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(54) *MANDARIN PLANT NAMED ‘Mikanken10’*

(50) Latin Name: *Citrus* sp.
Varietal Denomination: **Mikanken10**

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A01H 5/08 (2018.01)
A01H 6/78 (2018.01)

(52) **U.S. Cl.**
USPC **Plt./202**

(58) **Field of Classification Search**
USPC Plt./202, 201
CPC . A01H 5/08; A01H 5/00; A01H 6/785; A01H 6/78
See application file for complete search history.

(56) **References Cited**

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Ma et al. Effects of Postharvest Treatment with 1-Naphthaleneacetic Acid on Chlorophyll and Carotenoid Metabolism in Citrus Fruit, The Horticulture Journal 92 (4): 393-401, 2023. (Year: 2023).*

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(57) **ABSTRACT**

A new variety of *Citrus* sp. plant named ‘Mikanken10’ that has dense spines on the tree, leaf blade with emargination at tip, fruit with flattened general shape of distal part, and no navel opening.

4 Drawing Sheets

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Common name: Mandarin.
Botanical classification: *Citrus* sp.
Variety denomination: ‘Mikanken10’.

BACKGROUND OF THE NEW VARIETY

The present invention relates to a new and distinct variety of Mandarin, *Citrus* sp., which has been given the variety denomination ‘Mikanken10’.

ORIGIN OF THE VARIETY

The parent varieties are ‘ARIAKE’ (male parent) (patented in the US as U.S. Plant Pat. No. 9,235) and ‘NANKO’ (female parent) (not patented in the U.S.), respectively.

The variety was developed and propagated in Uwajima, Ehime, Japan.

The variety was reproduced asexually by vegetative reproduction by top grafting one-year-old scions on rootstocks, in Uwajima, Ehime, Japan. The rootstock used was ‘MIYAGAWAWASE’ (not patented) as an interstock grafted onto *Poncirus trifoliata* (trifoliate orange).

In 1993, crossing the parent varieties and collecting seeds to be grown in the next year.

In 1994 and 1995, seeds were planted and grown.

In 1996, scions were grafted on top of root stock.

In 1998, the first fruit was harvested.

2

In 2003, lines were primarily selected.

In 2009, plants were secondary selected.

From 2010 to 2022 there were growing tests for their performance.

5 In 2023, breeding was completed with DUS status confirmed (distinct, uniform, and stable), whereby it was confirmed that the instant tree reproduces true to type in successive generations of asexual reproduction, and the variety was named ‘Mikanken10’.

10 Cultivation of variety does not require special conditions or treatments.

The variety is currently mainly intended for fruit production.

15 **SUMMARY OF THE VARIETY**

This new mandarin plant ‘Mikanken10’ has dense spines on the tree, leaf blade with emargination at tip, fruit with flattened general shape of distal part, that distinguish it notably from its male parent ‘ARIAKE’, and no navel opening, that distinguish it notably from its female parent ‘NANKO’.

20 Also, ‘Mikanken10’ has no depression at the distal end of the fruit and no polyembryony of seeds, that distinguishes it notably from comparative variety ‘SEINANNOHIKARI’ (not patented in the U.S.).

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In addition, the fruit of ‘Mikanken10’ has the following characteristics: The fruit size is approximately 200 g, the predominant color of the fruit surface is vivid orange, the rind thickness is thin, the strength of the segment walls is weak, the fruit has no seeds, in early December, the total soluble solids (Brix) of juice is about 15 degrees and the juice acidity is medium, and the time of maturity of the fruit is in early to mid-December.

Table 1 shows a comparison between the instant variety ‘Mikanken10’ and Male parent variety ‘ARIAKE’ and Female parent variety ‘NANKO’, as follows (average evaluation):

TABLE 1

Comparison between ‘Mikanken10’ and ‘ARIAKE’ and ‘NANKO’				
No.	Characteristics	Male parent variety ‘ARIAKE’ States	Female parent variety ‘NANKO’ States	Present variety ‘Mikanken10’ States
3	Tree: density of spine	Absent or Sparse	Intermediate	Dense
15	Leaf blade: emargination at tip	Absent	Absent	Present
41	Fruit: general shape of distal part	Slightly rounded	Slightly rounded	Flattened
48	Fruit: presence of navel opening	Absent	Always present	Absent

Table 2 shows a comparison between the instant variety ‘Mikanken10’ and comparative variety ‘SEINANNNOHIK-ARI’, as follows (average evaluation):

TABLE 2

Comparison between ‘Mikanken10’ and ‘SEINANNNOHIKARI’			
No.	Characteristics	Comparative variety ‘SEINANNNOHIKARI’ States	Present variety ‘Mikanken10’ States
15	Leaf blade: emargination at tip	Absent	Present
42	Fruit: presence of depression at distal end	Present	Absent
91	Seed: poly-embryony	Present	Absent

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, which are as nearly true as is reasonable possible to make in a color illustration of this type:

FIG. 1 is a color photograph showing a general view of an illustrative mandarin tree of the variety named ‘Mikanken10’ bearing fruits.

FIG. 2 is a color photograph showing flowers of ‘Mikanken10’.

FIG. 3 is a color photograph showing upper surfaces of leaves of ‘Mikanken10’.

FIG. 4 is a color photograph showing whole fruits (distal end, side view and stalk end), and transverse section and longitudinal section of fruits of ‘Mikanken10’.

FIG. 5 is a color photograph showing whole fruits (distal end, side view and stalk end), and transverse section and longitudinal section of fruits of ‘Mikanken10’ and ‘NANKO’, which is indicating difference of fruit: navel opening.

FIG. 6 is a color photograph showing whole fruits (distal end, side view and stalk end), and transverse section and longitudinal section of fruits of ‘Mikanken10’ and ‘ARIAKE’, which is indicating difference of general shape of distal part.

FIG. 7 is a color photograph showing upper surfaces of leaves of ‘Mikanken10’ and ‘SEINANNNOHIKARI’, which is indicating difference of leaf: emargination at tip.

Due to chemical and/or digital development, processing and printing, the plants or portions of plants depicted in the photographs may or may not be precisely accurate when compared to the actual botanical specimens.

DETAILED DESCRIPTION OF THE INVENTION

Table 3 shows the botanical description of the ‘Mikanken10’ plants evaluated in 2023. The values as provided are averages. The ages of the trees evaluated was 15 years after grafted on top of rootstock, and the location of the trees evaluated was in Uwajima, Ehime, Japan.

Colors are given according to the J.H.S. (Japan Horticultural Society) Color Chart.

BOTANICAL DESCRIPTION

TABLE 3

Botanical description of ‘Mikanken10’			
No.	Characteristics	States	Values
1.	Ploidy	Diploid	
2.	Tree: growth habit	Spreading	
3.	Tree: average height		2.1 m
4.	Tree: average spread		3.0 m
5.	Trunk: average diameter at 10 cm above the grafted area		6.8 cm
6.	Trunk: surface texture		rough
7.	Trunk: bark color	Dark yellow-green	3107 (JHS Color Chart)
8.	Branches: average length		11.3 cm
9.	Branches: surface texture		smooth
10.	Branches: bark color	Dark yellow-green	3508 (JHS Color Chart)
11.	Tree: density of spines (number of thorns per total number of leaf-bearing nodes, multiplied by 100)	Dense	33.3%
12.	Length of spines		0.4 cm
13.	Spine: color	Dark yellow-green	3508 (JHS Color Chart)
14.	Leaf blade: length (apical leaflet in	Long	10.1 cm

TABLE 3-continued

Botanical description of 'Mikanken10'			
No.	Characteristics	States	Values
	case of compound leaf)		
15.	Leaf blade: width (apical leaflet in case of compound leaf)	Medium	4.2 cm
16.	Leaf blade: ratio length/width (apical leaflet in case of compound leaf)	Medium	2.4
17.	Leaf blade: shape in cross section (apical leaflet in case of compound leaf)	Inter-mediate	
18.	Leaf blade: twisting	Absent or Weak	
19.	Leaf blade: blistering	Absent or Weak	
20.	Leaf blade: color: upper surface	Dark yellow-green	3509 (JHS Color Chart)
21.	Leaf blade: undulation of margin	Absent or Weak	
22.	Leaf blade: incisions of margin	Absent	
23.	Leaf blade: shape of apex	Acute	
24.	Leaf blade: emargination at tip	Present	
25.	Petiole: length	Medium	1.6 cm
26.	Petiole: color	Deep yellow-green	3507 (JHS Color Chart)
27.	Petiole: presence of wings	Present	
28.	Varieties with petiole wings present only: petiole: width of wings	Narrow	2.9 mm
29.	Petiole wings: color	Dark yellow-green	3509 (JHS Color Chart)
30.	Flower: diameter of Calyx		0.8 cm
31.	Flower: length of petal	Medium	15.8 mm
32.	Flower: width of petal	Very Broad	7.0 mm
33.	Flower: ratio length/width of petal		2.3
34.	Flower: length of stamens		9.0 mm
35.	Blooming period	Early May	
36.	Fragrance	Present	
37.	Flower bud: color	Yellowish white	2502 (JHS Color Chart)
38.	Sepals: number per flower		5
39.	Sepals: length		0.25 cm
40.	Sepals: width		0.78 cm
41.	Petal: shape	Spindle-shaped	
42.	Petal: color (upper surface)	Yellowish white	2502 (JHS Color Chart)
43.	Petal: apex shape	Acute	
44.	Petal: base shape	Round	
45.	Anther: color	Bright reddish yellow	2204 (JHS Color Chart)
46.	Style: length		5.0 mm
47.	infructescence: clustering of fruits	Present	
48.	Fruit: length		6.2 cm
49.	Fruit: diameter		7.4 cm
50.	Fruit: ratio length/diameter		1.19

TABLE 3-continued

Botanical description of 'Mikanken10'			
No.	Characteristics	States	Values
51.	Fruit: position of broadest part	At Middle	
52.	Fruit: shape in transverse section	Circular	
53.	Fruit: general shape of proximal part (excluding neck, collar and depression at stalk end)	Flattened	
54.	Fruit: presence of neck	Absent	
55.	Fruit: presence of depression at stalk end	Absent	
56.	Fruit: presence of constriction at stalk end	Absent	
57.	Fruit: number of radial grooves at stalk end	Absent or few	2
58.	Fruit: length of radial grooves at stalk end		7.2 mm
59.	Fruit: presence of collar	Absent	
60.	Fruit: abscission layer between floral disc and fruit	Absent weekly developed	
61.	Fruit: general shape of distal part (excluding nipple, bulging of navel and depression at distal end)	Flattened	
62.	Fruit: presence of depression at distal end	Absent	
63.	Fruit: presence of areola	Incomplete	
64.	Fruit: type of areola	Smooth	
65.	Fruit: diameter of areola		3.0 cm
66.	Fruit: diameter of stylar scar		3.0 mm
67.	Fruit: persistence of style	None	
68.	Fruit: presence of navel opening	Absent	
69.	Fruit: presence of radial grooves at distal end	Absent	
70.	Fruit surface: predominant color(s)	Vivid orange	1605 (JHS Color Chart)
71.	Fruit surface: glossiness	Medium	
72.	Fruit surface: roughness	Medium	
73.	Fruit surface: size of oil glands	All more or less the same size	
74.	Fruit surface: size of larger oil glands	Medium	
75.	Fruit surface: conspicuousness of larger oil glands	Medium	
76.	Fruit surface: presence of pitting and pebbling on oil glands	Pitting absent, Pebbling present	
77.	Fruit: varieties with fruit surface: pebbling on oil glands only: surface: density of pebbling	Medium	
78.	Fruit: varieties with fruit surface: pebbling on oil glands only: surface: degree of pebbling		
79.	Fruit: rind thickness	Thin	2.5 mm
80.	Fruit: rind adherence of flesh	Weak to medium	
81.	Fruit: rind: strength	Medium	
82.	Fruit: rind: oiliness	Dry	
83.	Fruit: rind conspicuousness of oil glands on inner surface	Absent or weakly conspicuous	
84.	Fruit: color of albedo	Pale yellow	2503 (JHS Color Chart)

TABLE 3-continued

Botanical description of 'Mikanken10'			
No.	Characteristics	States	Values
85.	Fruit: density of albedo	Medium	
86.	Fruit: amount of albedo adhering to flesh (strand excluded)	Small	
87.	Fruit: presence of albedo strands	Present	
88.	Fruit: amount of albedo strands	Medium	
89.	Fruit: main color of flesh	Strong orange	1606 (JHS Color Chart)
90.	Fruit: filling of core	Medium	
91.	Fruit: diameter of core	Very small	8.2 mm
92.	Fruit: presence of rudimentary segments	Absent or very weak	
93.	Fruit: number of well-developed segments		13
94.	Fruit: coherence of adjacent segment walls	Medium	
95.	Fruit: strength of segment walls	Weak	
96.	Fruit: length of juice vesicles		6.5 mm
97.	Fruit: thickness of juice vesicles		2.6 mm
98.	Fruit; conspicuousness of juice vesicle walls	High	
99.	Fruit; coherence of juice vesicles	Medium	
100.	Fruit: presence of navel (viewed internally)	Absent or very rare	
101.	Fruit: juiciness	High	
102.	Fruit: juice: total soluble solids	High	14.9 (Brix)
103.	Fruit: juice: acidity	Medium	1.00

TABLE 3-continued

Botanical description of 'Mikanken10'			
No.	Characteristics	States	Values
104.	Fruit: strength of fiber	Weak	
105.	Fruit: number of seeds (open pollinated)	Absent or very few	0.7
106.	Seed: polyembryony	Absent	
107.	Seed: length		9.6 mm
108.	Seed: width		7.2 mm
109.	Seed: surface	Wrinkled	
110.	Seed: varieties with seed surface: wrinkled only: seed: prominence of wrinkled	Medium	
111.	Seed: external color	Whitish	
112.	Seed: color of inner seed coat	Light brown	
113.	Plant: time of maturity of fruit for consumption	Very early to early	December
114.	Plant: fruit: parthenocarp	Present	
115.	Plant: fruit harvest period	November	

Other features of the plant are as follows:

Disease and pest resistance: Not observed to date.
Tree hardiness: USDA Hardiness Zone 9a-9b (until -3° C.).
Shipping quality, storage life, and productivity (weight/plant): Under investigation to date. Market use is as a *Citrus* fruit for eating raw.

The invention claimed is:

1. A new and distinct variety of *Citrus* sp. plant named 'Mikanken10', substantially as described and illustrated herein.

* * * * *



Fig.1

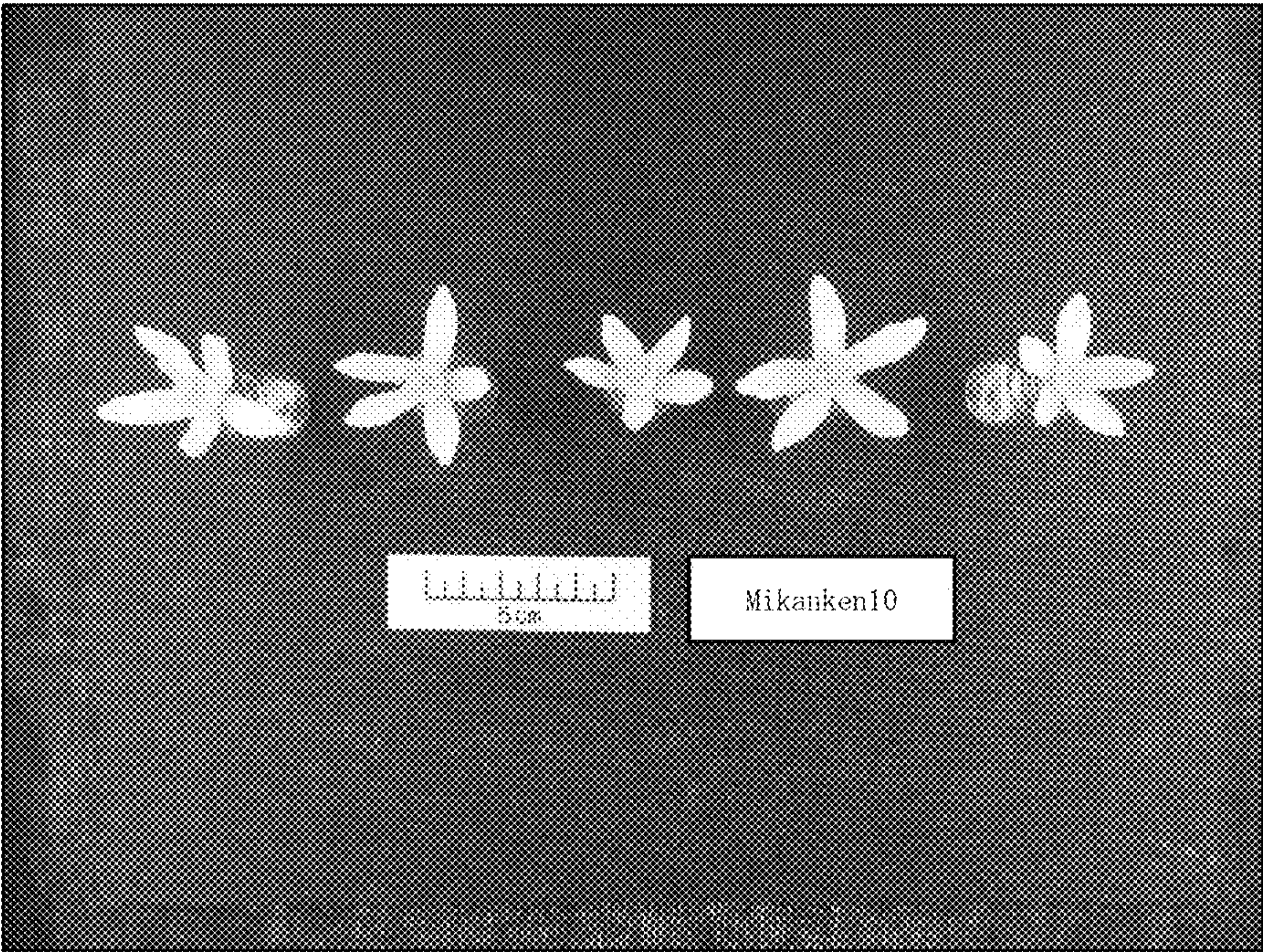


Fig.2

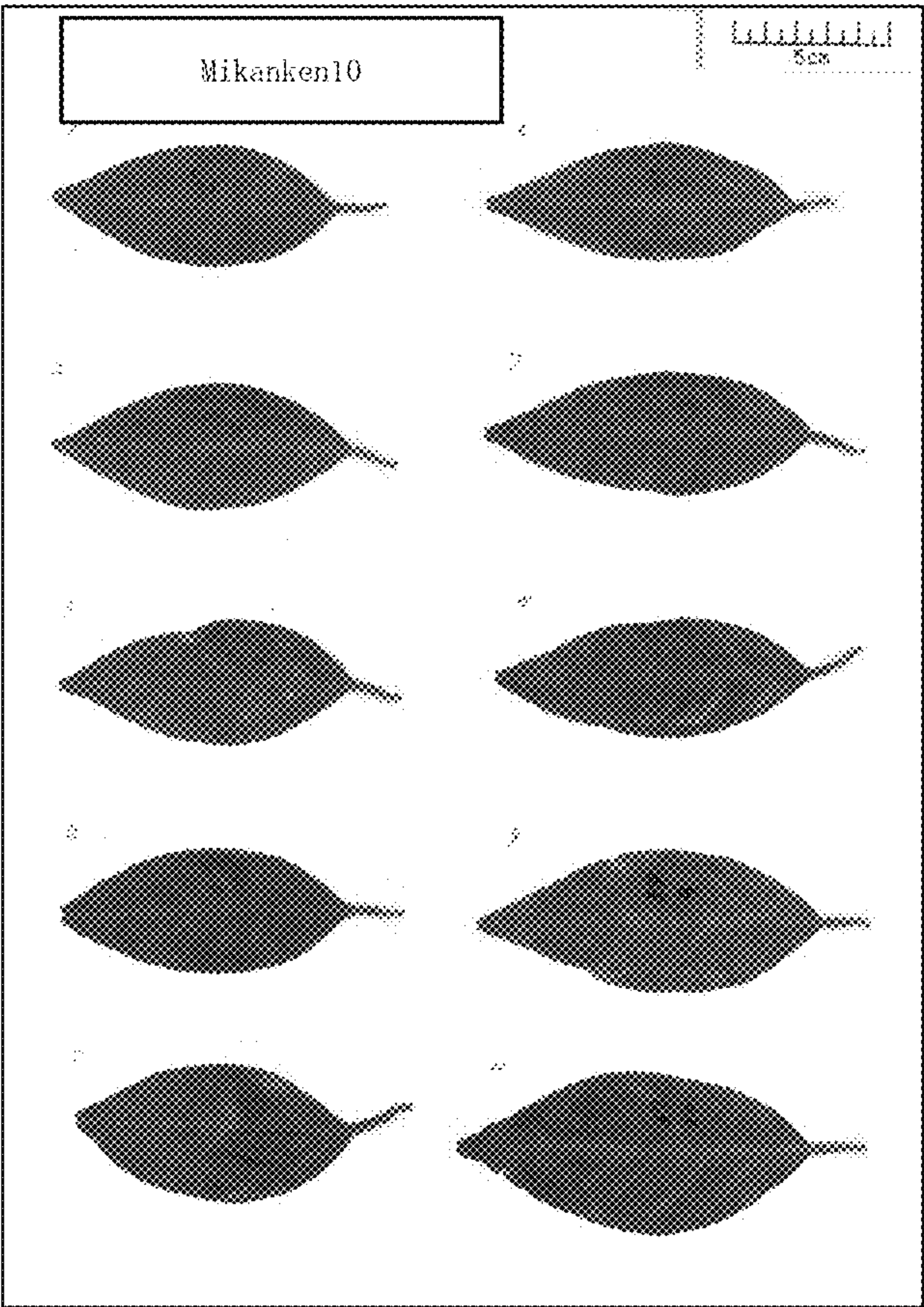


Fig 3

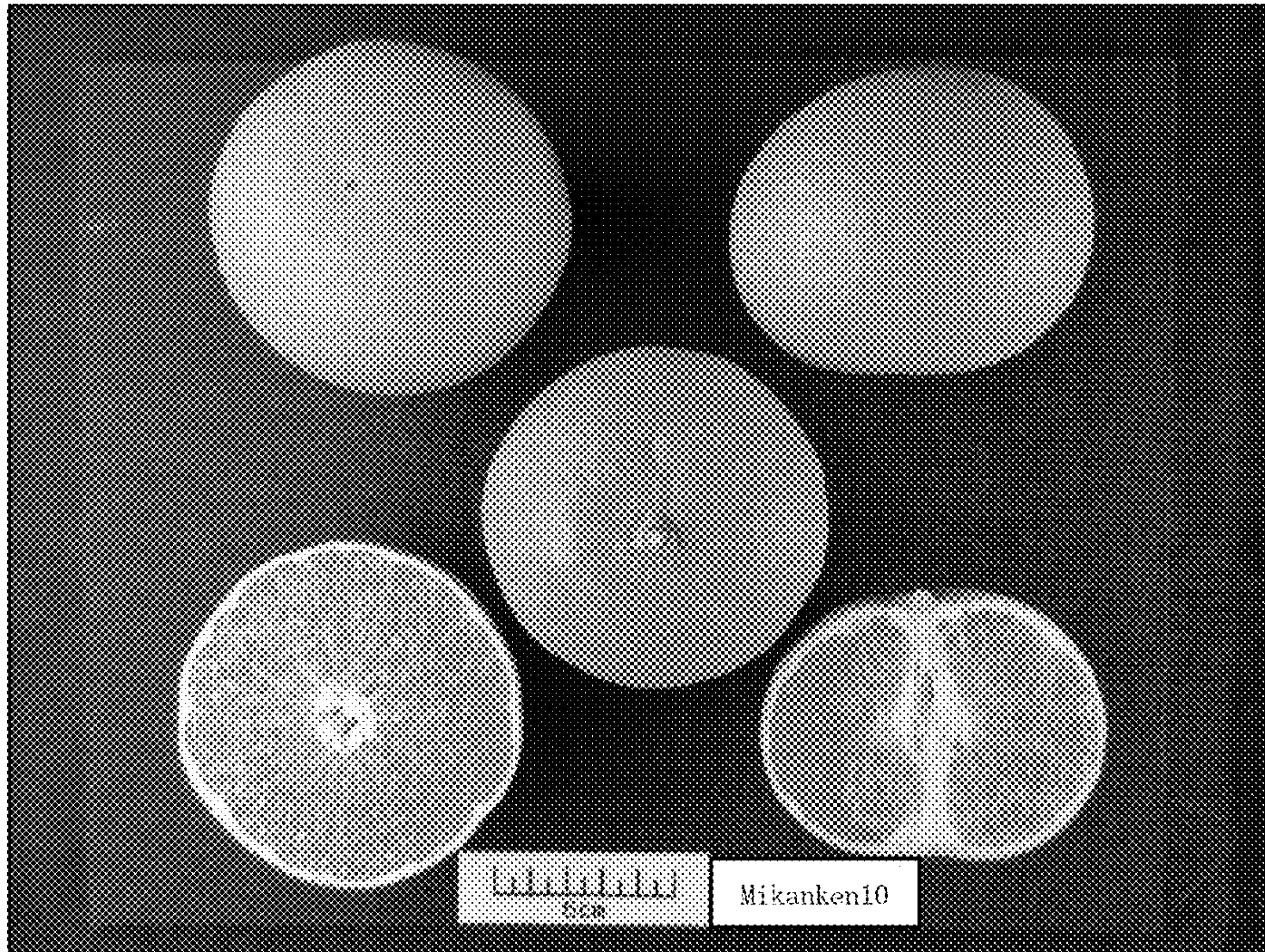


Fig.4

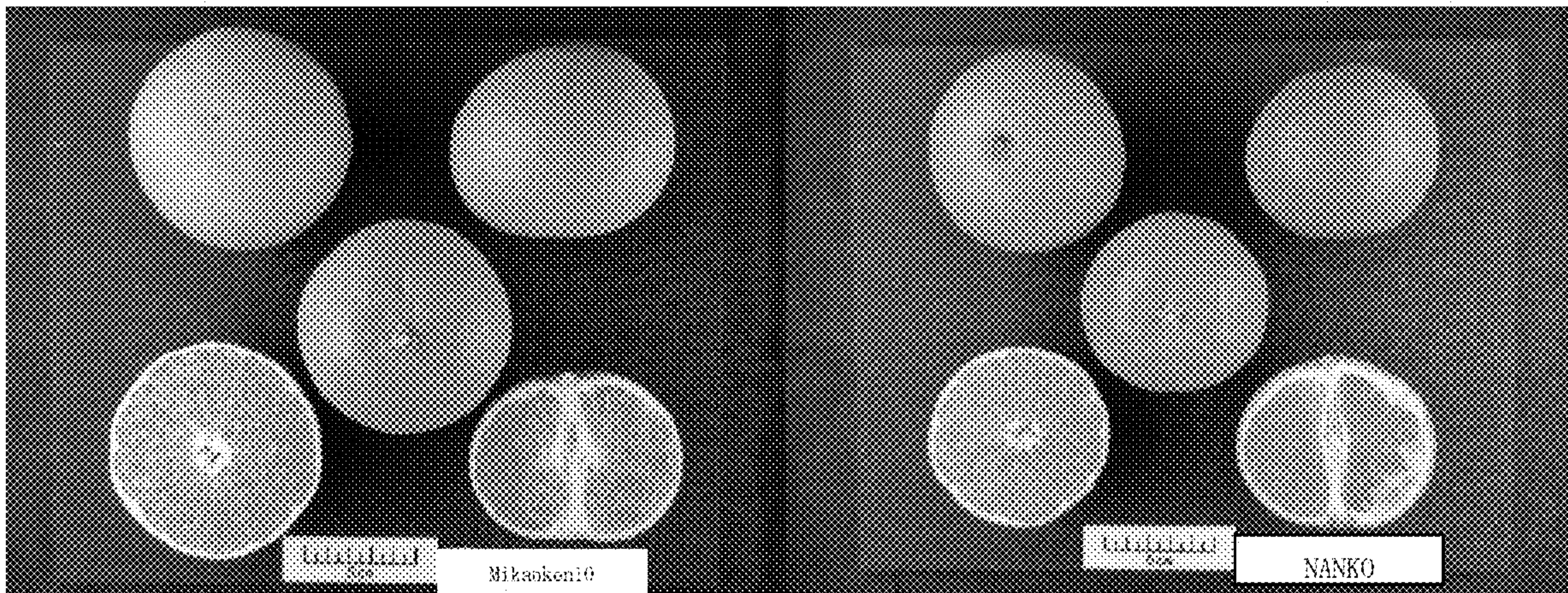


Fig.5

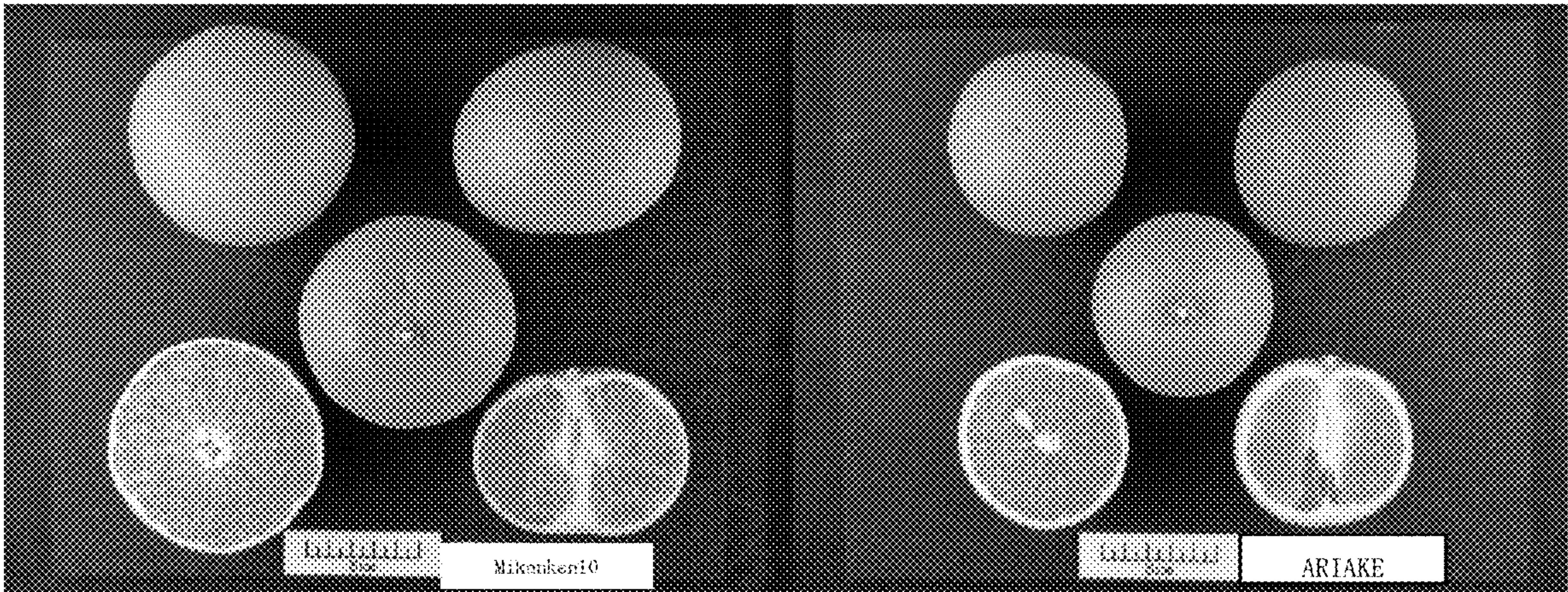


Fig.6

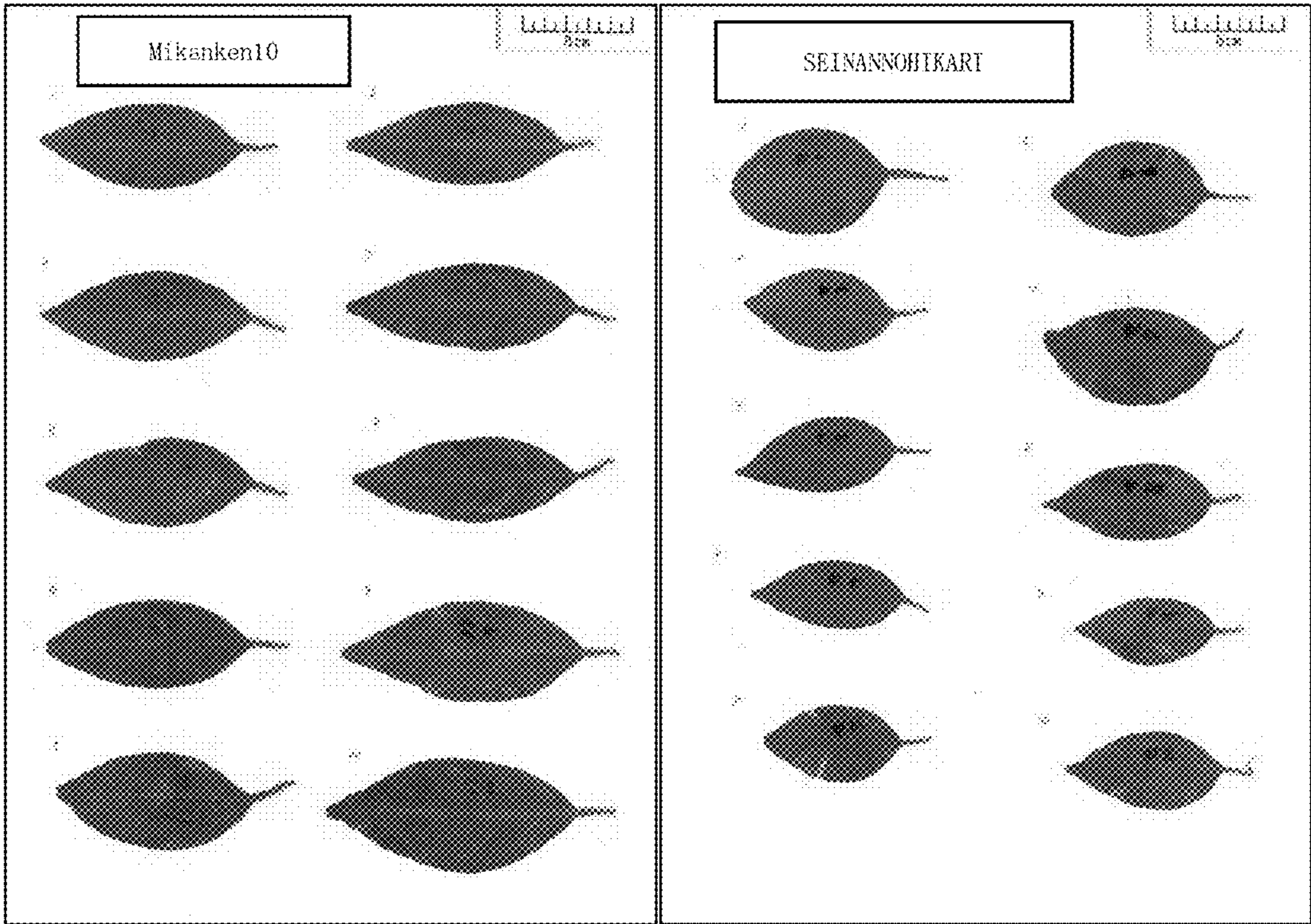


Fig.7