

FALSE CODLING MOTH (FCM) RISK MANAGEMENT SYSTEM
for export of fresh citrus fruit produced in South Africa
(Citrus FMS)

(Revised 26 October 2020; approved 12 November 2020)

1. Introduction and Summary

The Citrus FCM Management System (Citrus FMS) incorporates the Citrus FCM Systems Approach (Citrus FCM SA). The Citrus FCM SA has been developed in accordance with relevant guidelines provided by the International Plant Protection Convention (<https://www.ippc.int/en/core-activities/standards-setting/ispm/>) and its International Standards for Phytosanitary Measures (ISPMs), in particular ISPM 14. The Citrus Systems Approach combines multiple measures that cumulatively provide phytosanitary protection required to be able to certify qualifying export consignments as compliant with trading partner phytosanitary import requirements.

The Citrus FCM SA has been developed to ensure compliance with relevant phytosanitary import regulations, equivalent to that obtained through application of a post-harvest disinfestation treatment.

In the case of citrus fruit exports to the EU, the compliance requirement of relevance to the Citrus FCM SA is contained in Point 16.6 (d) of Annex IV Part A Section I of Council Directive 2000/29/EC. The treatment data to be indicated on the phytosanitary certificates accompanying compliant consignments, will be indicated as follows: "... compliant with Point 16.6 (d) of Annex IV Part A Section I of Council Directive 2000/29/EC, through application of the Citrus FCM Systems Approach". Lemons (*Citrus limon*) and Key limes (*Citrus aurantifolia*) are excluded from these EU requirements due to their recognised FCM non-host status.

The FMS provides for risk management of FCM at several stages, namely production, harvesting, handling, packing, inspection, certification and in-transit transport during export of citrus fruit through the application of variable levels of control or intervention, with the objective of achieving compliance with the relevant import requirements. The FMS is applied pre- and post-harvest on an orchard and a consignment basis. The FMS includes the following components:

- The potential establishment and maintenance of Pest Free Areas, Pest Free Places of Production and Pest Free Production Sites in accordance with the relevant ISPMs and an agreed FCM Pest Free Zones protocol [none of these options are currently available].
- Registration of eligible orchards
- Orchard monitoring – traps and fruit infestation, with associated thresholds for the latter indicating if additional pre-harvest control measures are required and subsequent handling options within the FMS
- Orchard sanitation
- Use of only registered pre-harvest control measures
- In-orchard fruit culling at harvest
- Post-harvest fruit inspections – for FCM infestation on delivery at packhouse, indicating which subsequent handling options are available
- Packhouse grading out of potentially infested fruit
- Phytosanitary inspections of fruit packed for export – by Perishable Products Export Control Board (PPECB)
- Verification of FMS orchard status using PPECB inspection data
- A limited set of post-harvest shipping options for application to individual export consignments as determined by the level of compliance with other aspects of the FMS.

- Department of Agriculture, Land Reform and Rural Development (DALRRD) phytosanitary certification of compliant consignments

The pre-packing measures and the packhouse measures, including sampling and inspection results, in combination determine available shipping condition options (A, B & C) for each consignment.

2. Eligibility and registration

2.1 Citrus from all production regions is potentially eligible.

2.2 In the case of citrus fruit exports to the EU, lemons (*Citrus limon*) and Key limes (*Citrus aurantifolia*) are excluded from the FMS requirement due to their recognised FCM non-host status. Bearss (Persian, Tahiti) limes (*Citrus latifolia*) are currently not exempt from the FMS requirement.

2.3 Export of citrus fruit with reliance on the FMS as assurance of compliance with FCM phytosanitary import regulations requires each participating orchard to be registered with DALRRD, using the PhytClean system.

2.4 The orchard registration requirement applies regardless of whether the intention is to export the fruit as being from a pest free zone², or under Option A, Option B or Option C of the FMS.

2.5 A requirement for orchard registration is that each producer gives the following undertakings: 1) to comply with the FMS protocol and provide accurate data (this includes ensuring the accuracy of any data provided by a third party on behalf of the grower, especially data for fruit infestation monitoring); 2) to implement Good Agricultural Practice (GAP) procedures for FCM management (as a guideline, refer to the current Citrus Research International (CRI) Production Guidelines for the control of FCM on citrus); 3) to conduct pheromone trap monitoring as specified in the FMS; 4) to perform orchard sanitation as specified in the FMS; 5) to use the correct number of data trees for each orchard and to clearly mark the data trees so that the data trees are protected from routine orchard sanitation procedures.

2.6 Packhouses, exporters, loading facilities and freight forwarders handling fruit for export under the FMS must be registered with DALRRD, via the PhytClean system. Packhouse registration applications will need to be verified by DALRRD.

2.6.1 A requirement for packhouse registration is that each packhouse gives the following undertakings: 1) to comply with the FMS protocol and provide accurate data; 2) to provide compulsory training to personnel responsible for packhouse delivery inspections and grading; 3) to ensure that Packhouse Delivery Inspections (PDI) results and PPECB detections of FCM infestation are communicated to the producer.

2.6.2 A requirement for exporter registration is that each exporter gives the following undertakings: 1) to ensure that temperature monitoring equipment, as stipulated in Appendix 6, is available for installation during loading; 2) to ensure that the shipping temperatures are reported, as stipulated in Appendix 6.

2.6.3 A requirement for loading facility registration is that each loading facility gives the following undertakings: 1) to comply with the FMS protocol; 2) to report

any detected FMS non-compliance to PPECB.

- 2.7 Only approved packaging, as specified in Appendix 5, may be used for export of fruit under the FMS.
- 2.8 Fruit from an orchard will not be inspected by PPECB for export under the FMS when PhytClean indicates the orchard status is “Not Permitted” or “On Hold”.
- 2.9 Producers, packhouses, exporters, loading facilities, third parties and freight forwarders handling fruit for export under the FMS must be registered with PhytClean to upload any data on PhytClean.

3. Requirements to qualify for Options A, B or C

Only cold sensitive citrus types, listed on PhytClean, qualify for Option B.

3.1 Option A or B

- 3.1.1 Registration of orchard,
- 3.1.2 Pheromone trap monitoring and
- 3.1.3 Orchard sanitation (as part of GAP), plus
- 3.1.4 Fruit infestation monitoring (for at least 12 wk before start of harvest) to determine need for additional control measures,
- 3.1.5 Fruit infestation monitoring (for 4 wk before start of harvest) and
- 3.1.6 Packhouse delivery inspection to determine export option
- 3.1.7 PPECB inspection (2% sample by pallet)
- 3.1.8 Ship in accordance with specific shipping regime codes

3.2 Option C

- 3.2.1 Registration of orchard
- 3.2.2 Pheromone trap monitoring and
- 3.2.3 Orchard sanitation (as part of GAP)
- 3.2.4 Packhouse delivery inspection
- 3.2.5 PPECB inspection (2% sample by pallet)
- 3.2.6 Ship in accordance with specific shipping regime codes

4. Details of FCM Risk Management Actions

4.1 Monitoring of pheromone traps (Options A, B & C)

- 4.1.1 Pheromone monitoring traps shall be used for registered FMS orchards. As a guideline for use, refer to the current CRI Production Guidelines for the Control of FCM on Citrus.
- 4.1.2 Only registered (in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, Act no. 36 of 1947 as amended) monitoring systems are permissible.
- 4.1.3 Trapping shall be initiated early enough to ensure that the traps are in position to record the first major moth flight peak, which normally occurs in late November or early December, depending on region and climate. If trapping does not commence by 15 December (latest), the orchard will not qualify for registration verification and the fruit will not be eligible for export under the FMS.
- 4.1.4 Pheromone monitoring traps should be placed at a density of no more than

one trap per 4 ha. One trap can represent more than one orchard, if the total area of the orchards is not more than 4 ha and the orchards are adjacent to one another. Individual orchards in excess of 4 ha require no more than one trap.

4.1.5 No level of FCM catches will result in disqualification of orchards, but the monitoring data must be used for management purposes, such as seasonal comparisons, treatment prioritisation of orchards and timing of treatment application.

4.1.6 Pheromone trap monitoring results do not need to be uploaded onto PhytClean, but the data must be recorded and records must be safeguarded for inspection / auditing if required.

4.2 Pre-harvest control measures

4.2.1 Orchard sanitation (Options A, B & C)

4.2.1.1 Orchard sanitation is an important component of GAP for FCM management.

4.2.1.2 Orchard sanitation entails the collection and removal of dropped fruit and hanging fruit, which show signs of damage or infestation.

4.2.1.3 A record of the end of fruit drop date must be maintained per orchard and orchard sanitation must be initiated no later than 2 weeks after the end of natural physiological November fruit drop which normally ends mid-November to mid-December.

4.2.1.4 Sanitation must be conducted weekly and continue until after harvesting has been completed, and within 14 days thereafter the orchard must be cleared of the current season's fruit (both fruit on the tree and fallen fruit).

4.2.1.5 Removed fruit must be destroyed outside the orchard. As a guideline, refer to the current CRI Production Guidelines for the Control of FCM on Citrus.

4.2.1.6 Commencing 15 January, a 4 weekly declaration must be made on PhytClean to confirm that the requisite sanitation practices have been maintained and will continue to be maintained for each FMS orchard. Declarations will be on a PUC level for all FMS orchards registered under the PUC.

4.2.1.7 Orchard sanitation must be recorded and records must be safeguarded for inspection / auditing.

4.2.1.8 **Sanitation must not be conducted on or under the data trees referred to in (5) and (6) below.**

4.2.2 Registered control measures (Options A, B & C)

Control measures must be used in accordance with product Registration (in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act no. 36 of 1947 as amended), and as a guideline refer to the current CRI Production Guidelines for the Control of FCM on Citrus.

5 Pre-harvest (in orchard, 12 weeks prior to start of harvest) fruit infestation monitoring to determine the need for additional pre-harvest control measures (Options A & B)

5.1 Fruit infestation must be monitored in each registered FMS orchard to be eligible for

Options A & B. As a guideline for procedures, refer to the current CRI Production Guidelines for the Control of FCM on Citrus.

- 5.2 Monitoring must be undertaken for a minimum of 12 weeks prior to start of harvest, unless the orchard is harvested sooner than 12 weeks after 15 January, as monitoring need not be initiated earlier than 15 January.
- 5.3 As actual start of harvesting may sometimes occur earlier than predicted, it is advisable to initiate monitoring 16 weeks before the projected harvest date, and only the period of 12 weeks up to actual start of harvest will apply in calculating eligibility for Options A & B.
- 5.4 Orchard monitoring entails marking a minimum of 5 data trees in each orchard (up to 3ha). The 5 data trees (set) must be positioned **wherever fruit drop shows highest FCM**. If any single orchard is larger than 3 ha, additional data trees should be marked and monitored in sets of 5 data trees (Appendix 1). Consult PhytClean, to verify whether the **correct number of data trees has been selected**.
- 5.5 Each week (on the same day as far as possible), fruit which has dropped underneath each of the 5 data trees must be collected and inspected (through careful dissection) for FCM infestation. This inspection must be conducted immediately after fruit collection to minimise the possibility that any larvae exit the fruit between collection and inspection. **Sanitation must not be conducted under or from these trees and the data trees must be clearly marked to protect them from routine orchard sanitation practices.**
- 5.6 Monitoring should preferably be conducted on the same day each week, but since this is not always feasible, the interval between any two monitoring days may not be more than 10 days and for a 12 week monitoring period no less than 12 monitoring records are required. The results must be uploaded onto PhytClean.
- 5.7 A fruit is considered infested if any FCM larva is found in the fruit, or it is reliably evident that the fruit was infested but the larva has recently exited the fruit.
- 5.8 If the orchard is in a Pest Free Area, Pest Free Place of Production or Pest Free Production Site, the presence of any larvae (dead or alive) is considered an infested fruit and must be dealt with according to the FCM Pest Freedom Protocol.
- 5.9 If any infested fruit are detected in the period 12 to 4 weeks prior to commencement of harvest, then a registered control measure, listed on PhytClean as a suitable corrective treatment, must be applied within 2 weeks after this intervention threshold has been surpassed. However, it is advisable to apply the control measure immediately on the threshold being surpassed, particularly as one gets closer to harvest.
- 5.10 If the control measure is applied in response to detected fruit infestation, then only products that are considered suitable as registered corrective treatments will satisfy this FMS requirement. These products are listed on PhytClean, PhytClean must be consulted before product selection, and the treatment data must be uploaded onto PhytClean.
- 5.11 This intervention requirement will only apply again 5 weeks after the registered control measure was applied, thus providing sufficient time for the efficacy of the control measure to be detected through a recorded reduction in FCM infestation
- 5.12 Orchard infestation monitoring (12 and 4 weeks prior to harvest) must be conducted by trained personnel. Training records and proof of competency evaluation must be

safeguarded for inspection / auditing.

6. Fruit infestation monitoring (4 weeks prior to start of harvest) to determine option for handling during shipping (Options A & B)

- 6.1 If any infested fruit are detected in the four weeks preceding the start of harvesting, then fruit from that orchard shall only be potentially eligible for export under Option C.
- 6.2 Delaying the start of harvesting might enable compliance with the threshold and a resumption of the opportunity to export under Options A and B.
- 6.3 Data must be recorded, the records must be safeguarded for inspection / auditing and the results must be uploaded onto PhytClean.

7 Post-harvest fruit grading and inspection

7.1 In-orchard fruit culling (Options A, B & C)

Fruit showing signs of potential FCM infestation should be removed during the picking process within the orchard as far as it is feasible to do so, prior to delivery of the fruit to the packhouse. Culled fruit must be excluded from packing for export under the FMS.

7.2 Packhouse delivery inspection (Options A, B & C)

- 7.2.1 The packhouse is required to register with DALRRD on PhytClean. The Packhouse manager must undertake to comply with the FMS and to report as required. Packhouse delivery inspection must be conducted by trained personnel. Training records and proof of competency evaluation must be safeguarded for inspection / auditing.
- 7.2.2 On delivery of citrus fruit from an orchard to the packhouse, for packing under the FMS, a sample of fruit per orchard must be removed and inspected for FCM infestation (one sample per orchard per season, unless harvesting continues beyond 4 weeks in which case 7.2.8 applies). The sample size for Option A and C fruit is 800. Depending on the desired shipping condition, the sample size for Option B fruit is 800, 1000, 1900 or 2800. The fruit sample must be selected randomly without selecting for fruit that looks more or less likely to be infested.
- 7.2.3 This inspection must be conducted according to the prescribed procedure (Appendix 2). All fruit with any suspicious marks that could possibly be indicative of FCM penetration and all fruit with injuries (however small) that could have facilitated easier penetration of FCM, must be further inspected destructively (i.e. fruit must be cut, according to the procedure in Appendix 2). This includes all Navel oranges with any sign of a split navel-end, however small the split, and other citrus types showing fruit splitting. Fruit with no observable external blemishes, that might be associated with FCM infestation, require no further inspection.
- 7.2.4 A fruit must be recorded as infested, if a live or dead FCM larva is found in the fruit.
- 7.2.5 **Option A:** To use Option A, there may not be more than 2 infested fruit detected in the sample of 800 fruit. If 3 to 5 infested fruit are detected in the sample, the fruit from the orchard defaults to export under Option C for the season. If more than 5 infested fruit are detected in the sample (that is it exceeds the requirement for Option C, see 7.2.7), fruit from the orchard is not suitable for export under the FMS for the season (the orchard status on PhytClean will become "Not Permitted"). To be able to use Option A, with regime code EW2 (Appendix 3 & 4), there may not be more than 1 infested fruit

detected in the sample of 800 fruit.

- 7.2.6 **Option B:** To use Option B, there may not be more than 1 infested fruit detected in the sample of 800, 1000, 1900 or 2800 fruit. If 2 or more infested fruit are detected in the sample, the fruit from the orchard defaults to export under Option A for the season, if the detected infestation does not exceed the requirements for Option A. If the detected infestation exceeds the requirement for Option A, the fruit from the orchard defaults to Option C for the season. If more than 5 infested fruit are detected in the sample (that is it exceeds the requirement for Option C, see 7.2.7), fruit from the orchard is not suitable for export under the FMS for the season (the orchard status on PhytClean will become “Not Permitted”).
- 7.2.7 **Option C:** To use Option C, there may not be more than 5 infested fruit detected in the sample of 800 fruit. If 6 or more infested fruit are detected in the sample, the fruit from the orchard cannot be exported under the FMS (the orchard status on PhytClean will become “Not Permitted”).
- 7.2.8 Packhouse delivery inspection must be repeated for any orchard where harvesting continues for more than 4 weeks after the first packhouse delivery inspection. If this results in a reduction of the available FMS Options for fruit from that orchard, the grower and packhouse are required to ensure that all parties along the supply chain are informed and the orchard status will be flagged accordingly on PhytClean. The status of an orchard cannot improve from C to A, or C to B, or A to B as a result of the 4 week repeat inspection.
- 7.2.9 Results from all inspections must be recorded, uploaded onto PhytClean and the records must be safeguarded for inspection / auditing.

7.3 Packhouse grading (Options A, B & C)

- 7.3.1 Citrus fruit must be thoroughly graded on the packing line to remove fruit with blemishes that may be associated with FCM infestation. All Navel oranges with any signs of navel-end splitting, however small the split, including other citrus types showing fruit splitting must be graded out.
- 7.3.2 Packhouse graders must be trained to identify fruit with signs of FCM infestation and the number of graders and conditions in the packhouse (eg. lighting) must be suitable to optimise effectiveness of removing FCM infested fruit during grading. Training records and proof of competency evaluation must be safeguarded for inspection / auditing.

7.4 Perishable Products Export Control Board (PPECB) inspection (A, B & C)

- 7.4.1 In the packhouse, after packing, PPECB shall inspect a 2% sample of citrus fruit per pallet packed for export under the FMS.
- 7.4.2 PPECB shall reject any pallets of citrus fruit for export under the FMS if any fruit infested with live FCM is detected during such inspection and the pallet of fruit may not be repacked for or sent to a FMS market.
- 7.4.3 The number “7” as the second digit in the target market code must be used for pallets of fruit from an FMS orchard if FCM was detected during inspection for a FCM-tolerant market.
- 7.4.4 The number “9” as the second digit in the target market code must be used for pallets of fruit from an FMS orchard if FCM and CBS was detected during inspection for a

FCM- and CBS-tolerant market.

- 7.4.5 PPECB shall ensure that pallets coded “7” or “9” will not be considered for export under the FMS.
- 7.4.6 PPECB rejection of a pallet of fruit from an FMS orchard will not disqualify further fruit from that orchard being exported under the FMS, provided such fruit is compliant with the criteria applicable to Options A, B or C.
- 7.4.7 PPECB shall observe the PDI and grading procedures at each packhouse within the first 4 weeks of packing in each season, report the findings to the packhouse manager and keep a record of the findings.

8. Verification of FMS orchard status using PPECB inspection data

- 8.1 FCM rejection data referred to in 8.2 will be captured.
- 8.2 PPECB data for FCM rejections of fruit inspected for export under the FMS, other FCM sensitive markets, age re-inspections and DALRRD data for FCM rejections for FCM sensitive markets will be used in PhytClean system calculations to flag orchards in which the indicated probability of infestation exceeds the probability associated with the FMS Option of the individual orchards.
- 8.3 The flagging of such discrepancy will elicit an investigation of the PUC and packhouse, by or under the auspices of DALRRD, which shall be conducted as rapidly as possible and the findings will inform the need for and nature of corrective actions (Appendix 7).

9. Shipping conditions

- 9.1 The FMS prescribes shipping conditions available for each consignment of FMS qualifying export fruit, according to the phytosanitary status (Options A, B or C) of the orchards from which the fruit was harvested and inspected.
- 9.2 The shipping condition options available for FMS export consignments are specified in prescribed FMS shipping regime codes (Appendix 3 & 4) and are controlled by PPECB.
- 9.3 The eligible shipping condition options for each consignment must be verified using PhytClean, at the point of loading of the container or ship, as a precondition for potential phytosanitary certification.

10. Phytosanitary certification

For export consignments of citrus fruit from orchards registered under the FMS, subject to compliance with the criteria set in the FMS, a phytosanitary certificate may be issued for export as being compliant with the relevant import requirements, subject to shipping in accordance with Options A, B or C. If fruit qualifying for different shipping Options are combined, the shipping Option shall default to the shipping Option most reliant on the shipping component of the system (refer to Appendix 3; B+A=A, B+C=C, B+A+C=C, A+C=C).

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APPENDIX 1

Procedure for allocation and positioning of data trees

The number of data trees for orchards of different sizes:

- a) 3 ha or less – 1 set of 5 data trees
- b) More than 3 ha, up to 10 ha – 2 sets of 5 data trees
- c) More than 10 ha, up to 20 ha – 3 sets of 5 data trees
- d) More than 20 ha, up to 30 ha – 4 sets of 5 data trees
- e) More than 30 ha – 5 sets of 5 data trees

Select the data tree site/sites in part/s of the orchard where fruit drop shows the highest FCM infestation. Consult PhytClean, to verify whether the correct number of data trees has been selected. Where more than one set of data trees are used in an orchard, the sets of data trees should be distributed regularly and evenly throughout the orchard, insofar as this is possible given the need to include parts of the orchard where fruit drop shows the highest FCM infestation. For example, in a 28 ha orchard, requiring 4 groups of 5 data trees, the orchard should be divided into 4 blocks of 7 ha each, each with one set of 5 data trees. Data trees must be clearly marked (preferably using bright tape) so that their identity as data trees is obvious for protection from routine orchard sanitation procedures.

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APPENDIX 2

Procedure for fruit inspection on delivery to the packhouse:

- a) with the aid of a magnification device (e.g. head loop), with a minimum of 2.5X magnification, thoroughly inspect each fruit for any marks which might indicate a point of FCM penetration or an injury from any other cause that could have facilitated easier FCM penetration, including a split navel-end;
- b) all fruit found with any such suspicious marks must be destructively inspected as described below;
- c) cut the rind away under the mark in thin slivers which will allow observation of even the shallowest penetration of a very small larva;
- d) continue cutting into the flesh of the fruit either until infestation or the lack of it is confirmed;
- e) this procedure must be followed for all such marks observed on the rind of the fruit;
- f) thereafter, the fruit must additionally be cut into quarters and carefully inspected for any signs of infestation;
- g) if any such signs are observed, then further cutting and inspection should be conducted in the relevant quarter of fruit.

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APPENDIX 3

Shipping condition options (shipping regime codes) available for export of citrus fruit under the FMS. **Refer to the last table in Appendix 4 and to Appendix 6 for further detail.**

Option A. For citrus fruit with a phytosanitary certificate for export under Option A, the fruit shall be shipped in accordance with one of the following (conditions described under Option C may also be used for fruit qualifying for Option A):

EC2. Temperature set point of 2°C, after precooling to pulp temperature of 5°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports.

EW2. Temperature set point of 2°C, when not pre-cooled to 5°C or lower. Available for shipments from Durban and Port Elizabeth. Also potentially available for shipments from Cape Town port, if there was no more than 1 infested fruit in the packhouse delivery sample.

EC1. Temperature set point of 1°C, after precooling to pulp temperature of 4°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports.

EW1. Temperature set point of 1°C, when not precooled to below 4°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports.

EW01. Temperature set point of -1°C, when not precooled to 10°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports.

Specialised Reefer Vessels – Option A and B

Only ECV0, ECV1 and ECV2 regime codes are currently available for specialised reefer shipments

ECV0. Precool to 1°C or lower, ship at set point of 0°C, with treatment duration (precooling + shipping) of 22 days. Pulp temperature at time of shipping not exceeding 3.0°C. Carry at 0.0°C for a minimum of 22 days and maintain until discharge.

ECV1. Precool to 2°C or lower, ship at set point of 1°C, with treatment duration (precooling + shipping) of 24 days. Pulp temperature at time of shipping not exceeding 4.0°C. Carry at 1.0°C for a minimum of 24 days and maintain until discharge.

ECV2. Precool to 3°C or lower, ship at set point of 2°C, with treatment duration (precooling + shipping) of 24 days. Pulp temperature at time of shipping not exceeding 5.0°C. Carry at 2.0°C for a minimum of 24 days and maintain until discharge.

Option B. For citrus fruit with a phytosanitary certificate for export under Option B (only listed cold sensitive citrus types, including Marsh Grapefruit, Satsuma mandarin, Pummelo, Bearss (Persian, Tahiti) lime *Citrus latifolia* and organically produced citrus), the fruit shall be shipped in accordance with one of the following (conditions described under Options A and C may also be used for fruit qualifying for Option B):

EC3. Temperature set point of 3°C, after precooling to pulp temperature of 5°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports.

EC35. Temperature set point of 3.5°C, after precooling to pulp temperature of 5.5°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports.

EC4. Temperature set point of 4°C, after precooling to pulp temperature of 6°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports depending on packhouse delivery inspection results.

Option C. For citrus fruit with a phytosanitary certificate for export under Option C the fruit shall be shipped in accordance with one of the following (conditions described under Options A and B may not be used for fruit qualifying for Option C):

EC0. Temperature set point of 0°C, after precooling to pulp temperature of 1.2°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports.

ECW0. Temperature set point of 0°C, after precooling to pulp temperature of 10°C or lower. Available for shipments from Durban and Port Elizabeth ports.

EC01. Temperature set point of -1°C, after precooling to pulp temperature of 0°C or lower.

Available for shipments from Durban, Port Elizabeth and Cape Town ports.

ECW01. Temperature set point of -1°C , after precooling to pulp temperature of 10°C or lower. Available for shipments from Durban, Port Elizabeth and Cape Town ports.

If fruit qualifying for different shipping Options are combined, the shipping Option shall default to the Option providing the most security (B+A=A, B+C=C, B+A+C=C, A+C=C).

The temperature set point shall be verified at point of loading and shall be maintained for the duration of the voyage, unless the voyage duration is such that it exceeds 30 days from gate-in, or hatch closure, in which case step up to 4°C (no higher) can be effected thereafter and maintained for the remainder of the voyage.

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APPENDIX 4

SUMMARY: FCM MANAGEMENT SYSTEM (FMS) FOR FRESH CITRUS EXPORTS FROM SOUTH AFRICA

The system encompasses orchard registration, a range of control requirements, monitoring procedures and compliance thresholds. The FMS provides an endpoint categorisation of phytosanitary status for individual orchards, pallets of packed fruit and consignments of fruit for export. Handling conditions during shipping are prescribed according to the phytosanitary status (Options A, B or C) of the fruit in the shipment.

REQUIREMENTS (COMPULSORY) TO QUALIFY FOR OPTIONS A, B & C

ACTION	REQUIRED FOR OPTION?	
	C	A & B
Registration of orchard	Yes	Yes
Trap monitoring	Yes	Yes
Orchard sanitation	Yes	Yes
Fruit infestation monitoring to determine need for control measure (last 12 weeks before start of harvest)	No	Yes & apply treatment if threshold surpassed
Fruit infestation monitoring to determine export option (last 4 weeks before start of harvest)	No	Yes & must not exceed threshold
Packhouse delivery inspection	Yes & must not exceed threshold	Yes & must not exceed threshold
PPECB 2% inspection sample per pallet, no live FCM detected in pallet	Yes	Yes

Only listed cold sensitive citrus types qualify for Option B

DESCRIPTION OF ACTIONS (COMPULSORY AND RECOMMENDED)

ACTION (required for Option A, B & C)	DETAILS
Registration (A, B, C)	Each orchard must register with DALRRD. Registration includes requisite undertaking to comply with FMS and provide accurate data as required by FMS.
Trap monitoring (A, B, C)	Pheromone trapping required from specified date.
Orchard sanitation (A, B, C)	Orchard sanitation required weekly from specified date.
Fruit infestation monitoring (A, B)	Monitor FCM fruit drop from 5 data trees per orchard, or more depending on orchard size. Compulsory to start 12 weeks prior to harvest (16 weeks recommended).
Control measures (A, B, C)	Use only registered control measures.
In-orchard culling (A, B, C)	Fruit showing signs of FCM infestation to be culled during harvesting.
Packhouse delivery inspection (A, B, C)	Sample of 800 fruit (Option A and C), or 800, 1000, 1900 or 2800 fruit (Option B) per orchard, to be inspected for FCM infestation. Visual inspection & all fruit with suspicious marks to be cut.
Packhouse grading (A, B, C)	Grade thoroughly on the packing line.
PPECB inspection (A, B, C)	2% sample.
Shipping regime code options (A, B, C)	The shipping regime code options that each consignment qualifies for shall be verified at the point of loading using PhytClean.
Phytosanitary certification (A, B, C)	A phytosanitary certificate for export as a pest-free consignment may be issued according to FMS compliance.

THRESHOLDS APPLYING TO OPTIONS A, B & C

MEASUREMENT	THRESHOLD (live larvae)	CONSEQUENCE OF EXCEEDING THRESHOLD
Pheromone trap catches (A, B & C)	None	None
Fruit infestation (A & B)	During the 12wk pre-harvest period Any fruit/tree/week	Apply a registered control measure, as listed on PhytClean.
	4-week average any fruit/tree/week in last 4 weeks before start of harvest.	Orchard defaults to Option C.
Packhouse delivery inspection (A, B & C)	Category A: More than 2 infested fruit in sample	Orchard defaults to Option C
	Category B: More than 1 infested fruit in sample	Orchard defaults to Option A (if compliant with A) or C
	Category C: More than 5 infested fruit in sample	Orchard defaults to "Not Permitted" and cannot be exported under FMS
PPECB 2% Sample	One or more infested fruit	Pallet cannot be exported under FMS (Options A, B & C).

HANDLING DURING SHIPPING

Table 1. Regime code options for containerised shipping under Options A, B & C

Option	Shipping regime code	Load-out temperature (°C)	Set point (°C)	Ports to which applicable: Durban (D), Port Elizabeth (PE), Cape Town (CT)	Packhouse delivery sample size and qualification threshold
A	EC2	≤5	2	D, PE, CT	800 fruit. Infested fruit ≤ 2. *Infested fruit ≤ 1.
	EW2	≤25	2	D, PE (CT*)	
	EC1	≤4	1	D, PE, CT	
	EW1	≤25	1	D, PE, CT	
	EW01	≤25	-1	D, PE, CT	
B	EC3	≤5	3	D, PE, CT	800 fruit. Infested fruit ≤ 1.
	EC35	≤5.5	3.5	D, PE, CT	1000 fruit. Infested fruit ≤ 1.
	EC4	≤6	4	D	1000 fruit. Infested fruit ≤ 1.
				PE	1900 fruit. Infested fruit ≤ 1.
				CT	2800 fruit. Infested fruit ≤ 1.
C	EC0	≤1.2	0	D, PE, CT	800 fruit. Infested fruit ≤ 5.
	ECW0	≤10	0	D, PE	
	EC01	≤0	-1	D, PE, CT	
	ECW01	≤10	-1	D, PE, CT	

Table 2. Regime code options for under-deck specialised reefer vessels (conventional shipping)

Option	Shipping regime code	Cold room precooling temperature (°C)	Load-out temperature (°C)	Set point (°C)	Departure ports to which applicable	Packhouse delivery sample size and qualification threshold	Minimum times to discharge
A and B	ECV2	≤3	≤5	2	All	800 fruit. Infested fruit ≤ 2.	24 days
	ECV1	≤2	≤4	1	All		
	ECV0	≤1	≤3	0	All		22 days

- See Appendix 6 for further details.
- Only packaging according to Appendix 5 shall be used.
- Requirements for fruit as stipulated in the CBS Risk Management System (CBS RMS) shall also apply to FMS shipments to EU, for example: the harvested fruit must be placed under cooling no later than 6d after packhouse inspection.

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APPENDIX 5 – FMS Packaging requirements

Packaging material

- a. The following applies to all citrus fruit exported under the Citrus FMS.
- b. Cartons and the corresponding vent-hole design must conform to the CRI-Postharvest Technical Forum document: “Packaging Material Specifications and Palletization Protocols for Export”.
- c. The following carton / packaging types are allowed:
 - i. SuperVent A15C cartons.
 - ii. D15C, E15C and G15C cartons.
 - iii. Open display cartons, e.g. E10D/E15D with adequate ventilation design as specified in the document mentioned in (b) above.
 - iv. Ventilated trays may be used, but only under one of the pre-cooled C codes.
 - v. IFCO plastic crates are allowed. If any internal packaging is used, only under one of the pre-cooled C codes.
 - vi. Bulk bins, as specified in the document mentioned in (b) above, in which ventilated sheets are placed at the bottom of the bin.
- d. The following additional specifications apply:
 - i. Ventilation in securing sheets must align with the cartons' vent holes to ensure cold air can flow unobstructed up into the pallet.
 - ii. No wrapping of fruit is allowed other than the alternative row top layer for display purposes.
 - iii. Use of unventilated trays is not permitted.

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APPENDIX 6 – Temperature monitoring, loading and shipping

Temperature monitoring

- a. Loading point facilities must **measure pulp temperatures** and provide records.
- b. The **temperature set point shall be verified** at point of loading and shall be maintained for the duration of the voyage, unless the voyage duration is such that it exceeds 30 days from gate-in, or hatch-closure, in which case step up to 4°C (no higher) can be effected thereafter and maintained for the remainder of the voyage.
- c. Every container shall be fitted with an air or pulp temperature monitoring device that complies with the following.
 - iv. Only PPECB approved portable loggers can be utilised. The loggers must be compatible with PhytClean in supplying data in the correct format.
 - v. PPECB to record the serial number of portable logger on Q08 and verify that it is an FMS approved device.
 - vi. Air temperature or pulp probes may be used.
 - vii. It is the exporters/agents' responsibility to arrange for the logger/s.
 - viii. It is compulsory for the exporters/agents to arrange for the logger/s to be downloaded and data to be uploaded on PhytClean, within 7 days after arrival in port of discharge.
 - ix. The probe and logger must be placed in the required position during loading. Failure to do so will result in PPECB not authorising the container for export under the FMS.
 - x. See diagram below for the position at which the temperature must be measured in the container - last pallet row, pallet on the left-hand side of the container.
 1. Air temperature recorders must be placed inside the carton, next to fruit close to the carton wall but 10 cm away from vent holes.
 2. In the case of pulp probe recorders, the spear must be placed in a fruit which is close to the carton wall but 10 cm away from vent holes. The logger body (recorder) should ideally be on top of the respective pallet.

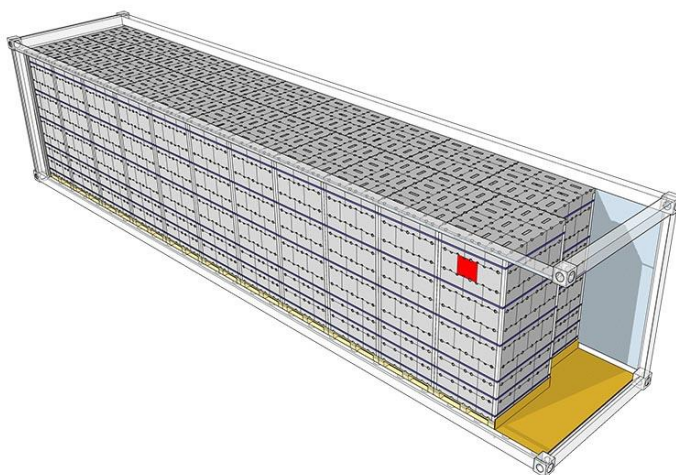


Figure 1: Red carton indicates where the temperature must be monitored (inside red carton).

2. Loading practices

- a. PE includes Coega.
- b. No change of shipping regime code within 24h before “load out” of fruit into the container, but the exporter / grower can instruct a subsequent reduction in set point temperature in accordance with a PPECB approved procedure.
- c. All shipping containers must be fitted with void plugs and void plugs must be placed in accordance with the following requirements. Failure to do so will result in PPECB not authorising the container for export under the FMS.
- d. The following specific requirements apply:
 1. No portion of the void plug board should exceed the T-bars in any way. A clear gap/opening should thus be present between the T-bars and the door.
 2. Void plug must cover the exposed base of pallets.
 3. Void plug must cover the exposed T-bar floor area.
 4. Void plug board is not warped and is not at risk of being shifted by airflow.

5. A 21 pallet loading configuration is only permissible through a dispensation granted by PPECB. Such dispensation may be granted, conditional to: installation of additional temperature monitoring as instructed by PPECB, compulsory reporting of the recorded shipping temperatures to PPECB within 24h of arrival at port of destination, and inter-pallet chimney blocking in accordance with PPECB procedure.
- e. No other air manipulation equipment/devices can be placed on either the container floor or on top of the pallets.

3. Conventional reefer shipments

- a. Shipment of citrus under the FMS in specialized reefers is permitted using three regime codes in accordance with the relevant SOP (contact PPECB or CRI).
- b. Every independent cooling space for under-deck specialised reefer vessels must have air temperature monitoring, and temperature records for the duration of the voyage, for each cooling space, must be made available for analysis on completion of the voyage.

4. General

- a. The handling of citrus fruit at the FMS temperatures may increase the risk of chilling injury. Consider recommendations on procedures to manage the risk of chilling injury
- b. The PPECB must be informed should the container malfunction or is not able to maintain the setting according to the applicable regime code.
- c. Special care must be taken in situations where fast sailing and short duration routes could be encountered, and in such situations, consideration should be given to providing for extra time under cooling.

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APPENDIX 7

Corrective actions and voluntary withdrawal

1. Exceeding the PPECB inspection threshold as contemplated in section 8 (Verification of FMS orchard status using PPECB inspection data)

- 1.1 When the threshold is exceeded by PPECB inspection of fruit from the orchard, the orchard is flagged on PhytClean as “On Hold” and this will trigger an investigation of the PUC and packhouse.
- 1.2 PPECB will not accept any further fruit from the flagged “On Hold” orchard for inspection under the FMS, until the investigation has been completed. However, fruit from the flagged orchard which has already passed PPECB inspection, but has not yet been shipped, may still be shipped under the Options for which the fruit was eligible after PPECB inspection.
- 1.3 The investigation will be conducted by or under the auspices of DALRRD and will be completed within three weeks of the orchard being flagged.
- 1.4 Appropriate corrective actions will be informed by the findings of the audit (may include suspension).
- 1.5 On completion of the investigation, if resumption of export from the flagged orchard is allowed, such fruit may only be exported under Option C shipping regime codes and any other corrective actions ensuing from the investigation.

2. Interception of live FCM in the EU

- 2.1 On receipt of an official notification of an FCM interception, DALRRD will notify the producer that no further fruit from the PUC will be inspected by PPECB for export to the EU (all the orchards will be flagged accordingly on PhytClean) for the remainder of the season.
- 2.2 Fruit from the non-implicated orchards of the PUC which have passed PPECB

- inspection, but have not yet been shipped, may still be shipped under the Options for which the fruit was eligible after PPECB inspection.
- 2.3 Fruit from the implicated orchard which have passed PPECB inspection, but have not yet been shipped, may still be shipped, but only under regime codes EC01 or ECW01.
 - 2.4 An investigation will be conducted and will include PUC, Packhouse, PPECB inspection and the cold chain.
 - 2.5 For remedial actions, see point 3 (Compliance Audit System).
 - 2.6 In the year following an EU interception, the PUC and packhouse will be subjected to on-site audit, conducted by or under the auspices of DALRRD, as a condition for DALRRD potentially approving (verifying) the PUC's orchard registration application and verifying the packhouse registration application.
 - 2.7 An EU FCM interception strike system will be operated as follows:
 - 1) The PUC will be excluded from exporting to the EU for the remainder of season if the PUC is implicated in an EU FCM interception.
 - 2) The PUC will be excluded from exporting to the EU for the remainder of season and the next season if the PUC is implicated in an EU FCM interception and the PUC was also implicated in an EU interception in the previous year.

3. Compliance Audit System

- 3.1 FMS compliance audits will be conducted on PUCs, PHCs, loading facilities and Exporters according to procedures as prescribed by DALRRD and will be conducted by a party as approved by DALRRD. Audits will be conducted when: 1) the PUC, PHC, loading facility or Exporter is selected for audit according to risk profiling; 2) the entity is implicated in an EU FCM interception; 3) an orchard is flagged for excessive PPECB FCM interception rates according to Section 8 of the FMS.
- 3.2 When compliance audits detect non-compliance, the corrective actions will be informed by the nature of audit findings, will be determined by DALRRD and can include but are not limited to the following.

3.2.1 Packhouse

The packhouse may be placed under curatorship until it has been demonstrated that the packhouse has successfully implemented prescribed corrective actions.

The packhouse manager may be required to sign an undertaking to implement prescribed corrective actions within an agreed timeframe.

In the year following the PHC being implicated in an EU interception or a major non-compliance finding during audit, the packhouse will be subjected to on-site audit as a condition for DALRRD potentially approving (verifying) the PHC's registration application.

3.2.2 Production unit.

The registration of orchards from the PUC to export under the FMS may be suspended for the remainder of the season.

The PUC may be required to sign an undertaking to implement prescribed corrective actions within an agreed timeframe.

In the year following the PUC being implicated in an EU interception or a major non-compliance finding during audit, if the PUC's orchards are eligible for registration application, the PUC will be subjected to on-site audit as a condition for DALRRD potentially approving (verifying) the PUC's orchard registration applications.

4. Voluntary withdrawal procedure

- 4.1 Producers may voluntarily de-register orchards on PhytClean from being able to export

to EU under the FMS.

- 4.2 Orchard registration may be withdrawn directly by the producer or through request to DALRRD (PatrickMag@daff.gov.za and TankisoA@daff.gov.za).
- 4.3 Fruit from the withdrawn orchard/s that has passed PPECB inspection, but has not yet been shipped, may still be shipped under the shipping options for which the fruit was eligible after PPECB inspection.
- 4.4 Withdrawal applies to the remainder of the season and cannot be reversed later in the season.