Northern Territory Government

The Plant Industries NT Newsletter

August 2011 e-newsletter

Mango pre-harvest special – no substitute for quality

Dear Reader,

Maintaining mango fruit quality through the supply chain is a perennial issue. It remains so, because there are numerous variables that continually demand vigilance to attain satisfactory quality outcomes. It is complex, and has multiple points for potential failure.

Circumstances affecting mango fruit quality losses can occur in:

- In the orchard.
- During harvest.
- In the packing shed
- During transport to market
- Through handling by the wholesaler.
- Handling by the retailer;
- or combinations of the all of the above.

This article will not be able to address all the issues with mango fruit quality, but will attempt to hone in on some of the big impacts that commonly afflict growers' hip-pockets. The checklist provided is backed by years of research and development in maintaining mango quality in the supply chain.

Also, please check your upcoming events section, there are a couple of immediate stand out activities you may be interested in.

I hope this newsletter is of practical use to those engaged in NT horticulture.

Regards,

Warren Hunt
Industry Development and Extension Leader, NT Dept of Resources.

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The PINT Newsletter is produced by the Plant Industries Division of Department of Resources.

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Maintaining mango fruit quality

Table 1. Checklist for mango fruit quality

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Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Planning when to start harvest	Poor flavour and skin de-greening	Picking immature fruit – poor estimation of when each maturity zone is ready to harvest: • Inaccurate recording of flowering date. • Poor determination of maturity zones. • Inaccurate testing of maturity close to harvest.	• Before flowering, install temperature loggers to monitor heat accumulation units. • Record the date of full flowering for each block. • Record the variation in flowering within each block. • From the above, identify maturity zones for the whole farm, based on areas of the farm that have similar flowering dates. • To further refine maturity profiles if required, label trees within zones where the whole canopy flowered evenly at least four weeks earlier or later than the main flowering for each zone. • If required, label additional trees if about half the canopy on the tree flowered 4 weeks before/after the main flowering. • Four weeks before estimated start of harvest, sample 20 fruit randomly from each maturity zone. If picking separately from the outside and inside of the canopy is anticipated, take 20 fruit from the outside and 20 fruit from the inside. Determine flesh colour and dry matter. • Estimate accumulated heat units from the temperature logger. • Repeat weekly, and plot the results on a graph to observe maturity trends, and to estimate the start of harvest. • Minimum harvest maturity is reached at 14% dry matter. A mature fruit is typically filled out around the beak and when sliced through the check, the flesh is yellowing across the cheek (stage 3 on the Kensington Pride mango Picking Guide).	Block flowering record Heat accumulation record Maturity check record
Preparation for harvest	Loss of external quality (physical injury, skin browning etc) and shelf life	Breakdown of equipment causing delays or slowing harvesting and packing. Injury from poorly maintained equipment	• Check operation of all harvesting, grading and packing equipment and cool rooms prior to start of harvest and carry out all necessary repairs and maintenance.	Equipment maintenance record

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Harvesting	Poor eating quality and skin de-greening	Picking immature fruit. Pickers harvesting: • Outside the specified maturity zone. • From the wrong-labelled trees (if specific early/late flowering trees have been labelled). • Immature fruit when trying to select pick from within the tree.	• Pickers and supervisors are effectively trained in assessing fruit maturity and picking technique • Clear instructions given to the supervisors on: o maturity zones to be harvested o labelled trees within each maturity zone to be harvested • Supervisors provide clear instructions to pickers on fruit selection for each block harvested during the day • If selective picking within trees: o ensure that harvest aid speed does not "rush" the pickers o monitor performance of picking crews regularly and retrain pickers if problems detected.	Staff training record
	Premature ripening, jelly seed, stem end cavity, insufficient saleable life	Picking over-mature fruit. Fruit ripening on tree	• Discard fruit that show skin yellowing or softening or stem end cavity • If fruit of more that 19% dry matter are harvested, ensure that fruit are packed and precooled within 15 hours of harvest and distributed to retail where the total time in the supply chain is less than 7 days	
	Sapburn	Sap contacts fruit skin before immersion in Mango Wash: • Fruit not inverted (stem end facing the ground) before removing from the tree. • Picker takes too long to place fruit on harvest aid after removing stem. • Sap on hands from other mangoes • Harvest aid tarpaulin not effectively covered with Mango Wash • Mango Wash concentration too weak or not replaced often enough.	Pickers instructed and supervised to: • Invert fruit before snapping from the tree. • Place on the harvest aid within two seconds of removing stem. • Hold only one fruit per hand. • Wash hands every 30 minutes, or when sap gets on hands. • Do not wear gloves • Tarpaulin spray nozzles checked regularly to ensure adequate flow and distribution. • Mango Wash solution maintained at the correct concentration.	

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Harvesting	Skin browning	Wrong detergent used on harvest aid. Mango Wash solution is the wrong concentration or not changed frequently enough. Fruit do not stay long enough in the mango wash solution. ○ Speed of harvest aid conveyer belt too high. ○ Mango Wash sprays on conveyer belt line blocked. Sap buildup on tarpaulin. Harvest aid not cleaned regularly enough Sap and dirt in empty field bins	• Only use Mango Wash™ in the harvest aid. • Mango Wash solution is mixed at the rate specified by the manufacturer • In recirculated systems, Mango Wash solution is replaced after every third field bin or sooner if the solution has lost its slippery, soapy feel or if sap/ dirt builds up. • Fruit to remain covered with Mango Wash for at least 60 seconds (preferably 90 seconds). ○ Ensure harvest aid conveyer belt speed is set correctly. ○ Regularly check conveyer belt spray nozzles for blockage/uneven coverage. • Maintain even Mango Wash spray over the tarpaulin. • Clean harvest aid tarpaulin with Mango Wash and a broom every two hours to remove sap. • Clean the whole harvest aid at the end of each day to remove dirt and traces of residual sap. • Field bins are cleaned after dumping in packhouse.	
	Physical injury	• Fruit thrown from too far away or too hard. • Speed of harvest aid not suitable for the number of pickers, tree spacing and crop load. • Damage from fingernails. • Damage from picking poles and secateurs. • Fruit bounce onto ground. • Fruit hit the stem button of other fruit. • Sharp edges on harvest aid. • Sap/dust build-up on tarpaulin causing abrasion. • Too big a drop from the harvest aid conveyer into the field bin. • Damage from the conveyer belt when fruit pile up in the bin. • Bins too full, resulting in damage when stacked for transport • Dirt, twigs in empty field bins.	• Pickers are thoroughly trained in picking technique – short fingernails, use of picking poles/ secateurs etc • Fruit are not thrown more than 2 metres onto the harvest aid. • Adjust the harvest aid speed to suit number of pickers, tree spacing and crop load to make sure pickers do not go too far away from the harvest aid. • Fruit that fall on the ground are not placed on to the harvest aid. • All surfaces that may cause physical damage are padded. • Clean tarpaulin every 2 hours at the end of the day to remove sap and dirt. • Ensure the drop from the conveyer belt into the field bin is less than 30 cm. • Use padded vinyl drop pads to break the fall into the bin. Adjust the pad so that fruit is always dropping onto the pad. • Make sure fruit do not pile up around the conveyer belt. • Fill bins to no more than 5cm from the top. • Filed bins are cleaned after dumping in packhouse and before each use	

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Harvesting	Lenticel spotting	• Fruit sits in Mango Wash for too long. • Fruit harvested too mature.	• Do not allow fruit to stay in Mango Wash for longer than two minutes	
	Skin browning, physical injury, lenticel spotting	Harvesting during wet weather Wet weather makes the skin cells more sensitive to damage during harvesting, handling in the packhouse, hot fungicide treatment, VHT.	• If more than 20mm of rain has fallen over 12 hours or more, wait for one day fine weather or two days overcast weather before re-starting harvesting. • If more than 50mm of rain has fallen over 24 hours or more, wait for two days fine weather or three days overcast weather before re-starting harvesting. • If harvesting has to occur during/soon after wet weather, delay packing for 24 hours to allow fruit to loose turgidity and for symptoms of damage to appear (so grading and packing staff can remove damaged fruit).	
	Sunburn	Field bins left in the sun too long.	• Field bins to be collected from blocks within 30 minutes of filling. • Place field bins in shade of tree where possible. • Use bin covers if temperature conditions extreme.	
	All of above quality hazards	Inadequate supervision and monitoring	<u>Monitoring</u> • Supervisors monitor performance of picking crews and cleanliness of harvest aids at least hourly and condition of harvest aid before starting each day. • Complete a packhouse receival assessment as per procedure/ work instruction. Assess bins from all picking crews for fruit maturity, physical damage, sapburn, skin browning, excessive sap, foreign matter. • Ripe fruit quality check – sample packed product and hold until eating ripe and assess for physical injury, sapburn, lenticel spotting and skin browning. Refer to procedure/ work instruction.	Harvesting record Packhouse receival assessment Ripe fruit quality record

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Transport of field bins to packhouse	Physical injury (abrasion, stem punctures, creases)	Poor suspension on bin, trailers runners. Driving too fast on farm roads. Accumulation of dust, causing abrasion. Bins too full.	• Ensure adequate suspension on bin trailers/ runners. • Deliver drivers are trained and instructed to drive at the correct speed to suit road conditions. Bins and fruit on the top of the bin must not "bounce". • Wash bins after every use to remove dust/grit (high pressure hose). Scrub bins with detergent as required to remove sap build-up. • Water down dirt farm roads to prevent dust accumulation in bins. • Place pallet liner in the bottom of each bin just before picking to prevent fruit damage from the bin bottom. • Make sure bins are not too full. • Avoid harvesting during wet weather wherever possible • If rain occurs during harvesting and transport of field bins, ensure bins are packed on same day as harvest. <u>Monitoring</u> • Complete a packhouse receival assessment as per procedure/ work instruction. Assess bins for signs of transport damage	Packhouse receival assessment
	Skin browning, lenticel spotting	Rain occurs during harvesting and transport to packhouse and fruit remains wet for too long.		

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Receival of field bins	Fruit ripen too quickly	Fruit held for too long at ambient conditions before packing and cooling.	Holding periods prior to dumping on packing line • Fruit must be packed within 24 hours of harvest – bins maybe held overnight at ambient conditions but must be dumped for packing the following morning <u>Bin handling</u> • Place bins in covered area immediately on arrival – do not leave bins in direct sun. • Ensure that all bins are correctly identified and bins are stacked so that each separate batch is clearly segregated and easily identified. <u>Monitoring</u> • Record delivery details (delivery date and time, number of bins x batch code, bin number, picking team etc) on delivery record • Receival quality assessment – sample fruit from field bins and assess for maturity, physical damage, sapburn, skin browning, lenticel spotting, foreign matter as per procedure/ work instruction. Report significant quality loss caused by poor harvesting/transport to the harvest/transport supervisor as soon as detected.	Delivery record (maybe computer record) Receival quality assessment
	Sunburn	Field bins left in sun for too long.		
	Fruit not suitable for specific market, due to quality loss during harvesting and transport	Each receival not identified and segregated correctly and wrong batch sent to market/ customer. Quality problems caused by poor harvesting/transport practices not detected by receival assessment.		
	Suspension of registration for access to domestic quarantine markets	ICA procedures not followed for receival inspection.	Refer to Mango ICA protocol for requirements	ICA receival inpsection record

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Dumping onto packing line	Physical damage (cuts, punctures, creases, abrasion)	Rough handling – poor design of bin tipper, drop height too high. Dirty hopper. Excessive level of stems and twigs in bin during harvest.	• Bin tipper design and operation – control flow so that fruit feed out slowly and do not drop from heights above 30cm, and do not remain in wet dumps for longer than 5 minutes. • Cleaning – surfaces that contact the fruit (hoppers etc) must be cleaned at least daily or sooner if build-up of sap and dirt occurs. • Provide instructions to pickers to avoid placing stems, twigs and leaves in field bins • Water in wet dumps is changed at least daily or sooner if build-up of sap and dirt occurs. Sanitiser in the dump may be required for control of food safety hazards. <u>Monitoring</u> • Supervisor checks operation of bin tipper and cleanliness of equipment at least every 3 hours	Cleaning record /checklist
	Skin browning	Build up of sap and dirt in wet dumps.		
	Lenticel spotting	Fruit remains submerged in wet dump for longer than 5 minutes.		
Cleaning/ washing	Skin browning	Build up of sap and dirt in wash water and brushes.	• Do not excessively brush the fruit o Brush sufficiently to remove foreign matter (dust, chemical residues etc) but no more o Brushing "intensity" governed by number of brushes, speed of fruit across the brushes and type of brush. As a general recommendation, use no more than 5 brushes. Test brush performance and cover excess brushes with vinyl if required. Do not brush fruit for longer 30 seconds • Brushes are cleaned at least daily or sooner if build of sap and dirt occurs • Use one water line at the start of brushes, with water run to waste. If the water is recirculated, change the water at least daily or sooner if build up of sap and dirt occurs. Sanitiser may be required to control food safety hazards. A water spray may not be required for wet dumps. <u>Monitoring</u> • Supervisor checks condition and cleanliness of brushes and water at least every 3 hours	Cleaning record /checklist
	Physical injury (cuts, scratches, creases, abrasion) Lenticel spotting	Build up of sap and dirt on brushes Excessive brushing. Incorrect or worn brushes. Sharp edges on equipment. Jamming of fruit in equipment.		

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records

Fungicide treatment	Fruit rots	Ineffective treatment – incorrect dosing/mixing (initial mix and top-up), application, treatment time and temperature.
		Faulty equipment.
			• Information on chemical approval and MRLs is available for all markets/ customers
			• Supervisor checks market destination/ customer for each batch packed and determines whether fungicide treatment is applied
			• Persons responsible for chemical application are trained in chemical use
			• Correct procedures are followed for application, handling, storage and disposal of chemicals – refer to procedure/ work instructions for details
			• Chemical application is recorded on postharvest chemical record
			• Sportak® treatment – non-recirculated spray until fruit are thoroughly covered with treatment solution (at least 15 seconds)
			• Recirculated solutions and dip tanks are topped-up as required and changed at least daily or at the halfway point of packing or sooner if build up of sap, dirt and fungicide occurs
			• Brushes/ rollers are cleaned at least daily or sooner if build of sap and dirt occurs
			• For export orders to markets with strict MRL requirements:
			  ○ preferably to use separate line that diverts around the spray line and next 5 metres of packing line
			  ○ if separate line is not used, equipment must be thoroughly cleaned before batch is processed. ideally process order at start of day
			• Equipment operation is checked prior to start of packing season and daily during packing – particularly check temperature of hot treatments, treatment durations, condition of nozzles, brushes and rollers – complete repairs and maintenance as required. Refer to procedure/ work instruction
				Staff training record
				Postharvest chemical record
				Equipment maintenance record
				Cleaning record/ checklist

	Skin browning	Build up of sap in treatment solution and brushes/ rollers. Blobs of fungicide build-up in treatment solution and stick to fruit. Temperature of treatment solution too high.		
	Physical injury (cuts, scratches, creases, abrasion)	Sharp edges on equipment. Jamming of fruit in equipment. Worn brushes/ rollers.		
	Chemical residues exceed MRL	Fungicide is not approved for use in country where fruit is exported. Equipment not cleaned effectively before export order and residue on equipment contaminates fruit. Incorrect application, handling, storage and disposal of chemicals.		

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records

Fungicide treatment	All quality hazards above	Inadequate supervision and monitoring	Monitoring • Supervisor checks operation and cleanliness of equipment and treatment solution at least every 3 hours, including at each break • Chemical residue test completed at start of packing season	Chemical residue test results

Insecticide treatment	Quarantine pest present – fruit fly	Ineffective treatment – incorrect mixing, application, treatment time Faulty equipment.	As per fungicide treatment Refer to Mango ICA protocol for insecticide treatment requirements	Staff training record Postharvest chemical record Equipment maintenance record Chemical residue test results Cleaning record /checklist
	Skin browning	Build up of sap in treatment solution and brushes/ rollers.		
	Physical injury (cuts, scratches, creases, abrasion)	Sharp edges on equipment. Jamming of fruit in equipment. Worn brushes/ rollers.		
	Chemical residues exceed MRL	Insecticide is not approved for use in country where fruit is exported. Equipment not cleaned effectively before export order and residue on equipment contaminates fruit. Incorrect application, handling, storage and disposal of chemicals.		
	Suspension of registration for access to domestic quarantine markets	ICA procedures not followed.		
Drying	Skin browning	Ineffective drying and fruit remains wet when packed Build up of sap and dirt on rollers	• Rollers are cleaned at least daily or sooner if build-up of sap and dirt occurs Monitoring • Supervisor checks operation of equipment at least every 3 hours	Equipment maintenance record Cleaning record /checklist
	Physical injury (cuts, scratches, creases, abrasion)	Sharp edges on equipment Jamming of fruit in equipment Worn rollers		

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Polishing	Skin browning	Build up of sap and dirt on brushes	• Replace brushes when wearing first appears or if brushes	Equipment

	Physical injury (cuts, scratches, creases, abrasion) Lenticel spotting	Sharp edges on equipment Jamming of fruit in equipment Excessive brushing Incorrect or worn brushes	become stiff and are unable to be cleaned properly • Do not brush fruit for longer than 30 seconds • Brushes are cleaned at least daily or sooner if build of sap and dirt occurs <u>Monitoring</u> • Supervisor checks condition and cleanliness of brushes at least every 3 hours	maintenance record Cleaning record /checklist

Quality sorting	Product quality does not meet customer specification	Specifications not clearly defined Untrained or tired staff Poor instructions to staff Fruit flow too fast Poor equipment design – insufficient lightning, sorting area too large etc Faulty equipment	• Specifications are clearly defined and agreed with customers – refer to product specifications • Staff are thoroughly trained in product specifications –see training procedure for details • Supervisor provides clear instructions to sorting staff for each batch/order • Plan work periods and breaks to avoid staff becoming too tired • Equipment operation is checked prior to start of packing season and daily during packing – particularly check fruit flow, lighting and potential injury points – complete repairs and maintenance as required • Rollers are cleaned at least daily or sooner if build of sap and dirt occurs <u>Monitoring</u> • Supervisor checks operation and cleanliness of equipment and staff alertness at least every hour • Monitor fruit quality of packed product as per procedure/ work instruction and report to supervisor if out of spec • Monitor fruit quality in reject bin as per procedure/ work instruction and report to supervisor if out of spec	Staff training record Packed product monitoring record Reject bin analysis record Equipment maintenance record Cleaning record /checklist
	Skin browning	Build up of sap and dirt on rollers		
	Physical injury (cuts, scratches, creases, abrasion)	Sharp edges on equipment Jamming of fruit in equipment		

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Size grading	Incorrect sizing	Faulty equipment operation/ calibration Fruit flow too fast.	• Equipment operation is checked prior to start of packing season and daily during packing – particularly check equipment calibration, fruit flow and condition of singulator and cups – complete repairs and maintenance as required • Singulator and cups are cleaned at least daily or sooner if build of sap and dirt occurs <u>Monitoring</u> • Supervisor checks operation and cleanliness of equipment at least every hour • Monitor fruit quality of packed product as per procedure/ work instruction and report to supervisor if out of spec.	Packed product monitoring record Equipment maintenance record Cleaning record /checklist
	Skin browning	Build up of sap and dirt on singulator and cups		
	Physical injury (cuts, scratches, creases, abrasion)	Sharp edges on equipment Jamming of fruit in equipment		

Packing	Product quality, presentation (fruit orientation, stickers, socks etc), labelling does not meet customer specification	Specifications not clearly defined Poor instructions to staff Untrained or tired staff Fruit flow too fast Poor equipment design – insufficient lightning, packing bins too large etc Faulty equipment operation Wrong package brand used	• Specifications are clearly defined and agreed with customers – refer to product specifications • Staff are thoroughly trained in product specifications –see training procedure for details • Supervisor provides clear instructions to packing staff for each batch/ order • Plan work periods and breaks to avoid staff becoming too tired • Packages are designed with sufficient strength for supply chain handling conditions and market/ customer requirements – refer to package specifications for manufacturer • Equipment operation is checked prior to start of packing season and daily during packing – particularly check fruit flow, lighting and potential injury points – complete repairs and maintenance as required • Packing bins and conveyors are cleaned at least daily or sooner if build-up of sap and dirt occurs <u>Monitoring</u> • Supervisor checks operation and cleanliness of equipment and staff alertness at least every hour • Monitor quality, presentation and labelling of packed product as per procedure/ work instruction • Monitor fruit quality in reject bin as per procedure/ work instruction	Staff training record Packing/ packing record (maybe be computerised) Packed product monitoring record Reject bin analysis record Equipment maintenance record Cleaning record /checklist
	Skin browning	Build up of sap and dirt on conveyors and packing bins		
	Physical injury (cuts, scratches, creases, abrasion, bruising)	Sharp edges on equipment Jamming of fruit in equipment Loose packing Insufficient package strength		
	Product identification and traceability lost	Incorrect package labelling and record-keeping		

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Palletising	Physical injury (abrasion, bruising)	Packages incorrectly stacked – misaligned, pattern incorrect, too high Packages not properly secured on pallet – untrained staff, faulty equipment etc Packages damaged from rough handling	• Staff are thoroughly trained in palletising requirements –see procedure/ work instruction for details • Supervisor provides clear instructions to staff for each batch/ order • Plan work periods and breaks to avoid staff becoming too tired • Equipment operation is checked prior to start of packing season and daily during packing – complete repairs and maintenance as required • Place incomplete pallets into pre-cooling room if held overnight or for longer periods <u>Monitoring</u> • Supervisor checks palletising operation at least every hour	Packing/ palletising record (maybe computerised) Equipment maintenance record
	Fruit ripen too quickly (premature)	Incomplete pallets left at ambient temperature for more than 12 hours		
	Product identification and traceability lost	Incorrect pallet labelling and record keeping Poor instructions to staff – wrong packages stacked on pallet		
Pre-cooling	Fruit ripen too quickly (premature)	Delay before pre-cooling is excessive. Pre-cooling not done correctly • room cooling used instead of forced-air cooling • excessive air leakage around pallets on forced-air cooler from incorrect placement of pallets and tarpaulin Poor maintenance of cool rooms	• Check operation of cool rooms prior to start of packing and carry out repairs and maintenance as required • Pre-cool to 12°C within 36 hours of harvest for domestic market • Precool to 12°C within 24 hours of harvest for export market • Use a forced-air system to pre-cool fruit • Ensure that pallets are placed in correct position and tarpaulin is placed correctly over the rows of pallets • Record pallet numbers/ID and cooling times on handling log <u>Monitoring</u> • Check forced air cooling performance: o Monitor when pre-cooling a full load of fruit o Place temperature loggers in fruit on the inside of the corridor (these will take the longest to cool down), at the front, middle and rear of the row. o Use loggers that monitor both pulp and air temperature o Set loggers to record 15 minutes o Adjust air temperature/forced air cooling fan speed to ensure cooling to set temperature within 12 hours o Repeat several times at the start of the season to ensure effective pre-cooling performance.	Handling log Record of forced-air cooler performance

Process	Potential hazard	Cause	Control measures/ Good agricultural practices	Records
Precooling	Lenticel spotting Excessive weight loss	Excessive airflow over the fruit, or forced air cooling for too long.	• Do not forced-air cool for longer than 12 hours. • Ensure airflow over the fruit is no more than required to bring fruit to storage temperature within 12 hours. • Maintain air humidity above 85%	
Holding/ storage before dispatch	Premature ripening Loss of saleable life – lenticel spotting, fruit rots, greater expression of physical damage	Excess holding in storage room Holding temperature too high – above 14°C Inadequate air circulation due to poor cool room design or stacking pallets too close.	Domestic: • For three or more days transit to market, hold at 12°C for no more than two days • For 1-2 days transit to market, hold at 12°C for no more than four days Export: • Hold all fruit at 12°C for no more than one day Pallet stacking • Place pallets with a gap of at least 5cm around all sides	Handling log
	Skin greying	Holding temperature too low – below 10°C		
Loading transport vehicle	Physical injury	Carton collapse, excessive vibration.	• Handle pallets carefully and avoid dropping of pallets. • Secure pallets in the truck to prevent load movement. • Use airbag suspension. • Maintain the cold chain (see above) to prevent condensation on cartons.	Dispatch advice Transport consignment docket
	Fruit ripens too quickly (premature)	Inadequate facility for loading vehicle Excessive delays during loading	• Design loading bay to enable loading directly from storage room • Truck pre-cooled to transport temperature before loading. • Load truck quickly to prevent temperature increase.	
Transport to ripening facility/ export dispatch point	Fruit ripens too quickly (premature)	Poor temperature control	Domestic market • For two or more days transit from the packhouse, transport at 12°C. • For 1-2 days transit, transport at 12-16°C for ripening at domestic destination within 3 days of arrival or at 12°C if fruit stored for more than 3 days before ripening Export • Transport at 12°C <u>Monitoring</u> ○ Include temperature loggers to confirm temperature management practices for loads to all destinations and different transport modes. Refer to procedure/ work instruction.	Dispatch advice Transport consignment docket Temperature monitoring profiles

Links

APVMA – Public Chemical Registration System

http://services.apvma.gov.au/PubcrisWebClient/welcome.do

APVMA Permits

http://www.apvma.gov.au/permits/search.php

Horticulture Publications – DAFWA

http://www.agric.wa.gov.au/PC_91713.html?s=505199810

Mango Information Kit

http://era.deedi.qld.gov.au/1647/

NT Primary Industries Agnotes and Fact sheets

http://www.nt.gov.au/d/Primary_Industry/index.cfm?Header=Agnotes%20and%20Factsheets

Primary Industries Publications – NT DoR

http://www.nt.gov.au/d/publications/

Coming Events

Mangoes:

1. **Workshop - Controlling termites in perennial horticultural crops – 4th August 10.00 am – 1.00pm.**
   Nick & Leo Skliros's Farm 545 Hopewell Rd Berry Springs.
   RSVP to Jacqui Peckham - 08 8999 2292

2. NT Mango Advisory Panel meeting
   9.00am – 1.00pm, 23rd August,
   Berrimah Research Farm.

3. Formation of Mango industry small group networks (Darwin and Katherine), February 2012.

4. Annual mango pre & post-harvest disease management workshops. Darwin & Katherine February - March 2012.

5. Annual 'Superior mango root-stocks' farm walks – April 2012.

6. Irrigation best-practice water use and nutrient efficiency workshops for NT mangoes. Darwin & Katherine – dates & venues to be advised

Asian vegetables:

IPM & disease management in vegetables - snake beans, okra, bitter melon and cucumber. September - October 2011.

Bananas:
On-farm workshop – Fusarium resistant variety selection for evaluation from overseas programs. November 2011.

Passion fruit:
Selection of superior rootstocks – farm walk at Berrimah Research Farm, followed by an industry development meeting with Passionfruit stakeholders.
August –September 2011 (date to be advised in near future).

Papaya:
Industry developmental workshop.

August – September 2011
Dates & venue to be advised

Fodder industry:

Fodder industry extension workshops

Workshops at 4 x locations:
- Barkly
- Katherine
- Douglas-Daly
- Darwin

Dates to be advised in 2012