

# 2009-Draft-Cold Treatment-01

Cold treatment of *Citrus sinensis* for *Ceratitis capitata*

Annex to ISPM No. 28



## INTERNATIONAL STANDARDS FOR PHYTOSANITARY MEASURES

[PARAGRAPH 1] Annex to ISPM No. 28 (PHYTOSANITARY TREATMENTS FOR REGULATED PESTS)

### [2] Cold treatment of *Citrus sinensis* for *Ceratitis capitata*

(200-)

#### [3] Endorsement

This phytosanitary treatment was adopted by the Commission on Phytosanitary Measures in ----.

#### [4] Scope of the treatment

[5] This treatment applies to the cold treatment of *Citrus sinensis* (orange) to result in the mortality of larvae of *Ceratitis capitata* (Mediterranean fruit fly) at the stated efficacy<sup>1</sup>.

#### [6] Treatment description

[7] Name of treatment	Cold treatment of <i>Citrus sinensis</i> for <i>Ceratitis capitata</i>
[8] Active ingredient	N/A
[9] Treatment type	Cold treatment
[10] Target pest	<i>Ceratitis capitata</i> (Diptera: Tephritidae) (Mediterranean fruit fly)
[11] Target regulated articles	<i>Citrus sinensis</i> (orange)

<sup>1</sup> The scope of IPPC treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition effects on product quality are considered before their international adoption. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

## 2009-Draft-Cold Treatment-01

[12]	Treatment schedule	<p><b>Schedule 1: 2 °C for 18 days</b>  Efficacy and confidence level (De Lima <i>et al.</i>, 2007):  For cultivar ‘Navel’ the efficacy is ED<sub>99,9982</sub> at the 95% confidence level.  For cultivar ‘Valencia’ the efficacy is ED<sub>99,9979</sub> at the 95% confidence level.</p> <p><b>Schedule 2: 3 °C for 20 days</b>  Efficacy and confidence level (De Lima <i>et al.</i>, 2007):  For cultivar ‘Navel’ the efficacy is ED<sub>99,9980</sub> at the 95% confidence level.  For cultivar ‘Valencia’ the efficacy is ED<sub>99,9979</sub> at the 95% confidence level.</p> <p><b>Schedule 3: 2 °C for 21 days</b>  For cultivars ‘Washington Navel’, ‘Salustiana’, ‘Valencia’ and ‘Lue Gim Gong’ the efficacy is ED<sub>99,9917</sub> at the 95% confidence level (Anon., 2007).</p> <p>The commodity must reach the treatment temperature before treatment commences.  The commodity temperature should be monitored and should not exceed the stated level.</p>
[13]	Other relevant information	Pre-cooling of the commodity to treatment temperature is required.
[14]	References	<p>Anon. 2007. Annex: Quarantine cold treatment of oranges for medfly (<i>Ceratitis capitata</i> Wied.). Document number 2007-TPPT-109a. Submission from Argentina in response to the 2007 IPPC call for treatments.</p> <p>De Lima, C.P.F., Jessup, A.J., Cruickshank, L., Walsh, C.J. &amp; Mansfield, E.R. 2007. Cold disinfestation of citrus (<i>Citrus</i> spp.) for Mediterranean fruit fly (<i>Ceratitis capitata</i>) and Queensland fruit fly (<i>Bactrocera tryoni</i>) (Diptera: Tephritidae). <i>New Zealand Journal of Crop and Horticultural Science</i>, 35: 39–50.</p>



**INTERNATIONAL STANDARDS FOR  
PHYTOSANITARY MEASURES**

[PARAGRAPH 15] Annex to ISPM No. 28 (PHYTOSANITARY TREATMENTS FOR REGULATED PESTS)

[16] **Cold treatment of *Citrus reticulata* × *Citrus sinensis* for  
*Ceratitis capitata***

**(200-)**

[17] **Endorsement**

This phytosanitary treatment was adopted by the Commission on Phytosanitary Measures in ----.

[18] **Scope of the treatment**

[19] This treatment applies to the cold treatment of *Citrus reticulata* × *Citrus sinensis*<sup>1</sup> to result in the mortality of larvae of *Ceratitis capitata* (Mediterranean fruit fly) at the stated efficacy<sup>2</sup>.

[20] **Treatment description**

[21]	Name of treatment	Cold treatment of <i>Citrus reticulata</i> × <i>Citrus sinensis</i> for <i>Ceratitis capitata</i>
[22]	Active ingredient	N/A
[23]	Treatment type	Cold treatment
[24]	Target pest	<i>Ceratitis capitata</i> (Diptera: Tephritidae) (Mediterranean fruit fly)
[25]	Target regulated articles	<i>Citrus reticulata</i> × <i>Citrus sinensis</i> (tangor)
[26]	Treatment schedule	<p><b>Schedule 1: 2 °C for 18 days</b> Efficacy and confidence level: ED<sub>99,9972</sub> at 95% confidence level (De Lima <i>et al.</i>, 2007).</p> <p><b>Schedule 2: 3 °C for 20 days</b> Efficacy and confidence level: ED<sub>99,9972</sub> at 95% confidence level (De Lima <i>et al.</i>, 2007).</p> <p>The commodity must reach the treatment temperature before treatment commences. The commodity temperature should be monitored and should not exceed the stated level.</p>
[27]	Other relevant information	<p>Pre-cooling of the commodity to treatment temperature is required.</p> <p>Schedules 1 and 2 were developed using cultivars ‘Ellendale’ and ‘Murcott’.</p>

<sup>1</sup> *Citrus* species and hybrids are named according to the nomenclature in Cottin, R. 2002. *Citrus of the world: a citrus directory*. France, INRA-CIRAD

<sup>2</sup> The scope of IPPC treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition effects on product quality are considered before their international adoption. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

## 2009-Draft-Cold Treatment-02

[28]

References	De Lima, C.P.F., Jessup, A.J., Cruickshank, L., Walsh, C.J. & Mansfield, E.R. 2007. Cold disinfestation of citrus ( <i>Citrus</i> spp.) for Mediterranean fruit fly ( <i>Ceratitis capitata</i> ) and Queensland fruit fly ( <i>Bactrocera tryoni</i> ) (Diptera: Tephritidae). <i>New Zealand Journal of Crop and Horticultural Science</i> , 35: 39–50.
------------	---



**INTERNATIONAL STANDARDS FOR  
PHYTOSANITARY MEASURES**

[PARAGRAPH 29] Annex to ISPM No. 28 (PHYTOSANITARY TREATMENTS FOR REGULATED PESTS)

[30] **Cold treatment of *Citrus sinensis* for *Bactrocera tryoni***  
**(200-)**

[31] **Endorsement**

This phytosanitary treatment was adopted by the Commission on Phytosanitary Measures in ----.

[32] **Scope of the treatment**

[33] This treatment applies to the cold treatment of *Citrus sinensis* (orange) to result in the mortality of larvae of *Bactrocera tryoni* (Queensland fruit fly) at the stated efficacy<sup>1</sup>.

[34] **Treatment description**

[35]	Name of treatment	Cold treatment of <i>Citrus sinensis</i> for <i>Bactrocera tryoni</i>
[36]	Active ingredient	N/A
[37]	Treatment type	Cold treatment
[38]	Target pest	<i>Bactrocera tryoni</i> (Diptera: Tephritidae) (Queensland fruit fly)
[39]	Target regulated articles	<i>Citrus sinensis</i> (orange)
[40]	Treatment schedule	<p><b>Schedule 1: 2 °C for 16 days</b> Efficacy and confidence level (De Lima <i>et al.</i>, 2007): For cultivar ‘Navel’ the efficacy is ED<sub>99,9973</sub> at the 95% confidence level. For cultivar ‘Valencia’ the efficacy is ED<sub>99,9960</sub> at the 95% confidence level.</p> <p><b>Schedule 2: 3 °C for 16 days</b> Efficacy and confidence level (De Lima <i>et al.</i>, 2007): For cultivar ‘Navel’ the efficacy is ED<sub>99,9988</sub> at the 95% confidence level. For cultivar ‘Valencia’ the efficacy is ED<sub>99,9976</sub> at the 95% confidence level.</p> <p>The commodity must reach the treatment temperature before treatment commences. The commodity temperature should be monitored and should not exceed the stated level.</p>
[41]	Other relevant information	Pre-cooling of the commodity to treatment temperature is required.

<sup>1</sup> The scope of IPPC treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition effects on product quality are considered before their international adoption. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

## 2009-Draft-Cold Treatment-03

[42]

References	De Lima, C.P.F., Jessup, A.J., Cruickshank, L., Walsh, C.J. & Mansfield, E.R. 2007. Cold disinfestation of citrus ( <i>Citrus</i> spp.) for Mediterranean fruit fly ( <i>Ceratitis capitata</i> ) and Queensland fruit fly ( <i>Bactrocera tryoni</i> ) (Diptera: Tephritidae). <i>New Zealand Journal of Crop and Horticultural Science</i> , 35: 39–50.
------------	---



**INTERNATIONAL STANDARDS FOR  
PHYTOSANITARY MEASURES**

[PARAGRAPH 43] Annex to ISPM No. 28 (PHYTOSANITARY TREATMENTS FOR REGULATED PESTS)

**[44] Cold treatment of *Citrus reticulata* × *Citrus sinensis* for  
*Bactrocera tryoni***

**(200-)**

**[45] Endorsement**

This phytosanitary treatment was adopted by the Commission on Phytosanitary Measures in ----.

**[46] Scope of the treatment**

[47] This treatment applies to the cold treatment of *Citrus reticulata* × *Citrus sinensis*<sup>1</sup> to result in the mortality of larvae of *Bactrocera tryoni* (Queensland fruit fly) at the stated efficacy<sup>2</sup>.

**[48] Treatment description**

[49] Name of treatment	Cold treatment of <i>Citrus reticulata</i> × <i>Citrus sinensis</i> for <i>Bactrocera tryoni</i>
[50] Active ingredient	N/A
[51] Treatment type	Cold treatment
[52] Target pest	<i>Bactrocera tryoni</i> (Diptera: Tephritidae) (Queensland fruit fly)
[53] Target regulated articles	<i>Citrus reticulata</i> × <i>Citrus sinensis</i> (tangor)
[54] Treatment schedule	<p><b>Schedule 1: 2 °C for 16 days</b> Efficacy and confidence level: ED<sub>99,9968</sub> at the 95% confidence level (De Lima <i>et al.</i>, 2007).</p> <p><b>Schedule 2: 3 °C for 16 days</b> Efficacy and confidence level: ED<sub>99,9989</sub> at the 95% confidence level (De Lima <i>et al.</i>, 2007).</p> <p>The commodity must reach the treatment temperature before treatment commences. The commodity temperature should be monitored and should not exceed the stated level.</p>
[55] Other relevant information	<p>Pre-cooling of the commodity to treatment temperature is required.</p> <p>Schedules 1 and 2 were developed using cultivars ‘Ellendale’ and ‘Murcott’.</p>

<sup>1</sup> *Citrus* species and hybrids are named according to the nomenclature in Cottin, R. 2002. *Citrus of the world: a citrus directory*. France, INRA-CIRAD.

<sup>2</sup> The scope of IPPC treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition effects on product quality are considered before their international adoption. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

## 2009-Draft-Cold Treatment-04

[56]

References	De Lima, C.P.F., Jessup, A.J., Cruickshank, L., Walsh, C.J. & Mansfield, E.R. 2007. Cold disinfestation of citrus ( <i>Citrus</i> spp.) for Mediterranean fruit fly ( <i>Ceratitis capitata</i> ) and Queensland fruit fly ( <i>Bactrocera tryoni</i> ) (Diptera: Tephritidae). <i>New Zealand Journal of Crop and Horticultural Science</i> , 35: 39–50.
------------	---





**INTERNATIONAL STANDARDS FOR  
PHYTOSANITARY MEASURES**

[PARAGRAPH 57]

Annex to ISPM No. 28 (PHYTOSANITARY TREATMENTS FOR REGULATED  
PESTS)

[58] **Cold treatment of *Citrus limon* for *Bactrocera tryoni***

**(200-)**

[59] **Endorsement**

This phytosanitary treatment was adopted by the Commission on Phytosanitary Measures in ----.

[60] **Scope of the treatment**

[61] This treatment applies to the cold treatment of *Citrus limon* (lemon) to result in the mortality of larvae of *Bactrocera tryoni* (Queensland fruit fly) at the stated efficacy<sup>1</sup>.

[62] **Treatment description**

[63] Name of treatment	Cold treatment of <i>Citrus limon</i> for <i>Bactrocera tryoni</i>
[64] Active ingredient	N/A
[65] Treatment type	Cold treatment
[66] Target pest	<i>Bactrocera tryoni</i> (Diptera: Tephritidae) (Queensland fruit fly)
[67] Target regulated articles	<i>Citrus limon</i> (lemon)
[68] Treatment schedule	<p><b>Schedule 1: 2 °C for 14 days</b> Efficacy and confidence level: ED<sub>99,9935</sub> at the 95% confidence level (De Lima <i>et al.</i>, 2007).</p> <p><b>Schedule 2: 3 °C for 14 days</b> Efficacy and confidence level: ED<sub>99,9928</sub> at the 95% confidence level (De Lima <i>et al.</i>, 2007).</p> <p>The commodity must reach the treatment temperature before treatment commences. The commodity temperature should be monitored and should not exceed the stated level.</p>
[69] Other relevant information	<p>Pre-cooling of the commodity to treatment temperature is required.</p> <p>Schedules 1 and 2 were developed using cultivar 'Lisbon'.</p>

<sup>1</sup> The scope of IPPC treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition effects on product quality are considered before their international adoption. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

## 2009-Draft-Treatment-05

[70]

References	De Lima, C.P.F., Jessup, A.J., Cruickshank, L., Walsh, C.J. & Mansfield, E.R. 2007. Cold disinfestation of citrus ( <i>Citrus</i> spp.) for Mediterranean fruit fly ( <i>Ceratitis capitata</i> ) and Queensland fruit fly ( <i>Bactrocera tryoni</i> ) (Diptera: Tephritidae). <i>New Zealand Journal of Crop and Horticultural Science</i> , 35: 39–50.
------------	---



**INTERNATIONAL STANDARDS FOR  
PHYTOSANITARY MEASURES**

[PARAGRAPH 71] Annex to ISPM No. 28 (PHYTOSANITARY TREATMENTS FOR REGULATED PESTS)

[72] **Cold treatment of *Citrus paradisi* for *Ceratitis capitata***

**(200-)**

[73] **Endorsement**

This phytosanitary treatment was adopted by the Commission on Phytosanitary Measures in ----.

[74] **Scope of the treatment**

[75] This treatment applies to the cold treatment of *Citrus paradisi* (grapefruit) to result in the mortality of larvae of *Ceratitis capitata* (Mediterranean fruit fly) at the stated efficacy<sup>1</sup>.

[76] **Treatment description**

[77]	Name of treatment	Cold treatment of <i>Citrus paradisi</i> for <i>Ceratitis capitata</i>
[78]	Active ingredient	N/A
[79]	Treatment type	Cold treatment
[80]	Target pest	<i>Ceratitis capitata</i> (Diptera: Tephritidae) (Mediterranean fruit fly)
[81]	Target regulated articles	<i>Citrus paradisi</i> (grapefruit)
[82]	Treatment schedule	<p><b>Schedule 1: 2 °C for 19 days</b> The efficacy is ED<sub>99,9917</sub> at the 95% confidence level (Anon., 2007a).</p> <p><b>Schedule 2: 3 °C for 23 days</b> The efficacy is ED<sub>99,9916</sub> at the 95% confidence level (Anon., 2007b).</p> <p>The commodity must reach the treatment temperature before treatment commences. The commodity temperature should be monitored and should not exceed the stated level.</p>
[83]	Other relevant information	<p>Pre-cooling of the commodity to treatment temperature is required.</p> <p>Schedule 1 was developed using cultivars ‘Marsh Seedless’, ‘Star Ruby’, ‘Henninger’s Ruby’ and ‘Rouge la Toma’.</p> <p>Schedule 2 was developed using cultivar ‘Henninger’s Ruby’.</p>

<sup>1</sup> The scope of IPPC treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition effects on product quality are considered before their international adoption. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

## 2009-Draft-Cold Treatment-06

[84]

References	<p>Anon. 2007a. Annex: Quarantine cold treatment of grapefruits for medfly (<i>Ceratitis capitata</i> Wied.). Document number 2007-TPPT-110a. Submission by Argentina in response to the 2007 IPPC call for treatments.</p> <p>Anon. 2007b. Annex: Quarantine cold treatment for grapefruits for medfly (<i>Ceratitis capitata</i> Wied.). Document number 2007-TPPT-111a. Submission by Argentina in response to the 2007 IPPC call for treatments.</p>
------------	--



**INTERNATIONAL STANDARDS FOR  
PHYTOSANITARY MEASURES**

[PARAGRAPH 85] Annex to ISPM No. 28 (PHYTOSANITARY TREATMENTS FOR REGULATED PESTS)

[86] **Cold treatment of *Citrus reticulata* cultivars and hybrids for  
*Ceratitis capitata***

**(200-)**

[87] **Endorsement**

This phytosanitary treatment was adopted by the Commission on Phytosanitary Measures in ----.

[88] **Scope of the treatment**

[89] This treatment applies to the cold treatment of *Citrus reticulata* cultivars and hybrids<sup>1</sup> to result in the mortality of larvae of *Ceratitis capitata* (Mediterranean fruit fly) at the stated efficacy<sup>2</sup>.

[90] **Treatment description**

[91] Name of treatment	Cold treatment of <i>Citrus reticulata</i> cultivars and hybrids for <i>Ceratitis capitata</i>
[92] Active ingredient	N/A
[93] Treatment type	Cold treatment
[94] Target pest	<i>Ceratitis capitata</i> (Diptera: Tephritidae) (Mediterranean fruit fly)
[95] Target regulated articles	<i>Citrus reticulata</i> cultivars and hybrids
[96] Treatment schedule	<b>Schedule: 2 °C for 23 days</b> Efficacy and confidence level: ED <sub>99,9918</sub> at 95% confidence level (Anon., 2007).  The commodity must reach the treatment temperature before treatment commences. The commodity temperature should be monitored and should not exceed the stated level.
[97] Other relevant information	Pre-cooling of the commodity to treatment temperature is required.  This schedule was developed using the following cultivars and hybrids: Clementinas Group ( <i>Citrus reticulata</i> ), 'Ellendale' ( <i>Citrus reticulata</i> × <i>C. sinensis</i> ), 'Nova' ( <i>C. reticulata</i> × tangelo cultivar 'Orlando' ( <i>C. reticulata</i> × <i>Citrus paradisi</i> )) and 'Murcott' ( <i>Citrus reticulata</i> × <i>Citrus sinensis</i> ).
[98] References	Anon. 2007. Annex: Quarantine cold treatment of tangerines and hybrids for medfly ( <i>Ceratitis capitata</i> Wied.). Document number 2007-TPPT-112a. Submission by Argentina in response to the 2007 IPPC call for treatments.

<sup>1</sup> *Citrus* species and hybrids are named according to the nomenclature in Cottin, R. 2002. *Citrus of the world: a citrus directory*. France, INRA-CIRAD.

<sup>2</sup> The scope of IPPC treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition effects on product quality are considered before their international adoption. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.



**INTERNATIONAL STANDARDS FOR  
PHYTOSANITARY MEASURES**

[PARAGRAPH 99] Annex to ISPM No. 28 (PHYTOSANITARY TREATMENTS FOR REGULATED PESTS)

[100] **Cold treatment of *Citrus limon* for *Ceratitis capitata***

**(200-)**

[101] **Endorsement**

This phytosanitary treatment was adopted by the Commission on Phytosanitary Measures in ----.

[102] **Scope of the treatment**

[103] This treatment applies to the cold treatment of *Citrus limon* to result in the mortality of larvae of *Ceratitis capitata* (Mediterranean fruit fly) at the stated efficacy<sup>1</sup>.

[104] **Treatment description**

[105]	Name of treatment	Cold treatment of <i>Citrus limon</i> for <i>Ceratitis capitata</i>
[106]	Active ingredient	N/A
[107]	Treatment type	Cold treatment
[108]	Target pest	<i>Ceratitis capitata</i> (Diptera: Tephritidae) (Mediterranean fruit fly)
[109]	Target regulated articles	<i>Citrus limon</i>
[110]	Treatment schedule	<p><b>Schedule 1: 2 °C for 16 days</b> Efficacy and confidence level: ED<sub>99,9977</sub> at 95% confidence level (De Lima <i>et al.</i>, 2007).</p> <p><b>Schedule 2: 3 °C for 18 days</b> Efficacy and confidence level: ED<sub>99,9975</sub> at 95% confidence level (De Lima <i>et al.</i>, 2007).</p> <p>The commodity must reach the treatment temperature before treatment commences. The commodity temperature should be monitored and should not exceed the stated level.</p>

<sup>1</sup> The scope of IPPC treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition effects on product quality are considered before their international adoption. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

## 2009-Draft-Cold treatment-08

[111]	Other relevant information	<p>Pre-cooling of the commodity to treatment temperature is required.</p> <p><i>Citrus limon</i> is considered to be a conditional host of <i>Ceratitis capitata</i>.</p> <p>This treatment was only validated, and therefore is only recognised, as a treatment for <i>Ceratitis capitata</i> infesting <i>Citrus limon</i> and not applicable to <i>Citrus latifolia</i> and <i>Citrus aurantiifolia</i>.</p> <p>Schedules 1 and 2 were developed using cultivar 'Lisbon'.</p>
[112]	References	<p>De Lima, C.P.F., Jessup, A.J., Cruickshank, L., Walsh, C.J. &amp; Mansfield, E.R. 2007. Cold disinfestation of citrus (<i>Citrus</i> spp.) for Mediterranean fruit fly (<i>Ceratitis capitata</i>) and Queensland fruit fly (<i>Bactrocera tryoni</i>) (Diptera: Tephritidae). <i>New Zealand Journal of Crop and Horticultural Science</i>, 35: 39–50.</p>