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FRUIT CROPS**

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**WORKING PAPER ON TEST GUIDELINES FOR KIWIFRUIT**  
*(Actinidia Lindl.)*

*Document prepared by experts from New Zealand*

<u>TABLE OF CONTENTS</u>	<u>PAGE</u>
I. Subject of these Guidelines .....	3
II. Material Required .....	3
III. Conduct of Tests .....	3
IV. Methods and Observations.....	4
V. Grouping of Varieties .....	4
VI. Characteristics and Symbols .....	5
VII. Table of Characteristics .....	6
VIII. Explanations on the Table of Characteristics.....	19
IX. Literature.....	24
X. Technical Questionnaire .....	25

## I. Subject of these Guidelines

These Test Guidelines apply to all vegetatively propagated fruiting female, polleniser male, hermaphroditic and rootstock varieties of the genus *Actinidia* Lindl.

## II. Material Required

1. The competent authorities decide when, where and in what quantity and quality the plant material required for testing the variety is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must make sure that all quarantine and customs formalities are complied with. As a minimum., the following quantity of plant material is recommended:

- 8 plants on their own roots or
- 8 plants on a clonal rootstock. The competent authorities to select the most appropriate rootstock.

2. The plant material supplied should be visibly healthy, not lacking in vigor or affected by any important pest or disease. It should preferably not be obtained from *in vitro* culture. If test material is grafted onto a clonal rootstock, there should be information available stating how the rootstock may affect the expression of characteristics. In the case of a female variety the applicant should send in or at least indicate one male variety which flowers at the same time and is compatible with the female variety under test. The male variety should preferably be of the same taxon and at the same ploidy level as the female variety. Hand pollination is suggested to ensure that potential fruit size is achieved.

3. The plant material must not have undergone any treatment unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

## III. Conduct of Tests

1. To assess distinctness of female and fruiting hermaphroditic varieties it is essential that the plants under test bear a satisfactory crop of fruit for at least two growing periods. To assess distinctness of fruit size and fruit shape it is important to ensure adequate seed set, either by hand pollination or by providing sufficient pollinators.

2. To assess distinctness of male and non fruiting varieties it is essential that the plants under test produce two full flowerings over at least two growing periods. If it is claimed that a variety is hermaphroditic, tests should be carried out to determine whether it is self-fertile and self-setting. Pollen viability should be tested separately in addition to flowers being bagged to prevent pollination by outside pollen.

3. The testing should normally be conducted at one place. If any important characteristics of the variety cannot be seen at that place, the variety may be tested at an additional place.

4. The tests should be carried out under conditions ensuring normal growth. As a minimum, each test should include all 8 plants. Separate plots for observation and for measuring can only be used if they have been subject to similar environmental conditions.

5. Additional tests for special purposes may be established.

#### IV. Methods and Observations

1. Unless otherwise stated, all observations should be made on 8 plants or 10 parts of 8 plants.
2. For the assessment of uniformity and stability, a population standard of 1% and an acceptance probability of 95% should be applied for varieties resulting from a crossing, and a population standard of 2% with the same acceptance probability for mutations. For a sample size of 8 plants, the maximum number of off-types allowed in both cases would be 1.
3. The shape, size and hairiness of leaves can vary greatly according to the type and vigor of the shoot on which they are borne. Unless specified, the shoots should be replacement canes, i.e., those that will be tied down and retained for the following season's flowering.
4. All observations on the young shoot should be made immediately after flowering, on internodes 10 to 20 cm from the tip of growing shoots.
5. All observations on the stem ( including observations on over wintering buds) should be made in the middle third of the replacement stem after leaf fall.
6. All observations on the bud and bud support should be made on dormant canes.
7. All observations on the leaf should be made near the base of the current season's growth on sufficiently mature, but not old leaves. The most basal leaves of a shoot should be excluded since they do not usually attain full size or typical shape.
8. All observations on the presence or absence of red pigment coloration in vegetative organs refer to the general appearance of the organ, irrespective of whether red pigments are present in hairs or in the underlying skin.
9. All observations on the flower should be made on fully opened terminal ( king) flowers. The presence of any lateral flowers should be recorded.
10. Unless otherwise stated, all observations on the fruit should be made on fruits at minimum harvest maturity of 6.2°Brix.

#### V. Grouping of Varieties

1. The collection of varieties to be grown should be divided into groups to facilitate the assessment of distinctness. Characteristics which are suitable for grouping purposes are those which are known from experience not to vary, or to vary only slightly, within a variety. Their various states of expression should be fairly evenly distributed throughout the collection.
2. It is recommended that the competent authorities use the following characteristics for grouping varieties.

For male varieties:

- (i) Time of beginning of flowering (characteristics 90)
- (ii) Flower: type of coloration (characteristic 53)

For female and hermaphroditic varieties:

- (i) Fruit: size (characteristic 63)
- (ii) Fruit: general shape (characteristic 64)
- (iii) Fruit: skin hairs (characteristic 75)
- (iv) Fruit: outer pericarp color at maturity for consumption (characteristic 83)
- (v) Fruit: time of maturity for harvest (characteristic 91)

## VI. Characteristics and Symbols

1. To assess distinctness, uniformity and stability, the characteristics and their states, as given in the four UPOV working languages in the Table of Characteristics, should be used.

2. Notes (1 to 9), for the purpose of electronic data processing, are given opposite the states of expression for each characteristics.

3. Legend:

(\*) Characteristics that should be used on all varieties in every growing period over which examinations are made and always be included in the variety descriptions, except when the state of expression of a preceding characteristic or regional environmental conditions renders this impossible.

(+) See Explanations on the Table of Characteristics in Chapter VIII.

**VIII. TABLE OF CHARACTERISTICS**

	<u>Characteristic and State</u>	<u>Example Variety</u>	<u>Note</u>
<b>1.</b>	<b>Plant: sex</b>		
(*)	male	Matua	1
	hermaphrodite		2
	female	Hayward	3
<b>2.</b>	<b>Plant: fruit setting ( hermaphrodite varieties only)</b>		
	absent		1
	present		9
<b>3.</b>	<b>Plant: ploidy</b>		
	haploid		1
	diploid	Hort16A	2
	triploid		3
	tetraploid		4
	pentaploid		5
	hexaploid	Hayward	6
	heptaploid		7
	octaploid		8
<b>4.</b>	<b>Plant: vigor</b>		
	very weak		1
	weak		3
	medium	Hayward	5
	strong		7
	very strong	Matua	9
<b>5.</b>	<b>Young shoot: hairs</b>		
(*)	absent		1
	present		9
<b>6.</b>	<b>Young shoot: density of hairs</b>		
(*)	sparse		3
	medium	Hayward	5
	dense	King	7
<b>7.</b>	<b>Young shoot: type of hairs</b>		
(*)	downy		1
(+)	velutinous		2
	tomentose		3
	hirsute		4
	bristly		5
	hispid		6

<b>8.</b>	<b>Young shoot: red</b>		
(*)	<b>coloration of growing tip</b>		
	absent or very weak	Hort16A	1
	weak	King	3
	medium	Tomua	5
	strong		7
	very strong		9
<b>9.</b>	<b>Stem: thickness</b>		
	thin		3
	medium	Hayward	5
	thick	Bruno	7
<b>10.</b>	<b>Stem: color of shoot on sunny side</b>		
(*)	grey white		1
	green white		2
	grey brown	King	3
	yellow brown	Hort16A	4
	light brown		5
	red brown	Ranger	6
	purple brown	Bruno	7
	dark brown		8
<b>11.</b>	<b>Stem: roughness of bark</b>		
	smooth	Sparkler	3
	medium	Meteor	5
	rough		7
<b>12.</b>	<b>Stem: hairs</b>		
	absent		1
	present		9
<b>13.</b>	<b>Stem: density of hairs</b>		
	sparse		3
	medium		5
	dense		7
<b>14.</b>	<b>Stem: type of hairs</b>		
(+)	downy		1
	velutinous		2
	tomentose		3
	hirsute		4
	bristly		5
	hispid		6

<b>15.</b>	<b>Stem: size of lenticel</b>		
(*)	small		3
	medium	Hayward	5
	large	Ranger	7
<b>16.</b>	<b>Stem: number of lenticels</b>		
(*)	few	Meteor	3
	medium	Hayward	5
	many	Bruno	7
<b>17.</b>	<b>Stem: color of lenticel</b>		
(*)	greyish white		1
	greyish yellow		2
	greyish brown		3
<b>18.</b>	<b>Stem: size of bud support</b>		
(*)	<b>(bud support diameter in relation to stem diameter)</b>		
(+)	small	Sparkler	3
	small to medium	Hayward	4
	medium	King	5
	medium to large		6
	large		7
<b>19.</b>	<b>Stem: position of bud</b>		
(*)	sunken		1
(+)	slightly raised	Ranger	2
	strongly raised		3
<b>20.</b>	<b>Stem: number of hairs visible</b>		
(*)	<b>on bud</b>		
	few	Hayward	3
	medium		5
	many	Hort16A	7
<b>21.</b>	<b>Stem: leaf scar</b>		
(+)	flat	Meteor	1
	shallow	Hayward	2
	deep	Monty	3
<b>22.</b>	<b>Leaf blade: general shape</b>		
(+)	lanceolate		1
	ovate		2
	broad ovate	Hayward	3
	very broad ovate	Hort16A	4
	broad obovate	Bruno	5
	very broad obovate	Matua	6



<b>23.</b>	<b>Leaf blade: shape of apex</b>		
(*)	emarginate		1
(+)	retuse		2
	truncate		3
	obtuse		4
	apiculate	Bruno	5
	acuminate	Hort16A	6
<b>24.</b>	<b>Leaf blade: shape of base</b>		
(*)	attenuate		1
(+)	acute		2
	obtuse		3
	rounded		4
	truncate		5
	cordate		6
<b>25.</b>	<b>Leaf blade: arrangement of base (if cordate)</b>		
(*)	<b>base (if cordate)</b>		
(+)	far apart		1
	slightly apart	Matua	3
	touching	Hort16A	5
	slightly overlapping	Hayward	7
	strongly overlapping		9
<b>26.</b>	<b>Leaf blade: density of hairs between main veins on upper surface</b>		
	absent or very sparse	Hort16A	1
	sparse	Tomua	3
	medium	Bruno	5
	dense	Meteor	7
	very dense		9
<b>27.</b>	<b>Leaf blade: density of hairs between main veins on lower surface</b>		
	absent or very sparse		1
	sparse		3
	medium	Hayward	5
	dense	Ranger	7
	very dense		9
<b>28.</b>	<b>Leaf blade: profile in cross section</b>		
	concave		1
	flat		2
	convex		3

<b>29.</b>	<b>Leaf blade: margin</b>		
	entire		1
	denticulate		2
	dentate		3
	serrulate		4
	serrate		5
<b>30.</b>	<b>Leaf blade: puckering/blistering on upperside</b>		
(*)	absent or very weak		1
	weak	Hort16A	3
	medium	Hayward	5
	strong		7
	very strong		9
<b>31.</b>	<b>Leaf blade: green color of upperside</b>		
(*)	light		3
	medium	Hayward	5
	dark	Bruno	7
<b>32.</b>	<b>Leaf blade: color of lowerside</b>		
(*)	whitish		1
	light green		2
	medium green	Bruno	3
	yellow green	Hayward	4
	yellow brown		5
<b>33.</b>	<b>Leaf blade: glaucosity of lowerside</b>		
(*)	absent		1
	present		9
<b>34.</b>	<b>Leaf blade: variegation</b>		
	absent		1
	present		9
<b>35.</b>	<b>Leaf blade: color of variegation</b>		
	white and green		1
	white, red and green		2
<b>36.</b>	<b>Leaf blade: spines along main vein on lowerside</b>		
	absent		1
	present		9
<b>37.</b>	<b>Leaf : hairs on petiole</b>		
	absent		1
	present		9

<b>38.</b>	<b>Leaf: density of hairs on petiole</b>		
	sparse		3
	medium	Meteor	5
	dense		7
<b>39.</b>	<b>Leaf: red coloration on upperside of petiole</b>		
	absent or very weak	Hort 16A	1
	weak	Sparkler	3
	medium	Hayward	5
	strong		7
	very strong		9
<b>40.</b>	<b>Flower bud: red coloration of protruding petal ends (at calyx split)</b>		
	absent or very weak	Hort16A	1
	weak		3
	medium	Hayward	5
	strong	Meteor	7
	very strong		9
<b>41.</b>	<b>Inflorescence: predominant (* number of flowers</b>		
	one	Hayward	1
	3-5	Matua	2
	6-10	Tomuri	3
	> 10		4
<b>42.</b>	<b>Pedice: length (*</b>		
	very short		1
	short	Matua	3
	medium	Hort 16A	5
	long	Tomua	7
	very long	Jade Moon	9
<b>43.</b>	<b>Pedice: hairs</b>		
	absent		1
	present		9
<b>44.</b>	<b>Pedice: length of hairs</b>		
	short	Hort16A	3
	medium	Hayward	5
	long		7
<b>45.</b>	<b>Flower: number of sepals</b>		
	2 or 3		1
	3-5		2
	> 5		3

<b>46.</b>	<b>Flower: color of sepals</b>		
(*)	white		1
	green	Hort16A	2
	brown	Tomua	3
	reddish-brown		4
<b>47.</b>	<b>Flower: sepal hairs</b>		
	absent		1
	present		9
<b>48.</b>	<b>Flower: length of sepal hairs</b>		
	short		3
	medium		5
	long		7
<b>49.</b>	<b>Flower: diameter</b>		
(*)	very small		1
	small		3
	medium	Matua	5
	large		7
	very large	Hayward	9
<b>50.</b>	<b>Flower: arrangement of petals</b>		
(*)	apart		1
(+)	touching	Bruno	2
	overlapping	Hayward	3
<b>51.</b>	<b>Flower: curvature of petals (in longitudinal section)</b>		
	flat	Bruno	1
	curved upwards at tip	Hayward	2
<b>52.</b>	<b>Flower: main color of petals on upper side</b>		
(*)	white	Hayward	1
	greenish white		2
	yellowish white		3
	yellowish green		4
	yellow		5
	orange		6
	light pink		7
	red pink		8
	red		9

<b>53.</b>	<b>Flower: type of coloration (upper side)</b>		
(*)	single-colored		1
	bicolored	Meteor	2
<b>54.</b>	<b>Flower: shades of color</b>		
(*)	<b>(for single-colored varieties)</b>		
	absent		1
	present		9
<b>55.</b>	<b>Flower: distribution of color</b>		
(*)	<b>(for single-colored varieties)</b>		
	lighter towards the base		1
	lighter towards the top		2
<b>56.</b>	<b>Flower: secondary color</b>		
	<b>(for bicolored varieties)</b>		
	white		1
	green	Hayward	2
	orange		3
	light pink		4
	dark pink	Meteor	5
<b>57.</b>	<b>Flower: distribution of secondary color</b>		
	<b>(for bicolored varieties)</b>		
	marginal		1
	blotched	Meteor	2
	basal spot		3
<b>58.</b>	<b>Flower: color of filament</b>		
	white		1
	light green		2
	light pink		3
	dark pink		4
<b>59.</b>	<b>Flower: color of anther</b>		
	yellow	Hayward	1
	yellow orange		2
	grey		3
	dark purple		4
	black		5
<b>60.</b>	<b>Flower: number of styles</b>		
	few		3
	medium	Hort16A	5
	many	Hayward	7

<b>61. Flower: color of styles</b>		
white		1
whitish yellow		2
light green		3
<b>62. Flower: attitude of styles</b>		
(*) erect	Hort16A	1
semi-erect	Hayward	2
both erect and horizontal		3
<b>63. Fruit: size</b>		
(*) very small	Blake	1
small		3
medium	Tomua	5
large	Hayward	7
very large	Jade Moon	9
<b>64. Fruit: general shape</b>		
(*) ellipsoidal	Hort16A	1
(+) cylindrical	Bruno	2
ovoid	Hayward	3
obovoid	Skelton	4
globose	Katiuscia	5
maliform		6
<b>65. Fruit: cross section (at median)</b>		
(*) circular	Bruno	1
(+) oblate		2
elliptical	Hayward	3
<b>66. Fruit: general shape of stylar end</b>		
(*) deeply depressed		1
(+) slightly depressed	Monty	3
flat	Hayward	5
raised	Bruno	7
protruding	Hort16A	9
<b>67. Fruit: shape of shoulder on stalk end</b>		
(*) square		1
(+) rounded	Hayward	2
strongly sloping	Skelton	3
<b>68. Fruit: persistence of sepals at harvest</b>		
absent		1
present		9

<b>69.</b>	<b>Fruit: adherence of skin to flesh</b>		
	weak		3
	medium		5
	strong		7
<b>70.</b>	<b>Fruit: lenticels on skin</b>		
	absent		1
	present		9
<b>71.</b>	<b>Fruit: skin color at harvest maturity</b>		
<b>(*)</b>	<b>(fruit still hard)</b>		
	light green	Hort16A	1
	medium green		2
	reddish green		3
	greenish brown	Hayward	4
	medium brown	Katiuscia	5
	reddish brown	Tomua	6
	dark brown		7
<b>72.</b>	<b>Fruit: longitudinal stripes or banding on the skin</b>		
	absent		1
	present		9
<b>73.</b>	<b>Fruit: skin color change during ripening</b>		
<b>(*)</b>	<b>during ripening</b>		
	absent		1
	present		9

<b>74.</b>	<b>Fruit: skin color at maturity</b>		
(*)	<b>for consumption</b>		
	light green		1
	medium green		2
	reddish green		3
	yellow		4
	orange yellow		5
	orange		6
	greenish brown		7
	light brown	Hort16A	8
	medium brown		9
	reddish brown	Tomua	10
	dark brown		11
	purple-red		12
<b>75.</b>	<b>Fruit: skin hairs</b>		
(*)	absent		1
	present		9
<b>76.</b>	<b>Fruit: density of hairs</b>		
(*)	sparse	Hort16A	3
	medium	Hayward	5
	dense	Bruno	7
<b>77.</b>	<b>Fruit: type of hairs</b>		
(*)	downy	Hort16A	1
(+)	velutinous		2
	tomentose		3
	hirsute	Hayward	4
	bristly	Bruno	5
	hispid		6
<b>78.</b>	<b>Fruit: location of hairs</b>		
(*)	evenly spread		1
	mainly at stylar end		2
<b>79.</b>	<b>Fruit: color of hairs at harvest</b>		
	white	Hort16A	1
	yellow		2
	yellow-brown		3
	medium brown	Hayward	4
	dark brown		5
<b>80.</b>	<b>Fruit: adherence of hairs to skin (when rubbed)</b>		
(*)	weak	Hort16A	3
	medium		5
	strong	Hayward	7



<b>81.</b>	<b>Fruit: core diameter relative to fruit diameter</b>		
<b>(*)</b>	<b>(at largest diameter)</b>		
	small	Hort16A	3
	small to medium		4
	medium	Bruno	5
	medium to large	Tomua	6
	large	Hayward	7
<b>82.</b>	<b>Fruit: core shape</b>		
<b>(*)</b>	<b>(in cross section)</b>		
	circular		1
	oblate		2
	elliptic	Hort16A	3
	fluted	Hayward	4
<b>83.</b>	<b>Fruit: outer pericarp color</b>		
<b>(*)</b>	<b>at maturity for consumption</b>		
	light green	Hayward	1
	dark green		2
	greenish yellow		3
	medium yellow	Hort16A	4
	dark yellow		5
	yellowish orange		6
	orange		7
	red		8
	red-purple		9
<b>84.</b>	<b>Fruit: inner pericarp color</b>		
<b>(*)</b>	<b>(locules) at maturity for consumption</b>		
	green	Hayward	1
	greenish yellow		2
	medium yellow	Hort16A	3
	dark yellow		4
	orange-yellow		5
	orange		6
	red		7
	red-purple		8
<b>85.</b>	<b>Fruit: core color at maturity</b>		
<b>(*)</b>	<b>for consumption</b>		
	white		1
	greenish white	Hayward	2
	yellow-white	Hort16A	3
	orange		4
	red-purple		5

<b>86.</b>	<b>Fruit: sweetness (Brix level) at maturity for consumption</b>		
(*)	very low	Jade Moon	1
	low	Hayward	3
	medium	Tomua	5
	high	Hort16A	7
	very high		9
<b>87.</b>	<b>Fruit: titratable acidity (as citric acid) at maturity for consumption</b>		
	low (< 0.6%)		3
	medium (0.6-1.0%)		5
	high (> 1.0%)		7
<b>88.</b>	<b>Fruit: vitamin C content</b>		
	low		3
	low to medium		4
	medium	Hayward	5
	medium to high	Bruno	6
	high		7
<b>89.</b>	<b>Time of vegetative budbreak</b>		
(*)	early	Tomua	3
	medium	Hayward	5
	late		7
<b>90.</b>	<b>Time of beginning of flowering</b>		
(*)	early	Hort16A	3
	medium	Bruno	5
	late	Hayward	7
<b>91.</b>	<b>Time of maturity for harvest</b>		
(*)	very early		1
	early		3
	medium	Tomua	5
	late	Bruno	7
	very late	Hayward	9

**IX. Explanations to the Table of Characteristics**









## X. Literature

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XI. Technical Questionnaire

	<p>Reference Number (not to be filled in by the applicant)</p>
<p style="text-align: center;"><b>TECHNICAL QUESTIONNAIRE</b> to be completed in connection with an application for plant breeders' rights</p>	
<p>1. Species</p>	<p style="text-align: center;"><i>Actinidia Lindl.</i>  KIWIFRUIT</p>
<p>2. Applicant (Name and address)</p>	
<p>3. Proposed denomination or breeder's reference</p>	

4. Information on origin, maintenance and reproduction of the variety

4.1 Breeding method

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to that question is yes, please attach a copy of such an authorization.

4.2 Origin

(a) Seedling of unknown parentage [ ]

(b) Produced by controlled pollination [ ]  
(indicate parent varieties)

– Seed bearing parent [ ]

.....

– Pollen parent [ ]

.....

(c) Produced by open pollination of [ ]  
(indicate seed bearing parent plant)

.....

(d) Mutation or sport from (indicate parent variety) [ ]  
.....

(e) Discovery (indicate where and when) [ ]  
.....

4.3. *In vitro* propagation

The plant material has been obtained by *in vitro* propagation      yes      [ ]  
no      [ ]

4.4 Virus status

The variety is

(a) virus free      [ ]  
(indicate viruses)

.....

(b) virus tested      [ ]  
(indicate against which virus)

.....

(c) The virus status is unknown      [ ]

4.5 Pollinator [for female varieties]

Good pollinators are the following varieties:

.....

4.6 Other information

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the state of expression which best corresponds).

Characteristics	Example Varieties	
<b><u>For male varieties</u></b>		
<b>5.1 Flower: type of coloration (upper side)</b> <b>(53)</b>		
single-colored		1[ ]
bicolored	Meteor	2[ ]
<b>5.2 Time of beginning of flowering</b> <b>(90)</b>		
early	Hort16A	3[ ]
medium	Bruno	5[ ]
late	Hayward	7[ ]
<b><u>For female and hermaphrodite varieties</u></b>		
<b>5.3</b> <b>(63) Fruit: size</b>		
very small	Blake	1[ ]
small		3[ ]
medium	Tomua	5[ ]
large	Hayward	7[ ]
very large	Jade Moon	9[ ]
<b>5.4 Fruit: general shape</b> <b>(64)</b>		
ellipsoidal	Hort16A	1[ ]
cylindrical	Bruno	2[ ]
ovoid	Hayward	3[ ]
obovoid	Skelton	4[ ]
globose	Katiuscia	5[ ]
maliform		6[ ]

Characteristics	Example Varieties	
<b>5.5 Fruits: skin hairs (75)</b>		
absent		1[ ]
present		9[ ]
<b>5.6 Fruit: outer pericarp color at maturity for consumption (83)</b>		
light green	Hayward	1[ ]
dark green		2[ ]
greenish yellow		3[ ]
medium yellow	Hort16A	4[ ]
dark yellow		5[ ]
yellowish orange		6[ ]
orange		7[ ]
red		8[ ]
red-purple		9[ ]
<b>5.7 Time of maturity for harvest (91)</b>		
very early		1[ ]
early		3[ ]
medium	Tomua	5[ ]
late	Bruno	7[ ]
very late	Hayward	9[ ]

6. Similar varieties and differences from these varieties

Denomination of similar variety	Characteristic in which the similar variety is different <sup>o)</sup>	State of expression of similar variety	State of expression of candidate variety
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<sup>o)</sup> In the case of identical states of expressions of both varieties, please indicate the size of the difference.

7. Additional information which may help to distinguish the variety

7.1 Resistance to pests and diseases

7.2 Special conditions for the examination of the variety

7.3 Other information

A representative color photo of the variety should be included in the Technical Questionnaire.