplanted to pots. The resulting seedlings (about 300) were planted in cultivation pots on May 1, 2005. Fructification of the planted seedlings was started from Jun. 20, 2008 (on Year 3), and about 20 plant individuals were selected based on the characteristics, including larger fruit size, better taste balance of sweetness and acidity, higher yield per plant, earlier ripening time, large and uniform fruits, etc. For the about 20 plant individuals selected, test plots (each including about 20 cuttings per plant individual) were formed, where these plants were asexually propagated by cutting means. During the period from Jul. 20, 2010 to Dec. 25, 2016 and for 3 generations, the plants were propagated and examined for their characteristics based on the growth, and yield and fruits quality in each test plot. For 10 test plots, the characteristics of the plants were observed for the period between the flowering time and the ripening time yearly for 4 years, and since neither variant nor off-type plant was observed for the period, the characterization of 'RYOKU NH-12' was finished on Dec. 25, 2016 and the breeding was completed.

'RYOKU NH-12' is a blueberry clone distinguishable from the important blueberry varieties 'Spartan' and 'Duke', both of which are widely planted in the Chubu district of Japan, due to its characteristics including more compact plant size, comparatively early fruit ripening time, comparatively large and uniform fruit size, firmer and lower dehiscent fruits, sweeter fruits with better taste balance of sweetness and acidity, and better taste fruits. 20 plants of 'RYOKU NH-12' had been propagated by cutting means in Matsumoto, Nagano, Japan, and all the resulting plants were phenotypically indistinguishable from the original plant variety 'RYOKU NH-12'. In addition, comparing to 'Spartan' and 'Duke', the claimed plant 'RYOKU NH-12' has more compact plant size, about 1 week earlier fruit ripening time (on average, around June 25 to July 1 of each year in Matsumoto, Nagano, Japan), larger and more uniform fruit size, and firmer and sweeter fruit when compared to its related variety 'Spartan', and has more compact plant size, lower dehiscent fruits, sweeter fruits, a better balance of sweetness and acidity, and better tasting of fruits when compared to the 'Duke' variety (see Table 1 below).

The following data defining characteristics of 'RYOKU NH-12' were collected from the asexual propagation carried out in Matsumoto, Nagano, Japan. The plant history was taken on a plot of 10 four-year-old plants growing in Matsumoto, Nagano, Japan. 'RYOKU NH-12' has not been observed under all possible environmental conditions, and the measurements provided might therefore vary if grown in different environments. Where averages are given, the sample size was 10.

B. Phenotypic Description of *Vaccinium corymbosum* L. ('RYOKU NH-12')

Characteristics of 'RYOKU NH-12' are further specifically described as follows:

1. Plant:
   - *Plant vigor.*—Medium.
   - *Growth habit.*—Semi-upright.
   - *Plant size.*—Small.
   - *Plant height.*—1.3 m on average for 4-year old plant.
   - *Plant spread.*—0.8 m on average for 4-year old plant.
   - *Color of bark of plant.*—Dark Red, 187-B (The R.H.S. Colour Chart).
   - *Cold hardiness.*—Survived in winter frost (below −10° C.) with minimum damage.
   - *Ease of propagation.*—Propagated from each of the dormant wood cutting and the softwood stem cutting, where the rooting percentage was greater than 70% and comparable to the other varieties.
2. Trunk and branches:
   - *Suckering tendency.*—Medium suckering tendency.
   - *Surface texture (of 6-month-old shoots).*—Medium smoothness.
   - *Surface texture (of 3-year-old and older wood).*—Medium smoothness.
   - *Color of new twigs observed in the field.*—Orangish yellow green.
   - *Internode length.*—16.2 mm on average.
3. Leaves:
   - *Length including petiole.*—54.0 mm on average.
   - *Width of leaf at widest point.*—33.0 mm on average.
   - *Shape.*—Ovate.
   - *Leaf margin.*—Entire.
   - *Color.*—Upper surface of leaves: Dark Yellowish Green, 139-A. Lower surface of leaves: Strong Yellow Green, 143-A (The R.H.S. Colour Chart).
   - *Pubescence.*—Upper Surface of leaves: Absent. Lower Surface of leaves: Absent. Margin: Absent.
   - *Timing of vegetative bud burst.*—Medium.
4. Flowers:
   - *Shape.*—Campanulate.
   - *Color of opened flower.*—Pale Yellow Green, 157-C (The R.H.S. Colour Chart).
   - *Flowering period.*—Mean date of 50% opening of flowers in Matsumoto-City, Nagano-prefecture, Japan is May 1 (2 days earlier than 'Spartan' variety).
   - *Corolla.*—Diameter: 7.4 mm on average. Length (from pedicel attachment point to corolla tip excluding the pedicel): 10.8 mm on average. Color: light green white. Anthocyanin coloration in corolla tube — Absent or very weak.
5. Reproductive organs:
   - *Pollen.*—Color: Yellow.
6. Fruit:
   - *Mean date of 50% harvest in Matsumoto-City, Nagano-prefecture.*—July 1 on average.
   - *Diameter of calyx aperture on mature berry.*—5.9 mm on average.

Size and shape of calyx lobe on mature berry.—Medium in size, outcurving, and having deep calyx basin.

Detachment force for ripe berries (*easy, medium, hard*).—Easy.

Fruit cluster density (*sparse, medium, dense*).—Medium.

Fruiting type.—On one-year old shoots only.

7. Berry:

Cluster (*tight, medium, loose*).—Medium.

Weight (*on well-pruned plants*).—3.79 g on average.

Height.—14.9 mm on average.

Width.—20.4 mm on average.

Shape.—Oblate.

Skin of fruit, with bloom.—Light Purplish Blue, 98-D (The R.H.S. Colour Chart).

Intensity of fruit bloom.—Medium.

Skin of fruit, without bloom.—Greyish Purplish Blue, 103-A (The R.H.S. Colour Chart).

Immature berry color, with bloom.—Medium green.

Immature berry color, without bloom.—Yellow green.

Flesh color.—Light Yellow Green, 150-D (The R.H.S. Colour Chart).

Peel color.—Medium blue.

Color of seeds.—Moderate Orange, N167-C (The R.H.S. Colour Chart).

Pedicel scar.—Medium. 2.92 mm on average.

Firmness.—Medium.

Intensity of fruit sweetness.—High, Bx 14.5.

Intensity of fruit acidity.—High, pH 2.59.

Texture.—Somewhat soft pulp, very juicy, medium seeds.

8. Use: 'RYOKU NH-12' produce northern highbush blueberries suitable for fruit-picking farms, fresh fruit markets and processed fruit market, etc.

9. Resistance to disease, insects, and mites: 'RYOKU NH-12' grew vigorously and showed excellent bush survival in the field. It appears to be tolerant to stem blight (*Botryosphaeria* spp.) and root rot (*Phytophthora cinnamoni*), with very few young plants dying soon after planting. The response of 'RYOKU NH-12' to the various fungal species that cause summer leaf spots is typical of other northern highbush varieties, and fungicide applications may be needed after harvest in order to reduce foliar diseases and to retain leaves until autumn and make maximum flower bud set. Similarly, susceptibility to typical blueberry insect and mite pathogens, such as spotted wing drosophila (*Drosophila suzukii*), blueberry gall midge (*Dasineura oxycoccana*) and blueberry bud mite (*Acalitus vaccini*), is similar to other northern highbush cultivars.

TABLE 1

(Comparison of characteristics among varieties)

Charact. No.	UPOV No	Code	Characteristics	Definition
1	1 (*)	QN (+)	Plant: vigor	Strength of growth level of plant
2		QN	Plant: size	Size of plant crown
3	2 (*)	QN G	Plant: growth habit	Whole shape of plant without pruning during dormant period
4	3	PQ	One-year-old shoot: color	Color of middle part of shoot extended before dormant period
5		QN	One-year-old shoot: length	Length of middle part of shoot extended before dormant period
6	4	QN	One-year-old shoot: length of internode (upper half)	Length of internode of shoot extended before dormant period (upper half)
7	5 (*)	QN	Leaf: length	Length of leaf sufficiently expanded
8	6	QN	Leaf: width	Maxiumum width of mature leaf
9	7	QN	Leaf: ratio legnth/width	Ratio of leaf length to maximum width (leaf length/ leaf width)
10	8 (*)	PQ	Leaf: shape	Shape of mature leaf
11		QN (+)	Leaf: shape of tip	Shape of tip of mature leaf
12	9	QL	Leaf: color of upper side	Color of surface of mature leaf
13	10 (*)	QN	Only varieties with green leaf color : Leaf: intensity of green color on upper side	Intensity of green color on surface of mature leaf
14	11 (*)	QL	Leaf: margin	Type of margin of mature leaf
15	12	QN	Flower bud: anthocyanin coloration	Intensity of anthocyanin coloration of flower bud occuring to one year old shoot
16	13	QN	Inflorescence: length (excluding peduncle)	Length of inflorescence at flowering time (excluding peduncle)
17	14	PQ	Flower: shape of corolla	Shape of corolla at full bloom
18		PQ	Flower: color of corolla	Color of corolla at full bloom
19	15 (*)	QN	Flower: size of corolla tube	Size of corolla tube at full bloom
20	16 (*)	QN	Flower: anthocyanin coloration of corolla tube	Intensity of anthocyanin coloration on surface of corolla tube
21	17	QL	Flower: ridges on corolla tube	Presence or absence of ridges on corolla tube
22	18	QN	Fruit cluster: density	Density of fruit per fruit cluster
23	19 (*)	QN	Unripe fruit: intensity of green color	Intensity of green color of fruit before ripening
24	20 (*)	QN	Fruit: size	Size of fruit at ripening
25	21 (*)	PQ (+)	Fruit: shape in longitudinal section	Shape in longitudinal section of fruit at ripening
26		QN (+)	Fruit: size of scar	Size of stem scar of mature fruit

TABLE 1-continued

(Comparison of characteristics among varieties)

TABLE 1-continued

(Comparison of characteristics among varieties)

27		PQ (+)	Fruit: shape of calyx cavity	Shape of calyx cavity of mature fruit
28	22	QN	Fruit: attitude of sepals	Attitude of sepals relative to mature fruit
29	23	QN	Fruit: type of sepals	Direction of curving of sepals
30	24	QN	Fruit: diameter of calyx basin	Diameter of calyx basin of mature fruit
31	25	QN	Fruit: depth of calyx basin	Depth of calyx basin of mature fruit
32	26 (*)	QN	Fruit: intensity of bloom	Intensity of bloom on surface of mature fruit
33	27 (*)	PQ G	Fruit: color of skin (after removal of bloom)	Color of skin of mature fruit after removal of bloom
34	28	QN (*)	Fruit: firmness	Firmness of mature fruit
35		PQ	Fruit: color of flesh	Color of flesh of mature fruit
36	29 (*)	QN (+)	Fruit: sweetness	Sweetness of mature fruit
37	30 (*)	QN (+)	Fruit: acidity	Acidity of mature fruit
38	31 (*)	QL G	Plant: fruiting type	Shoots to which fruit adnate
39		QN	Fruit: tendency of cracking	Tendency of cracking during harvest season
40	32 (*)	QN (+)	Time of vegetative bud burst	Time of beginning to burst first vegetative bud of each individual plant
41	33 (*)	QN (+) G	Time of beginning of flowering on one-year-old shoot	Time of 10% flowering occuring to one year old shoot

Charact. No.	Method	Class	State	Standard Variety (Ex. Var.)
1	Observation (a) VG	3	weak	Bluetta, Meader
		5	medium	Collins, Weymouth
		7	strong	Berkeley, Homebell, Woodard
2	Observation (a) VG	3	small	Avonblue, Bluetta, Flordablue
		5	medium	Bluecrop, Earliblue
		7	large	Dixi, Homebell, Tifblue
3	Observation (a) VG	1	upright	Becyblue, Bluechip, June, Spartan
		2	semi-upright	Bluecrop, Lateblue
		3	spreading	Northland, Weymouth
4	Observation (a) VG	1	green	
		2	greenish red	
		3	greyish red	Briteblue, Homebell
		4	reddish yellow	Berkeley, Dixi
		5	reddish brown	Blueray, Darrow, Weymouth
		6	dark red	

TABLE 1-continued

(Comparison of characteristics among varieties)

5	Measurement mm (a) VG	3	short	5
		5	medium	
		7	long	
6	Observation (a) VG	3	short	Avonblue, Weymouth
		5	medium	
		7	long	Jersey
7	Measurement mm (b) MS/VG	3	short	
		5	medium	
		7	long	
8	Measurement mm (b) MS/VG	3	narrow	
		5	medium	
		7	broad	
9	Measurement (b) MS/VG	3	small	
		5	medium	
		7	large	
10	Observation (b) VG	1	lanceolate	
		2	ovate	Northland
		3	elliptic	Berkeley, Collins, Coville
		4	oblong	
11	Observation (b) VG	3	acute	Weymouth, Woodard
		5	medium	Earliblue, Tifblue
		7	obtuse	Berkeley, Climax, Southland
12	Observation (b) VG	1	yellow	
		2	green	Bluechip, Bluecrop, Blueray
13	Observation (b) VG	3	light	
		5	medium	
		7	dark	
14	Observation (b) VG	1	entire	
		2	serrate	
15	Observation (a) VG	3	weak	
		5	medium	
		7	strong	
16	Measurement mm (c) MS/VG	3	short	
		5	medium	
		7	long	
17	Observation (c) VG	1	urceolate	Bluecrop, Jersey
		2	campanulate	Northblue, Northsky
		3	cylindrical	
18	Observation (c) VG	1	white	Aliceblue, Bluetta, Briteblue
		2	creamy white	Avonblue, Berkeley, Bluecrop
		3	greenish white	Blueray, Collins, Coville
		4	light pink	Bluebell, Delite, Dixi, Tifblue
19	Observation (c) VG	3	small	
		5	medium	
		7	large	
20	Observation (c) VG	1	absent or very weak	
		3	weak	
		5	medium	
		7	strong	
21	Observation (c) VG	1	absent	Herbert
		9	present	Aliceblue Berkeley, Dixi

TABLE 1-continued

(Comparison of characteristics among varieties)

22	Observation (d) VG	3	sparse	Homebell, Jersey, Woodard
		5	medium	Bluechip, Bluecrop, Bluetta
		7	dense	Darrow, Herbert, Patriot
23	Observation VG	3	light	
		5	medium	
		7	dark	
24	Observation (d) VG	3	small	Homebell, June, Northblue
		5	medium	Collins, Earliblue
		7	large	Berkeley, Bluecrop, Spartan
25	Observation (d) VG	1	elliptic	
		2	round	Berkeley, Jersey, Sharpblue
		3	oblate	Earliblue, Harrison, Woodard
26	Observation (d) VG	3	small	
		5	medium	
		7	large	
27	Observation (d) VG	1	star	
		2	circular	
28	Observation (d) VG	1	erect	
		2	erect to semi-erect	
		3	semi-erect	
		4	level	
29	Observation (d) VG	1	incurving	
		2	straight	
		3	reflexed	
30	Observation (d) VG	3	small	Avonblue, Bluechip, Sharpblue
		5	medium	Blueray, Woodard
		7	large	Coville, Darrow, Homebell
31	Observation (d) VG	3	shallow	Bluecrop, Rancocas, Tifblue
		5	medium	Earliblue, Jersey
		7	deep	Blueray, Collins, Dixi
32	Observation (d) VG	1	very weak	
		3	weak	Dixi, Herbert, Sharpblue
		5	medium	Collins, Coville
		7	strong	Avonblue, Bluecrop, Tifblue
33	Observation (d) VG	1	light blue	Berkeley, Bluechip, Tifblue
		2	medium blue	Blueray, Jersey, June
		3	dark blue	Dixi, Homebell
		4	blue red	
34	Observation (d) VG/VS	3	soft	Herbert, Homebell, Spartan
		5	medium	Collins, Dixi
		7	firm	Coville, Southland
		9	very firm	

TABLE 1-continued

(Comparison of characteristics among varieties)

35	Observation (d) VG	1	white	Berkeley, Bluecrop, Blueray
		2	cream	Earliblue
		3	light green	Bluechip, Lateblue, Sharpblue
		4	light purple	Aliceblue, Delite, Homebell
36	Observation (d) VG	3	low	Avonblue, Bluechip
		5	medium	Berkeley, Bluetta, Spartan
		7	high	Aliceblue, Bluecrop, Blueray
37	Observation (d) VG	3	low	Earliblue, Homebell
		5	medium	Blueray, Herbert
		7	high	Collins, Elliott, Lateblue
38	Observation (c) VG	1	on one-year-old shoots only	
		2	on one-year-old and current season's shoots	
39	Observation (d) VG	3	less	Earliblue, Herbert, Spartan
		5	medium	Avonblue, Berkeley, Bluechip
		7	much	Briteblue, Climax, Darrow
40	Measurement MG	3	early	Avonblue, Beckyblue Sharpblue
		5	medium	Darrow, Weymouth
		7	late	Elliot, Lateblue
41	Measurement MG	1	very early	
		3	early	
		5	medium	Bluecrop, Collins, Woodard
		7	late	Dixi, Herbert, Lateblue
		9	very late	

Charact. No.	The present variety RYOKU	Control Varieties	
		NH-12	Spartan	Duke
1	5	6	7
2	3	5	7
3	2	1	2
4	5	4	4
5	7 (164 mm)	7 (222 mm)	(245 mm)
6	4 (16.2 mm)	5 (17.0 mm)	5 (18.0 mm)
7	3 (54.0 mm)	5 (76.0 mm)	5 (71.0 mm)
8	5 (33.0 mm)	5 (37.0 mm)	5 (36.0 mm)
9	4 (1.64)	5 (2.05)	5 (1.97)
10	2	3	3
11			
12	2	2	2
13	5	7	7
14	1	1	1
15	5	5	5
16	7 (35.7 mm)	5 (25.2 mm)	5 (26.4 mm)
17	2	1-2	2
18	2	2-3	2-3

TABLE 1-continued

(Comparison of characteristics among varieties)

19	5	5	6
20	1	1	3
21	9	9	9
22	5	5	5
23	5	3	5
24	7 (3.79 g)	7 (4.56 g)	7 (3.96 g)
25	3	3	3
26	5 (2.92 mm)	5 (2.30 mm)	5 (1.90 mm)
27	2	2	2
28	2	1	1
29	3	1	3
30	5 (5.86 mm)	5 (5.80 mm)	5 (5.90 mm)
31	7 (2.72 mm)	7 (2.20 mm)	5 (1.50 mm)
32	5	5	5
33	2	2	2
34	5	3	5

TABLE 1-continued

(Comparison of characteristics among varieties)

35	1	2-3	1-2
36	7 (Bx 14.5)	5 (Bx 11.9)	5 (Bx11.1)
37	7 (pH 2.59)	5 (pH 3.12)	3 (pH 3.87)
38	1	1	1
39	3	3	5
40	5 Apr. 6, 2016	7 Apr. 8, 2016	5 Apr. 5, 2016
41	3 Apr. 25, 2016	3 Apr. 24, 2016	3 Apr. 24, 2016

What is claimed is:

1. A new and distinct variety of *Vaccinium corymbosum* L. plant named 'RYOKU NH-12', as described and illustrated herein.

* * * * *

Fig. 1

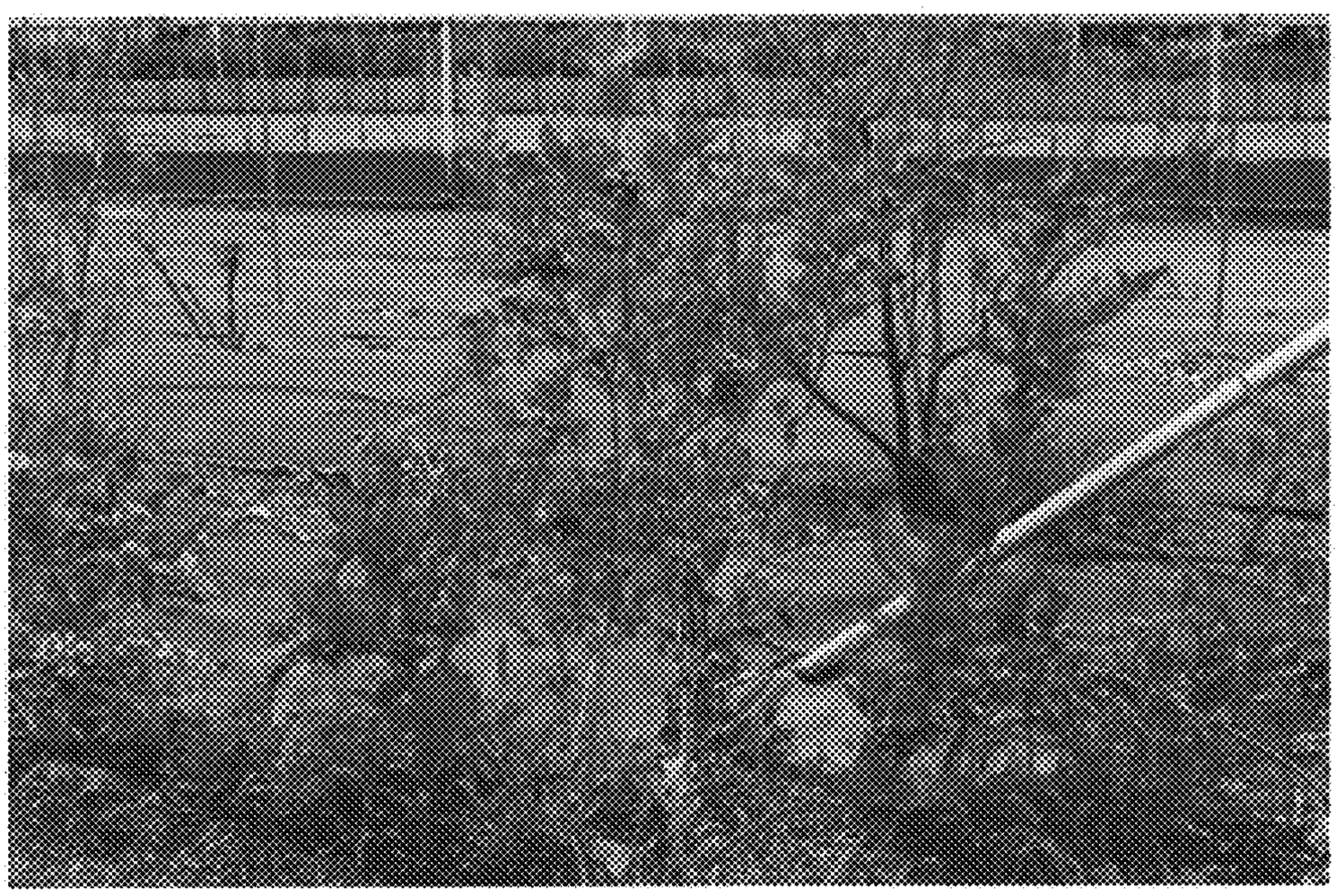

Fig. 2

Fig. 3

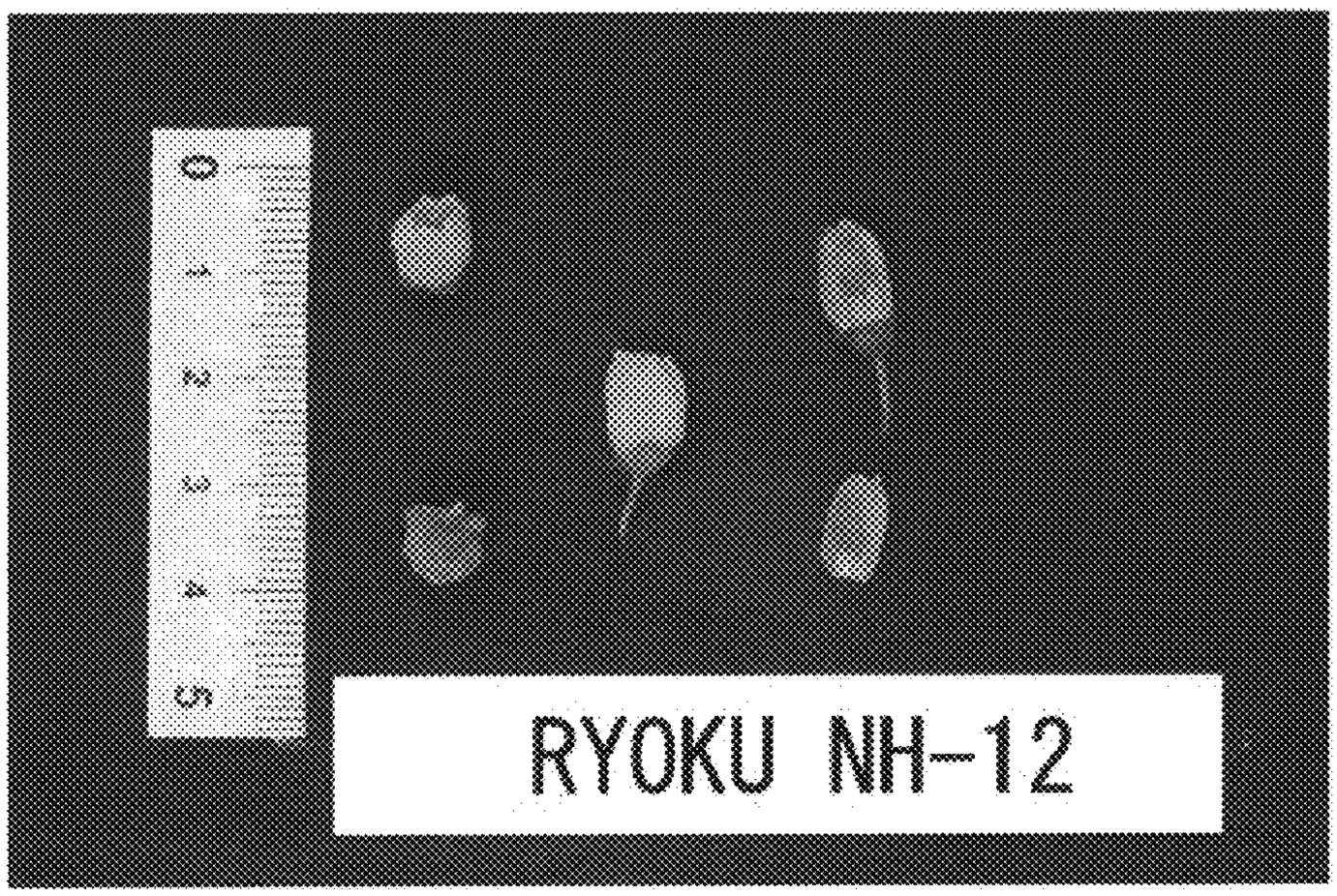

Fig. 4

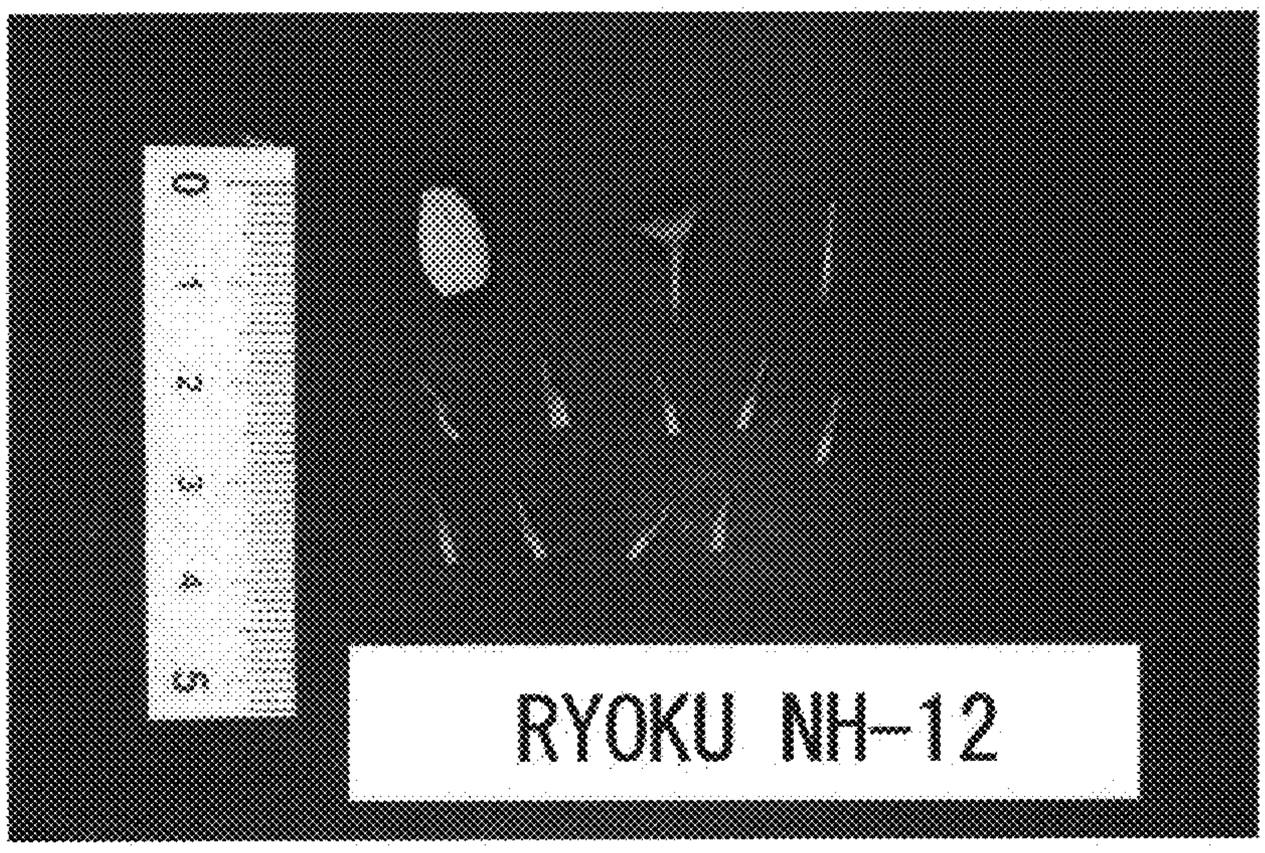

Fig. 5

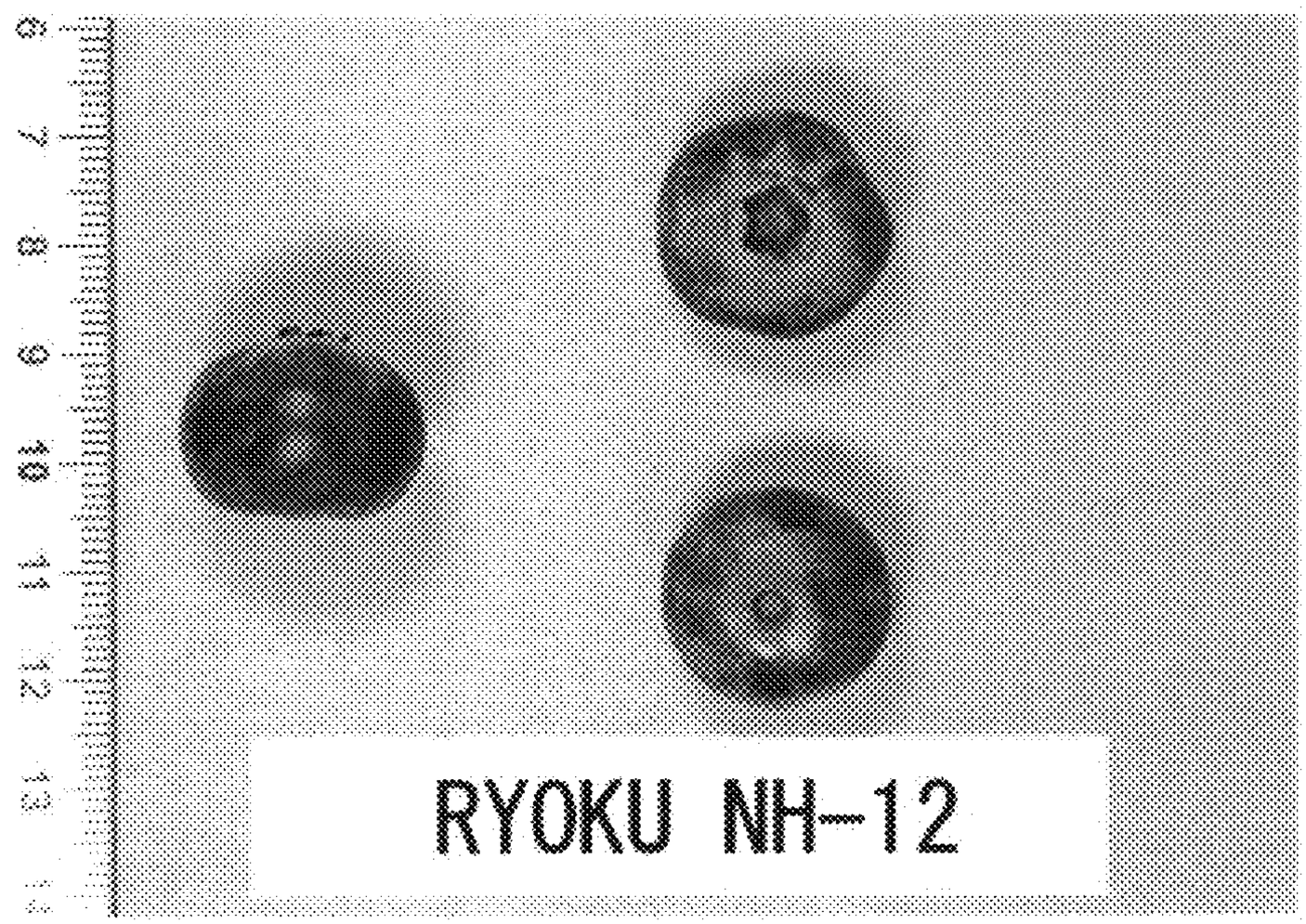

Fig. 6

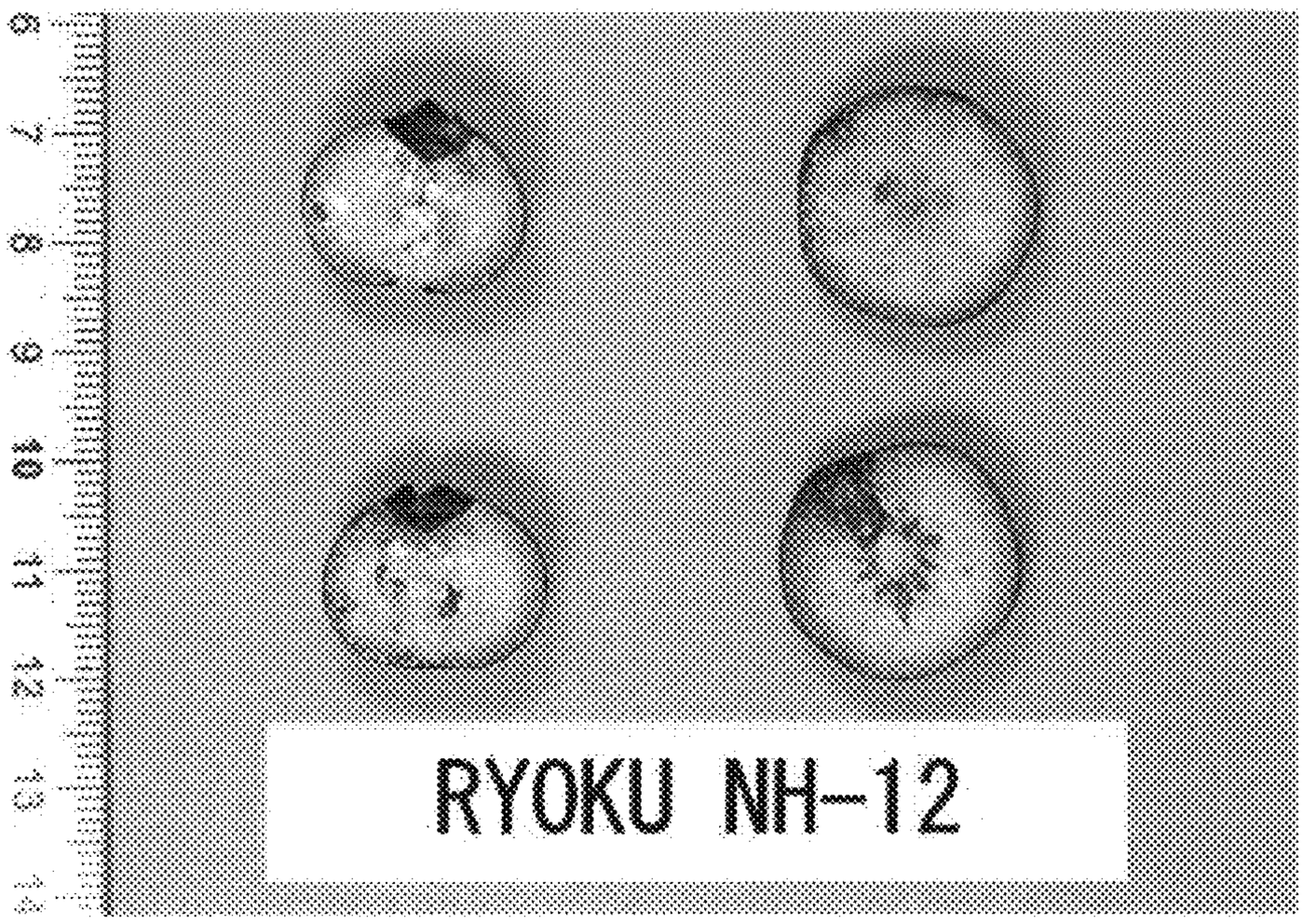

Fig. 7

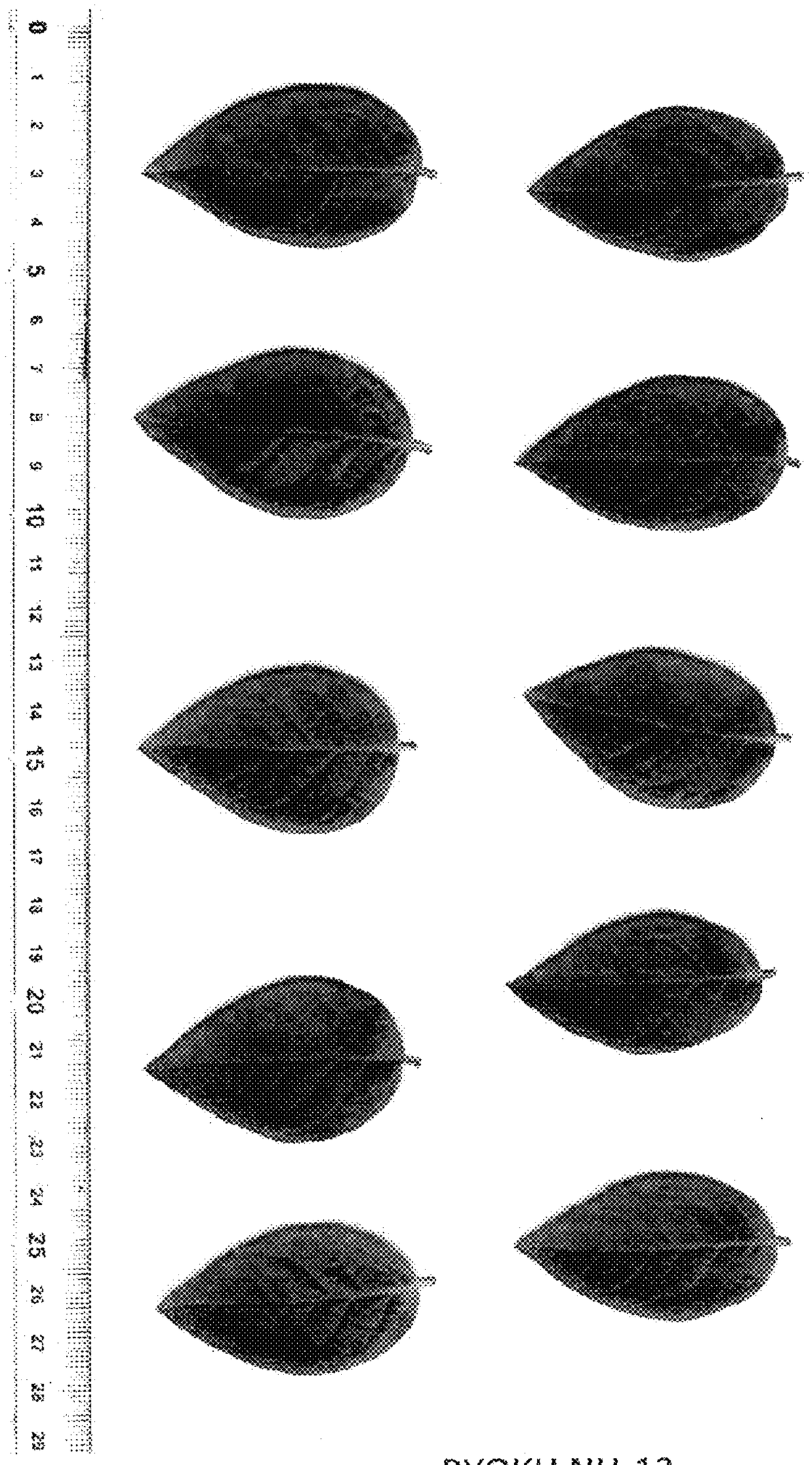

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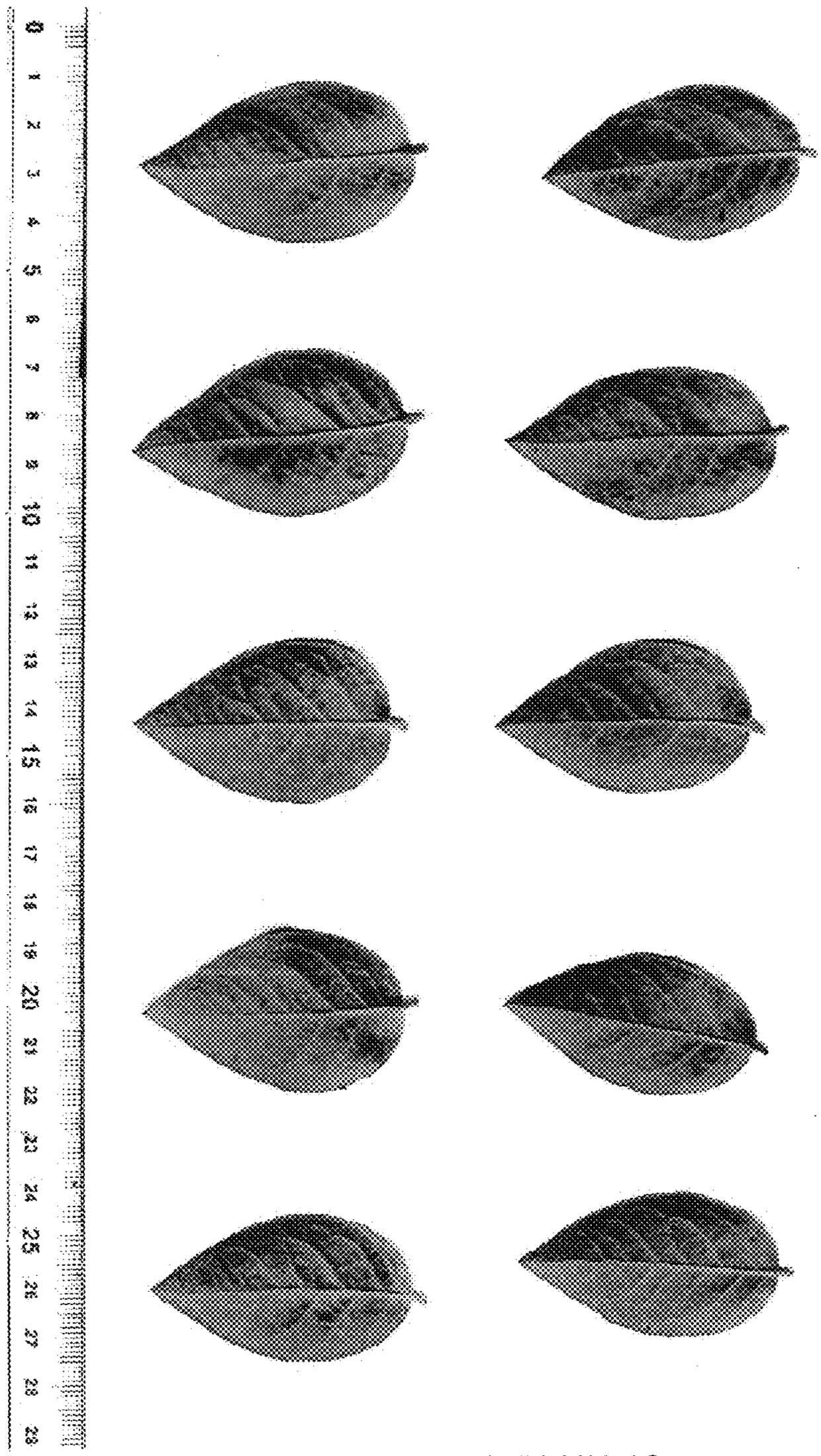
Fig. 8



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