Satsumas

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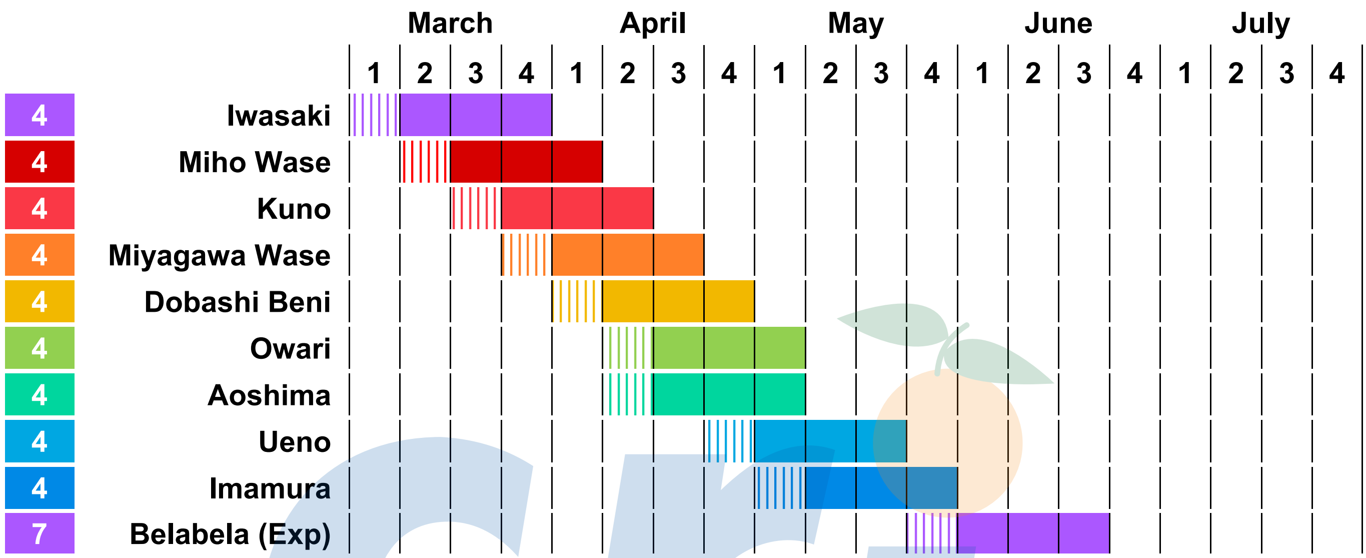
Satsuma Maturity Periods

Western Cape



Key:

Exp Experimental Cultivar
1 CGA Cultivar Company
2 Citrogold
3 Eurosemillas
4 Open
5 Stargrow
6 XLnT
7 Citrus Genesis

Updated: July 2024

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Aoshima Satsuma

Origin
An Owari mutation of Japanese origin. The selection was released in South Africa in 1993.

Ownership
Open.

General Description
This is a later maturing Satsuma, the leading late variety in Japan. Production and fruit size are generally good with a flat shape. Local information is limited. Maturity is early to mid May.

Tree Characteristics
Trees are of medium vigour, slightly larger than Miho Wase.

Rootstock Options
There is limited experience regarding rootstock choice in South Africa. Carrizo and Troyer citrange are suggested, depending on soil type and whether plantings are on new or replant ground. Poor quality inducing rootstocks should be avoided as well as Swingle citrumelo as this may delay rind colour.

Fruit Characteristics
Yields are good with medium to medium large fruit size. The fruit is quite oblate with a smooth rind. Flesh colour develops into a bright orange. The fruit can be slightly raggy. Rind colour develops later than internal quality. Maturity is around early to mid May. In general, Satsuma mandarins have a short harvest period which usually lasts 2 - 3 weeks although selective picking can extend this period.

Aoshima fruit showing typical colour, shape, rind texture and rind thickness.

Production
Production is good although figures are still to be included.

General
Deficit irrigation may be necessary to enhance sugar levels. As with all Satsumas, nitrogen should not be applied too late. No specific pest and disease problems have been noted under South African conditions, except for fruit piercing moths (*Serrodes partita*) that occur erratically approximately every 10 years. The moths live in the semi desert regions and in years when abnormally high rainfall occurs in the late summer the moths breed profusely due to over abundance of vegetative growth on the indigenous wild plum trees (*Pappea capensis*). This causes a migration of the moths away from their breeding grounds and in so doing they pass through regions such as the East Cape citrus areas where they cause varying degrees of damage on early maturing cultivars such as Satsumas.

Four year old Aoshima tree on Swingle citrumelo showing typical shape and growth with a good yield (tree height 1.8m).

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Control options are limited and there is little that can be done to eradicate the moths once on the move. For further details refer to the section on Fruit Piercing Moths by S. D. Moore in the Production Guidelines.

Sunburn can be a problem in dry climates with terminal fruit being the worst affected. Wind blemish can reduce exportable fruit. Harvest, packing and shipping requirements as well as post harvest disorders are as for other Mandarins.

Status, Area Suitability and Availability
The Satsuma is the most cold hardy of all the mandarin selections. Aoshima has only been tested in Southern Africa's cooler coastal climatic zones on a limited scale and sites have not been ideal. Further evaluations are necessary. Limited quantities of propagation material are available from the Citrus Foundation Block.

Key References
The information in this fact sheet is based on evaluations by Citrus Research International.

Evaluation Data

Internal Quality - Aoshima on Carrizo citrange - Count 1/2 - Western Cape						
Date	**Juice %**	**Brix**	**Acid**	**Ratio**	**Seed**	**Colour**
08/03/2011	56.2	9.1	1.78	5.1	0.3	8
06/04/2011	54.6	9.5	0.97	9.8	0.6	6
11/05/2011	47.8	10.9	0.67	16.3	0.4	1

Note: These results are from 5 year old trees.

Count Distribution
Data still to be included.

Production
20 to 25 Kg per tree on 5 year old trees.

Note: These data are from trial trees in the Paarl region of the Western Cape.

Export %
Data still to be included.

Comments
The Aoshima has been included in new trials to establish its value to the South African soft citrus industry.

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Dobashi Beni Satsuma

Origin
A limb sport of Owari, of Japanese origin. The selection was released in South Africa in 1993.

Ownership
Open.

General description
An early to mid maturing selection, with similar characteristics to Owari except for a deep orange red rind colour. Rind colour can be variable, probably due to more than one set.

Tree characteristics
The tree is of medium vigour.

Rootstock options
There is limited experience regarding rootstock choice in South Africa. Carrizo and Troyer citrange are suggested, depending on soil type and whether plantings are on new or replant ground. Poor quality inducing rootstocks should be avoided as well as Swingle citrumelo as this may delay rind colour. Trees on C-35 citrange have performed well in California.

Fruit characteristics
Yields and fruit size are good. Fruit shape is fairly flat and rinds tend to be smooth. The advantage of Dobashi Beni over Owari is that it develops a deep orange red rind colour, especially after degreening. Internal flesh colour is deep orange and the quality comparable to Owari. Peak maturity is the end of April, early May. Rind colour development may be behind internal maturity.

Production
Production is good although figures are still to be included.

General
Deficit irrigation is necessary to enhance sugar levels. Satsumas are degreened successfully. As with all Satsumas, nitrogen should not be applied too late. No specific pest and disease problems have been noted under South African conditions, except for fruit piercing moths (*Serrodes partita*) that occur erratically approximately every 10 years. The moths live in the semi desert regions and in years when abnormally high rainfall occurs in the late summer the moths breed profusely due to over abundance of vegetative growth on the indigenous wild plum trees (*Pappea capensis*). This causes a migration of the moths away from their breeding grounds and in so doing they pass through regions such as the East Cape citrus areas where they cause varying degrees of damage on early maturing cultivars such as Satsumas.

Control options are limited and there is little that can be done to eradicate the moths once on the move. For further details refer to the section on Fruit Piercing Moths by S. D. Moore in the Production Guidelines.

Dobashi Beni fruit showing typical shape, colour, rind texture and rind thickness. Note deeper colour of fruit.

Four year old Dobashi Beni tree on Carrizo citrange showing typical shape and growth with a good yield (tree height 1.7m).

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Sunburn can be a problem in dry climates with terminal fruit being the worst affected. Wind blemish can reduce exportable fruit. Satsuma mandarins have a short harvest period which usually lasts 2 - 3 weeks, although selective picking can extend this period. The possibility of two separate sets makes this an option with the Dobashi Beni Satsuma. Harvest, packing and shipping requirements as well as post harvest disorders are as for other Mandarins.

Status, Area Suitability and Availability
Satsuma is the most cold hardy of all the mandarin selections. Dobashi Beni has only been grown in southern Africa's cooler coastal and cold inland climatic zones on a fairly limited scale, but results to date have been promising. Limited quantities of propagation material are available from the Citrus Foundation Block.

Key References
The information in this fact sheet is based on evaluations by Citrus Research International

Evaluation Data

Internal Quality - Dobashi Beni Satsuma on Carrizo citrange - Count 2 - Western Cape						
Date	**Juice %**	**Brix**	**Acid**	**Ratio**	**Seed**	**Colour**
08/30/2011	54.2	11.4	1.56	7.1	0.1	8
06/04/2011	56.0	12.5	1.57	8.0	0.2	7
11/05/2011	57.9	12.6	1.43	8.8	0.2	1-3

Count Distribution
There is insufficient information at this stage to give an accurate count distribution.

Production
There is insufficient information at this stage to give accurate production data.

Export %
There is insufficient information at this stage to give accurate export data.

Comments
The Dobashi Beni has been grown on a limited scale to date in South Africa. It matures later than Miho Wase and Okitsu Wase, but is earlier than Owari, which makes it a useful gap filler. It is a good quality Satsuma amongst a series of selections that need special attention to produce good quality fruit.

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Imamura Satsuma

Origin
Of Japanese origin, originating from an Owari Satsuma. Budwood was first released around 1982 in South Africa.

Ownership
Open.

General Description
A late maturing selection, with good sugars and acid, maturing towards the end of May in a cool citrus production area. The trees are vigorous, with fair to good yields of medium and large fruit size. A trial has now been established to test later maturing selections.

Tree Characteristics
The trees are vigorous, dense and sometimes thorny and become large to extra large with a more upright growth habit than other selections. The trees are slow in coming into production, but produce fair to good crops.

Rootstock Options
Rootstocks tried in South Africa include Rough lemon, Troyer citrange, Australian trifoliate and Cleopatra mandarin. Troyer/Carrizo are suggested rootstocks, depending on soil type and whether plantings are on new or replant ground, as Rough lemon in some instances produced inferior quality fruit and Cleopatra mandarin inverted benching (scion overgrowth) even on young trees.

Fruit Characteristics
Fruit size is good and fruit is borne more singly or on terminals than in clusters. The fruit varies from smooth to coarse with some high shoulders, depending on tree vigour and age. Internal colour is deep orange. Quality is generally good, meeting export standards early in the season with higher acid levels than other selections. If picked too early fruit can be immature and raggy, but if left to mature, the fruit then peels easily and cleanly without rag. Juice levels may be lower if fruit is hung too late. Maturity in the Cape areas is 3-4 weeks later than Owari, peaking from mid May to early June.

Production
Production is good although figures are still to be included.

General
Deficit irrigation may be necessary to enhance sugar levels. As with all Satsuma's, nitrogen should not be applied too late. No specific pest and disease problems have been noted under South African conditions, except for fruit piercing moths (*Serrodes partita*) that occur erratically approximately every 10 years. The moths live

Imamura fruit from young trees showing typical shape, colour and rind texture. Rinds are thick due to tree age.

Four year old Imamura tree on Carrizo citrange showing typical shape and growth with a good yield (tree height 2.0m).

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in the semi desert regions and in years when abnormally high rainfall occurs in the late summer the moths breed profusely due to over abundance of vegetative growth on the indigenous wild plum trees (*Pappea capensis*). This causes a migration of the moths away from their breeding grounds and in so doing they pass through regions such as the East Cape citrus areas where they cause varying degrees of damage on early maturing cultivars such as Satsuma's. Control options are limited and there is little that can be done to eradicate the moths once on the move. For further details refer to the section on Fruit Piercing Moths by S. D. Moore in the Production Guidelines.

Sunburn can be a problem in dry climates with terminal fruit being the worst affected. Wind blemish can reduce exportable fruit. Harvest, packing and shipping requirements as well as post harvest disorders are as for other Mandarins.

Status, Area Suitability and Availability
The Satsuma is the cold hardiest of all the mandarin selections. The Imamura is most likely more suited to southern Africa's cooler coastal climatic zones and possibly the cool inland production areas. Data is limited. Limited quantities of propagation material are available from the Citrus Foundation Block.

Key References
The information in this fact sheet is based on evaluations by Citrus Research International.

Evaluation Data

Internal Quality - Imamura on Carrizo citrange - Count 1/2 - Western Cape						
Date	**Juice %**	**Brix**	**Acid**	**Ratio**	**Seed**	**Colour**
08/03/2011	51.5	9.2	2.96	3.1	0	8
06/04/2011	52.5	9.7	1.77	5.5	0	7
11/05/2011	55.1	10.7	1.03	10.4	0	2-3

Note: These results are from 5 year old trees.

Count Distribution
Data still to be included.

Production
10 to 15 Kg per tree on 5 year old trees.

Note: These data are from trial trees in the Paarl region of the Western Cape.

Export %
Data still to be included.

Comments
The Imamura has been included in new trials to establish its value to the South African soft citrus industry.

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Miho Wase Satsuma

Origin

Miho Wase Satsuma is a nucellar selection of Japanese origin, derived from the Miyagawa Wase using controlled pollination. The selection was introduced as seed by Dr Cameron McOnie in the late 1970s, i.e. prior to shoot tip grafting, and developed from nucellar selections by Dr Hannes de Lange in association with Outspan International. It was released in South Africa in 1983. This selection of Miho Wase is unique to South Africa.

Ownership

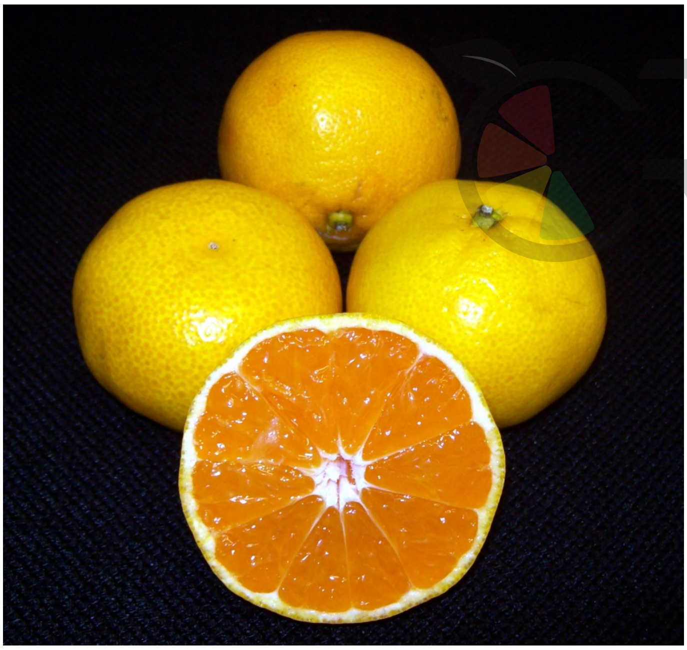
Open.

General Description

The earliest maturing Satsuma selection currently available in South Africa in terms of colour and internal quality and matures towards the end of March in the cold citrus production areas. The trees are more vigorous than Owari and produce good yields of very good internal fruit quality. Fruit size is slightly smaller than Owari, fruit shape flatter and the neck not as pronounced. The selection matures earlier in South Africa than in Japan.

Tree Characteristics

The tree is fairly slow growing in comparison with other mandarin types, with a spreading open growth habit. Due to its nucellar origin, the trees are larger and more vigorous than Owari. The leaf colour is more olive green. There are occasional thorns. Yields are good.



Miho Wase Satsuma showing typical rind thickness, rind texture and colour after successful degreening, harvested mid March.

Rootstock Options

Rootstocks used for Satsumas in South Africa include Carrizo/Troyer citrange, depending on soil type and whether plantings are on new or replant ground. X639 has also performed well. Due to Satsumas having inherently low sugars, rootstocks inducing low sugars like Rough Lemon, Volckameriana and Rangpur lime are not recommended. Swingle citrumelo is not recommended due to delayed rind colour. Cleopatra mandarin is not recommended any more as precocity is delayed and also due to inverted benching (scion overgrowth), even on relatively young trees; no tree mortalities have yet been recorded. This phenomenon is not evident in Owari.

Fruit Characteristics

Fairly good fruit size, medium and sometimes small fruit (mainly counts 2-3 with some count 1 and larger as well) and smaller than Owari. The rinds tend to be smooth and thin. In South Africa, the rind has a pale orange colour and the fruit often matures internally prior to adequate colour development. Internal flesh colour is deep orange and the flavour is very good with adequate acid levels. The fruit is seedless and is easily and cleanly peeled. Brix levels are higher than Owari. Acid levels can be too low and rind colour poor in warmer areas. Miho Wase is the earliest selection to ripen, maturity in the cool Cape areas being mid to end March.

Production

Yields of 50 to 60 tons per hectare are normal for mature orchards.

General

Deficit irrigation may be necessary to enhance Brix levels. Degreening is necessary for the first harvest in mid March. Satsumas are degreened successfully. As with all Satsumas, nitrogen should not be applied too late. No specific pest and disease problems have been noted under South African conditions, except for fruit

Three year old Miho Wase Satsuma tree on Troyer citrange under micro sprinkler irrigation at the Citrus Foundation Block (tree height 1.4m).

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piercing moths (*Serrodes partita*) that occur erratically approximately every 10 years. The moths live in the semi desert regions and in years when abnormally high rainfall occurs in the late summer the moths breed profusely due to over abundance of vegetative growth on the indigenous wild plum trees (*Pappea capensis*). This causes a migration of the moths away from their breeding grounds and in so doing they pass through regions such as the East Cape citrus areas where they cause varying degrees of damage on early maturing cultivars such as Satsumas. Control options are limited and there is little that can be done to eradicate the moths once on the move. For further details refer to the section on Fruit Piercing Moths by S. D. Moore in the Production Guidelines.

Status, Area Suitability and Availability
Satsuma is the most cold hardy of all the mandarin selections. It appears to be especially suited to southern Africa's cooler coastal and cold inland climatic zones where it is planted commercially. Fruit quality and shape are marginal and can be unacceptable in the cool inland production areas. Commercial quantities of propagation material are available from the CFB.

Key References
The information in this fact sheet is based on evaluations by Citrus Research International.

Evaluation Data

Internal Quality - Miho Wase on Swingle citrumelo - Count 2 - East Cape Midlands						
Date	**Juice %**	**Brix**	**Acid**	**Ratio**	**Seed**	**Colour**
10/3/2010	62.7	10.7	1.44	7.4	0	6-7
18/3/2010	60.7	11.6	1.28	9.1	0	6
25/3/2010	61.2	12.4	1.18	10.5	0	5-6

Count Distribution

Count	1XX	1X	1	2	3	4	5
%	6	5	18	23	22	17	9

Production
105.8 Kg per tree and 57 tons per hectare at 5.75 x 3.25m spacing.

Export %

Grade	Percentage
1	68.0
2	10.0
3	6.0
4	16.0*

*Mainly sunburn

Note: These data are from 9 year old trees in the Patensie region of the Gamtoos Valley in the East Cape.

Comments
The Miho Wase has been the main Satsuma selection planted in South Africa. It matures earlier than all other citrus cultivars. It is a very good quality Satsuma amongst a series of selections that need special attention to produce good quality fruit.

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Miyagawa Wase Satsuma

Origin
A limb sport originating in Japan from the seedy Zairai, an old Satsuma selection. The selection was released in South Africa in 1991.

Ownership
Open.

General Description
It is the most extensively planted selection in Japan. Tree size is small with good yields and fruit size. Maturity is early with a sharper flavour than Miho Wase.

Tree Characteristics
The tree is less vigorous and smaller than the Miho and Okitsu Wase selections with a spreading, open growth habit. Production is good, being better than Okitsu Wase.

Rootstock Options
Rootstocks used in South Africa include Carrizo and Troyer citrange. Due to Satsumas having inherently low sugars, rootstocks inducing low sugars like Rough Lemon, Volckameriana and Rangpur lime are not recommended. Swingle citrumelo is not recommended due to delayed rind colour. Cleopatra mandarin is not recommended due to delayed cropping. Choice of rootstock also depends on soil type and whether plantings are on new or replant ground.

Fruit Characteristics
Fruit size is slightly larger than Okitsu and Miho Wase. Fruit are smooth and fairly flat. Of the three selections, Miyagawa has lower ratios, resulting in a sharper flavour. Internal flesh colour is deep orange and the fruit is seedless. Maturity is from early April about two weeks after Miho Wase.

Production
Yields of 50 to 60 tons per hectare are normal for mature orchards.

General
Deficit irrigation may be necessary to enhance sugar levels. Degreening can be necessary for the first harvest in late March. Satsumas are degreened successfully. As with all Satsumas, nitrogen should not be applied too late. No specific pest and disease problems have been noted under South African conditions, except for fruit piercing moths (*Serrodes partita*) that occur erratically approximately every 10 years.

The moths live in the semi desert regions and in years when abnormally high rainfall occurs in the late summer the moths breed profusely due to over abundance of vegetative growth on the indigenous wild plum trees (*Pappea capensis*). This causes a migration of the moths away from their breeding grounds and in so doing they pass through regions such as the East Cape citrus areas where they cause varying degrees of damage on early maturing cultivars such as Satsumas. Control options are limited and there is little that can be done to eradicate the moths once on the move. For further details refer to the section on Fruit Piercing Moths by S. D. Moore in the Production Guidelines.

Sunburn can be a problem in dry climates with terminal fruit being the worst affected. Wind blemish can reduce exportable fruit. Satsuma mandarins have a short harvest period which usually lasts 2 - 3 weeks, although selective picking can extend this period. Harvest, packing and shipping requirements as well as post harvest disorders are as for other Mandarins.

Seven year old Miyagawa Wase Satsuma tree on Swingle citrumelo showing typical crop and fruit size (Tree height 2.0m)

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Status, Area Suitability and Availability
Satsumas are the most cold hardy of all the mandarin selections. The Miyagawa Wase appears to be suited to southern Africa's cooler coastal and cold inland climatic zones where there are a number of commercial orchards. Commercial quantities of propagation material are available from the Citrus Foundation Block.

Key References
The information in this fact sheet is based on evaluations by Citrus Research International.

Evaluation Data

Internal Quality - Miyagawa Wase on Carrizo citrange - Count 2 - East Cape Midlands						
Date	**Juice %**	**Brix**	**Acid**	**Ratio**	**Seed**	**Colour**
25/03/2010	60.7	10.0	1.18	8.5	0	5-6
31/03/2010	56.1	9.9	1.12	8.8	0	5
07/04/2010	56.1	10.0	1.06	9.4	0	4-5

Count Distribution

Count	1XX	1X	1	2	3	4	5
%	8	18	18	20	15	12	9

Production
80 Kg per tree and 58 tons per hectare at 5.5 x 2.5m spacing.

Export %

Grade	Percentage
1	65.0
2	15.0
3	6.0
4	14.0*

*Mainly sunburn

Note: These data are from 8 year old trees in the Adelaide region of the East Cape Midlands

Comments
The Miyagawa Wase has been planted on a limited scale in South Africa to date. It matures after Miho Wase and before Kuno and other later Satsuma selections. As such it is a useful gap filler. It is a very good quality Satsuma amongst a series of selections that need special attention to produce good quality fruit.

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Ohtsu Satsuma

Origin
A nucellar mutation of the Juman, which is an Owari mutation. This selection is of Japanese origin. The selection was released in South Africa in 1994.

Ownership
Open.

General Description
This is a late maturing Satsuma with fairly good production and good fruit size and a flat shape. Local information is limited. Maturity is mid to end April.

Tree Characteristics
Trees are fairly vigorous with a spreading-open growth habit and no thorns. Yields are fair to good.

Rootstock Options
There is limited experience regarding rootstock choice in South Africa. Carrizo and Troyer citrange are suggested, while poor quality inducing rootstocks should be avoided as well as Swingle citrumelo as this may delay rind colour. Choice of rootstock also depends on soil type and whether plantings are on new or replant ground.

Fruit Characteristics
Fruit size is good being medium to large. The rinds tend to be smooth, although sometimes coarse if tree vigour is excessive, and fruit shape is oblate. Rind colour develops later than internal maturity. Internal quality has been variable in South Africa, and poor to good internal quality tests. However, new trial results show good Internal quality fruit. The fruit becomes loose skinned if left to hang on the tree. Maturity is mid to late April, sometimes earlier than Aoshima.

Ohtsu fruit showing typical shape, colour, rind thickness and rind texture.

Production
Production is good although figures are still to be included.

General
Deficit irrigation may be necessary to enhance sugar levels. As with all Satsumas, nitrogen should not be applied too late. No specific pest and disease problems have been noted under South African conditions, except for fruit piercing moths (*Serrodes partita*) that occur erratically approximately every 10 years. The moths live in the semi desert regions and in years when abnormally high rainfall occurs in the late summer the moths breed profusely due to over abundance of vegetative growth on the indigenous wild plum trees (*Pappea capensis*). This causes a migration of the moths away from their breeding grounds and in so

Four year old Ohtsu tree on Carrizo citrange showing typical shape and growth with a good yield (Tree height 1.8m).

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doing they pass through regions such as the East Cape citrus areas where they cause varying degrees of damage on early maturing cultivars such as Satsumas. Control options are limited and there is little that can be done to eradicate the moths once on the move. For further details refer to the section on Fruit Piercing Moths by S. D. Moore in the Production Guidelines.

Sunburn can be a problem in dry climates with terminal fruit being the worst affected. Wind blemish can reduce exportable fruit. Harvest, packing and shipping requirements as well as post harvest disorders are as for other Mandarins.

Status, Area Suitability and Availability
The Satsuma is the most cold hardy of all the mandarin selections. In the past, Ohtsu has only been tested in Southern Africa's cooler coastal climatic zones on a limited scale. Further evaluations are now underway.

Key References
The information in this fact sheet is based on evaluations by Citrus Research International

Evaluation Data

Internal Quality - Ohtsu on Carrizo citrange - Count 1X - Western Cape						
Date	**Juice %**	**Brix**	**Acid**	**Ratio**	**Seed**	**Colour**
08/03/2011	58.0	9.1	1.79	5.1	0.3	8
06/04/2011	57.6	9.4	1.08	8.7	0.4	7
11/05/2011	53.7	10.6	0.76	13.9	0.4	2-3

Note: These data are from 5 year old trial trees.

Count Distribution
Data still to be included.

Production
Data still to be included.

Export %
Data still to be included.

Comments
The new trial trees are only in the 5th year (tree photo taken 2010) but growth, production and internal quality have been very good to date for such young trees.

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Owari Satsuma

Origin

The Owari is of unknown Japanese origin, presumably named after the old "Owari" province (now Aichi). South Africa has the Frost selection, introduced from California and distributed in trials in various regions of South Africa during the 1960s by Prof Piet Oberholzer of the University of Pretoria. The most significant of these trials was to be a small block planted about 1970 at Baddaford near Fort Beaufort in the East Cape Midlands as it was from this planting that the first consignment of superior quality Satsumas was exported to the UK, proving that South Africa was able to produce quality Satsumas. Virus free material was released in 1983. Although the Owari did not prove to be popular in Japan the Satsuma industry started with this selection in both Spain and South Africa.

Ownership

Open.

General Description

A mid to late maturing Satsuma selection, of good quality, maturing mid April to early May in the cool citrus production areas. The trees are small and produce good yields of medium fruit size.

Tree Characteristics

The trees are small and compact, but not dense and with dark green leaves. Trees are precocious and bear very good yields.

Rootstock Options

It is important to use good quality inducing rootstocks, depending on soil type and whether plantings are on new or replant ground. Rootstocks used in South Africa include Carrizo/Troyer citrange and Cleopatra mandarin. Swingle citrumelo can have a delaying effect on fruit colour development. Trees on Australian trifoliate are small and have been known to snap off at the bud union due to a severe benching, especially when the trees are older. It has also been reported that there is delayed incompatibility with Owari on citranges after 15-20 years in California. These problems have not been observed in South Africa and one theory is that budding heights in South Africa are higher reducing these effects.

Fruit Characteristics

Fruit size varies from 70 to 50 mm (counts 1X to 4) with most fruit being in counts 1 to 3. Owari fruit is larger than Miho Wase, but smaller than Kuno. Fruit shape is flat, but can have a pronounced neck when grown in warmer, inland areas. The rinds can be coarse and rind colour pale at the beginning of the harvest season, particularly in borderline climates or with incorrect management practices. Internal colour is deep orange and flesh juicy with good internal quality when grown in suitable areas. The fruit is seedless and very easily and cleanly peeled. If left to hang it becomes loose skinned (puffy), but is more robust than other Satsuma selections. Maturity in the Cape areas is mid April to early May.

Production

Yields of 50 to 60 tons per hectare are normal for mature orchards.

Owari fruit showing typical flat shape, rind thickness and rind texture.

Four year old Owari tree on Carrizo citrange showing typical shape and growth with a very good yield (Tree height 2.0m).

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General
Deficit irrigation may be necessary to enhance sugar levels. As with all Satsumas, nitrogen should not be applied too late. Satsumas are degreened successfully. No specific pest and disease problems have been noted under South African conditions, except for fruit piercing moths (*Serrodes partita*) that occur erratically approximately every 10 years. The moths live in the semi desert regions and in years when abnormally high rainfall occurs in the late summer the moths breed profusely due to over abundance of vegetative growth on the indigenous wild plum trees (*Pappea capensis*). This causes a migration of the moths away from their breeding grounds and in so doing they pass through regions such as the East Cape citrus areas where they cause varying degrees of damage on early maturing cultivars such as Satsumas. Control options are limited and there is little that can be done to eradicate the moths once on the move. For further details refer to the section on Fruit Piercing Moths by S. D. Moore in the Production Guidelines. Sunburn can be a problem in dry climates with terminal fruit being the worst affected. Wind blemish can reduce exportable fruit. Satsuma mandarins have a short harvest period which usually lasts 2 - 3 weeks, although selective picking can extend this period. If hung too late in wet conditions rind breakdown (water spot) can occur. Harvest, packing and shipping requirements as well as post harvest disorders are as for other Mandarins.

Status, Area Suitability and Availability
Satsuma is the cold hardiest of all the mandarin selections. It appears to be especially suited to southern Africa's cooler coastal zones where it is planted commercially and is marginal in the cool inland production areas. Fruit shape is flatter in cold areas and close to the coast. Limited quantities of propagation material are available from the Citrus Foundation Block.

Key References
The information in this fact sheet is based on evaluations by Citrus Research International.

Evaluation Data

Internal Quality - Owari on Carrizo citrange - Count 1/2 - Western Cape						
Date	**Juice %**	**Brix**	**Acid**	**Ratio**	**Seed**	**Colour**
08/03/2011	56.6	9.2	1.92	4.8	0	8
06/04/2011	58.4	9.3	1.21	7.7	0	6
11/05/2011	53.4	11.5	0.88	13.1	0	1-2

Count Distribution

Count	1XX	1X	1	2	3	4	5
%	7	5	21	26	22	14	5

Production
117.1 Kg per tree and 63 tons per hectare at 5.75 x 3.25 m spacing.

Export %

Grade	Percentage
1	61.45
2	4.79
3	7.85
4*	22.38

Note: These data are from 9 year old trees in the Gamtoos Valley for 2008 season.* Mainly oversized, coarse fruit

Comments
The Owari was the first Satsuma selection planted in South Africa. It has been replaced mainly by improved, earlier maturing selections.

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Ueno Satsuma

Origin
A bud mutation of Miyagawa Wase from Japan. The selection was released in South Africa in 1993.

Ownership
Open.

General description
A mid to later maturing selection in South Africa, which however, falls in the very early group in Japan, where it is the second most popular selection in this group. Fruit size is medium to large and fruit shape is flat. Maturity is 3 to 5 weeks later than Miho Wase.

Tree characteristics
The tree is fairly vigorous with no thorns. Production is very good.

Rootstock options
There is limited experience regarding rootstock choice in South Africa. Carrizo and Troyer citrange are suggested, while poor quality inducing rootstocks should be avoided as well as Swingle citrumelo as this may delay rind colour. Choice of rootstock also depends on soil type and whether plantings are on new or replant ground.

Fruit characteristics
Fruit size is medium large to large. The rinds are fairly smooth, sometimes coarse fruit and mostly oblate shape. Internal flesh colour is good. There is the occasional very small navel end. Rind colour develops later than internal maturity. Quality has been consistent with older orchards and young trial trees have now shown promise in their fifth year. Maturity in South Africa is approximately end April to early May.

Production
Production is good although figures are still to be included.

General
Deficit irrigation is necessary to enhance sugar levels. Satsumas are degreened successfully. As with all Satsumas, nitrogen should not be applied too late. No specific pest and disease problems have been noted under South African conditions, except for fruit piercing moths (*Serrodes partita*) that occur erratically approximately every 10 years. The moths live in the semi desert regions and in years when abnormally high rainfall occurs in the late summer the moths breed profusely due to over abundance of vegetative growth on the indigenous wild plum trees (*Pappea capensis*).

Ueno fruit showing typical shape, colour, rind texture and rind thickness. Note flatness of fruit.

Four year old Ueno tree on Carrizo citrange showing typical shape and growth with a good yield (height 1.9m).

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This causes a migration of the moths away from their breeding grounds and in so doing they pass through regions such as the East Cape citrus areas where they cause varying degrees of damage on early maturing cultivars such as Satsumas. Control options are limited and there is little that can be done to eradicate the moths once on the move. For further details refer to the section on Fruit Piercing Moths by S. D. Moore in the Production Guidelines.

Sunburn can be a problem in dry climates with terminal fruit being the worst affected. Wind blemish can reduce exportable fruit. Satsuma mandarins have a short harvest period which usually lasts 2 - 3 weeks, although selective picking can extend this period. Harvest, packing and shipping requirements as well as post harvest disorders are as for other Mandarins.

Status, Area Suitability and Availability
The Satsuma is the most cold hardy of all the mandarin selections. Ueno has only been tested in southern Africa's cooler coastal climatic zones on a limited scale. Further evaluations are necessary. Limited quantities of propagation material are available from the Citrus Foundation Block.

Key References
The information in this fact sheet is based on evaluations by Citrus Research International

Evaluation Data

Internal Quality - Ueno Satsuma on Carrizo citrange - Count 1/3 - East Cape Midlands						
Date	Juice %	Brix	Acid	Ratio	Seed	Colour
31/03/2010	54.2	11.4	1.56	7.1	0	7
07/04/2010	56.0	12.5	1.57	8.0	0	6-7
14/04/2010	57.9	12.6	1.43	8.8	0	6
21/04/2010	53.0	13.0	1.44	9.0	0.2	5

Count Distribution
There is insufficient information at this stage to give an accurate count distribution.

Production
There is insufficient information at this stage to give accurate production data.

Export %
There is insufficient information at this stage to give accurate export data.

Comments
The Ueno has only been planted on a very limited commercial basis in South Africa to date. From performance so far it has shown some promise but does not presently appear to have space in South Africa’s Satsuma industry. Further evaluations may change this status.

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