

A Manual for Exporting of Fresh Fruits to the United States



National Bureau of Agricultural Commodity and Food Standards
Ministry of Agriculture and Cooperatives



A Manual for Exporting of Fresh Fruits to the United States

National Bureau of Agricultural Commodity and
Food Standards (ACFS)

Ministry of Agriculture and Cooperatives

A Manual for Exporting of Fresh Fruits to the United States

ISBN 978-974-403-461-8

National Bureau of Agricultural Commodity and Food Standards
Ministry of Agriculture and Cooperatives

©Copyright by ACFS

Preface

It has been more than 3 years that several agencies involved in Ministry of Agriculture and Cooperatives (MOAC) and Ministry of Science and Technology under the Royal Government of Thailand has negotiated for market access of fresh Thai fruits with the United States Department of Agriculture. The negotiation concluded in the year 2007 with a huge success for market access of six Thai fruits; namely, longan, lychee, mango, mangosteen, pineapple and rambutan.

A manual for exporting of Fresh Fruits to the United States was outlined in early March 2007 and finished in the end of June 2007, which was in time that the United States notified the Final Rule allowing the importation of six fresh fruits from Thailand. AFCS truly wishes that the manual would capture all essences and be of the most benefits for all stakeholders either public or private agencies through the exporting processes (e.g. farmers, GAP inspectors, treatment facility, exporters).

To the success of this publication, ACFS would like to made a dedication and convey sincere appreciation to Mr. Prakarn virakul, former Advisor to ACFS. This is for all his endeavors not only to support MOAC delegations from the beginning and through negotiation process but also to dedicate his valuable time to edit this manual with ACFS staff.

Division of Agricultural Commodity and Food Standards
National Bureau of Agricultural Commodity and Food Standards

July 2007



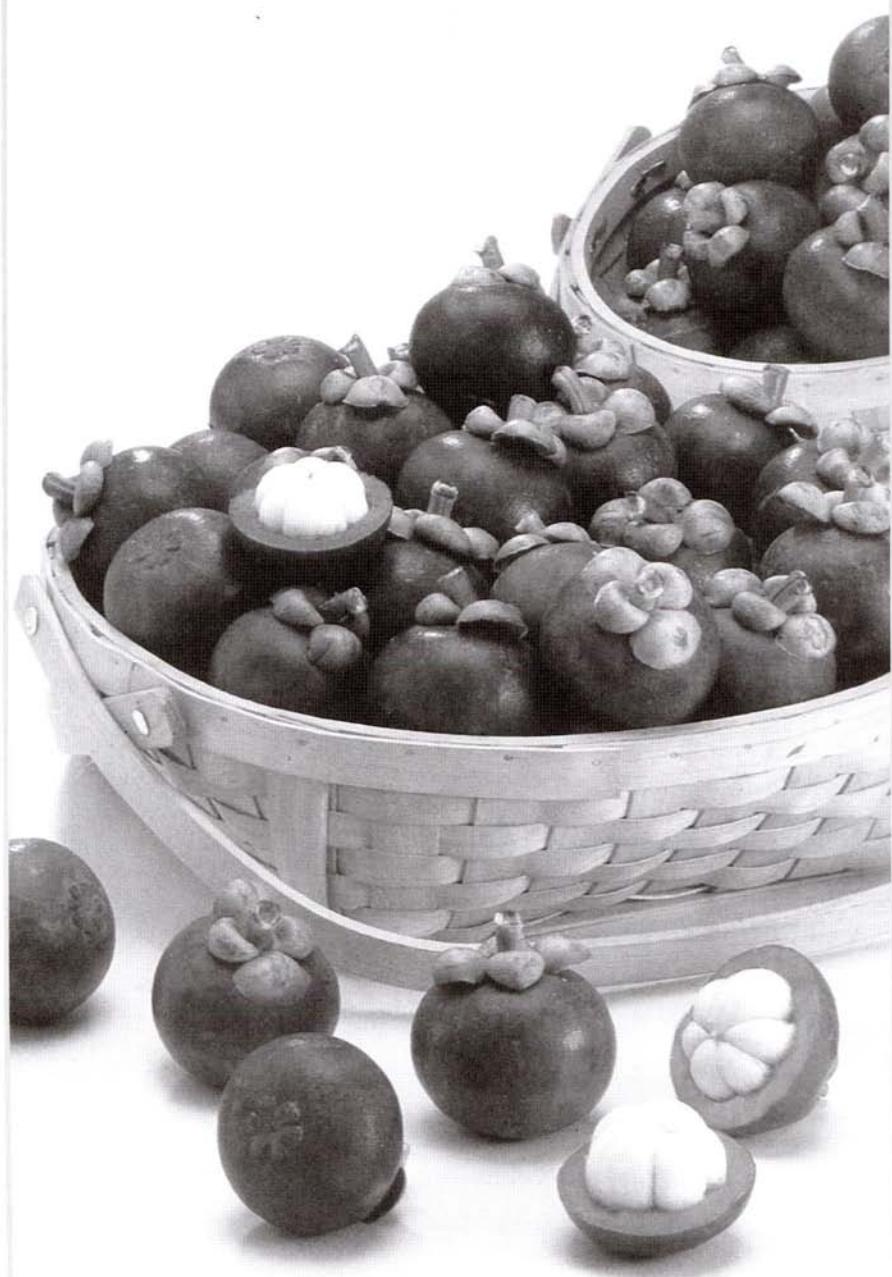


Index

	Page
Guidelines for the Stakeholders in Exporting of Fresh Fruits to the United States	7
● Guidelines for the Growers/Producers	7
● Guidelines for the Exporters/Packing House	9
● Guidelines for the Public Organization	16
● Department of Agriculture (DOA)	16
● National Bureau of Agricultural Commodity and Food Standard (ACFS)	23
● Thailand Institute of Nuclear Technology (TINT) and National Plant Protection Organization (NPPO or DOA)	25
● The Documents for Exporting Irradiated Fruits	26

ANNEXES

Annex 1	Data entry table for the grower	28
Annex 2	Production Unit Code	32
Annex 3	Harvesting Season	36
Annex 4	Maximum Residue Limit	37
Annex 5	GMP Standards for the Packing House	47
Annex 6	Guidelines for the Use of Irradiation as a Phytosanitary Measures	53
Annex 7	Checklist for Facility Approval	73
Annex 8	Passion of Thai Fruits	81





Guidelines for the Stakeholders in Exporting of Fresh Fruits to the United States

1. Guideline for the Growers/Producers

1.1 Recording of orchard information.

- 1.1.1 Name and address of the orchard (for verifying the code of orchard)
- 1.1.2 Plantation plan of each orchard
- 1.1.3 Producing area, harvested area and production yield
- 1.1.4 Time for harvesting each fruit both in season and out season
- 1.1.5 Record of the data when using the pesticide
- 1.1.6 Record of the management and control of fruit fly to low pest prevalence level (e.g. trapping, wrapping etc.)

1.2 Registering as GAP orchard with the Department of Agriculture (DOA) 90 days before the exporting season commences.

- 1.3 Having contact with any exporters/Packing House
- 1.4 Harvesting fruits at the appropriate stage for irradiation
- 1.5 Growing in the production unit certified by DOA
- 1.6 Studying the annexes 1-5

Precaution

1. APHIS officer may, from time to time, inspect production area which have been certified by DOA and review record of orchard information.
2. Certified production unit should apply fruit fly management control in order to maintain low post prevalence area.

2. Guidelines for the Exporters/Packing House

- 2.1 Registering and being notified by DOA as GMP packing house (for further detail please see the Annex 2)
- 2.2 Notifying the list of exporters and packing house to the DOA. Then, DOA will issue the permanent Packing House Code (PHC).
- 2.3 Notifying DOA and APHIS of the commence date of exporting season.
- 2.4 Accepting only produces originating from designated production areas registered with DOA. These areas will be periodically monitored by APHIS.
- 2.5 Applying pest management control in the packing house
- 2.6 Applying systematic approach that separate non-program from program articles. Non-program articles should be sent out of the packing house on a daily basis.
- 2.7 Packing the produces in the insect-proofed cartons before sending to the treatment facility.
- 2.8 Covering the ventilation hole with screening at a minimum of 30 mesh per linear inch.



- 
- 2.9 Sampling and inspecting the box for certainty that the produces are free from pest and chemical residues.
 - 2.10 Applying a sticker providing the detailed information of lot, PUC and PHC for the purpose of traceability.
 - 2.11 Keeping the record of each lot.
 - 2.12 Having Standard Operating Procedures (SOPs) covering operational, inspection and managerial procedures within the packing house.

Transportation to the Treatment Facility

The packing house has to fill out a form requesting for irradiation treatment and send to the treatment facility by facsimile. Then, the facility will arrange the schedule and inform all exporters and packing houses. If your request is granted in morning session, the loading time at the treatment facility is between 8.00-9.00 am. The produces should be accompanied with document providing information of

- (1) Type of commodity
- (2) Amount of box
- (3) Box's weight
- (4) Total weight of Cargo
- (5) Name of the Packing House
- (6) Production Unit Code and the signature of APHIS Officer or Department of Agriculture official.

Sticker for the Packing House

Fruit variety : e.g. Mango

Orchard numbers : XXGRXXX

Packinghouse number : PHXXX

Date of Packing / Lot Number : M-D-Y / XXGRXXX

Produce of Thailand

XX refers to province code e.g. 04 = Lamphoon

GRXXX refers to Production Unit Code in province XX

PHXXX refers to Packing House Code





Carton

Cartons which was irradiated must have the information as follows;

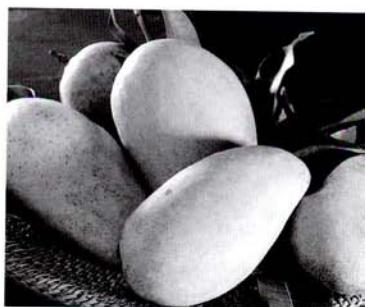
- Production Unit Code : PUC
- Packing House Code : PHC
- Date of Packing
- Treatment Facility Code : TFC
 - (Treatment Identification Number: TIN)
 - Date of Treatment
- Radura symbol and phrase identified “Treated by Irradiation” or “Treated with radiation”.

Remarks

1. *The above mentioned information must be identified on the box before sending out from the Packing House.*
2. *On 4 April 2007, FDA notified the propose rule reviewing the requirement for irradiation labeling. It may consider applying irradiation label only with the irradiated produces that have significant physical changes (i.e. smell, color, taste, nutritional and purpose of use).*

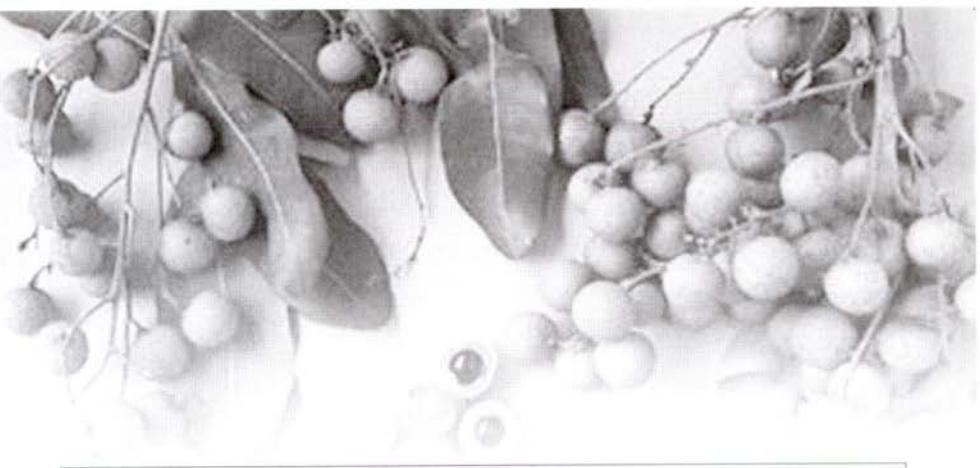
Wax coating

After harvesting, the article will be cleaned to eliminate dust clay and pest. However, this method of cleaning may destroy the natural wax of fruits. Therefore, waxing is necessary to maintain moisture of the fruit and stop fungi growing. The waxing; however, must be in compliance with USFDA regulation on Food Additive: Generally Recognized as Safe (GRAS) which requires the labeling with "Coated with food-grade vegetable-, petroleum-, beeswax-, or shellac- based wax or resin, to maintain freshness."



Precaution

- 1. Breaching the agreement.** If the Packing House violates the agreement by shipping the non-program articles, the punishment to the first violation is the Packing House will be no more than 30 days suspended for exporting fruits to the United States. The repeat of violation will lead to suspension to the rest of the season. Constant violations will reflect on the suspension for at least 5 years.



2. **Inspection of Live Plant Pest at Port of Entry (e.g. Los Angeles)** According to CFR 319.56-6, APHIS has the authority to sampling the shipment at the port of entry although the preclearance has been done at the exporting country.
3. **Live Non-Target Quarantine Pest** Finding of live non-target quarantine pest will effect the Packing House as following

The First finding, the Packing House and/or the grower will either temporarily be suspended from shipping their produces to the US for not less than 14 days or until full investigation is completed. Also, the Packing House should have appropriate cautionary measures to the level of APHIS satisfactory.

The Second finding, the Packing House will be suspended for the rest of the exporting season. Furthermore, APHIS will also review and re-certify the packing house.

4. Outcomes of finding live plant pest in each lot from each orchard at the treatment facility

Pest	Type of pest	Pest found	Outcomes
Quarantine Pest	1. Tephritisid	1 or over	rejected
	2. Internal Lepidoptera	1	certified
		2 or more	Rejected
	3. Other Internal Pest (not 1 or 2)	1 or more	certified if more than 1 insect, must notify APHIS
	4. Target External Pest	1 or more	certified if more than 1 insect, must notify APHIS
Non-quarantine pest	Adults and Pupae Pest of Lepidoptera, plant patholog, snail or mite	1 or more	rejected

RESPONSIBILITIES OF THE PARTICIPATING ORGANIZATIONS



3. Guidelines for the Public Organization

3.1 Department of Agriculture (DOA)

3.1.1 Management at orchard level

- (1) To certify production areas and assign Production Unit Code: PUC
- (2) To submit a master list of certified production areas by region to APHIS 30 days before the season starts.
- (3) To ensure that the areas designated for the production of export articles will utilize pest management control measures to maintain low population levels of target pests.
- (4) To notify APHIS of outbreaks of target and non-target quarantine pests.

3.1.2 Management at packing house level

- (1) To register and certify GMP for packing houses and assign Packing House Code: PHC.
- (2) To verify that registered packinghouses receive fruit for the Program from approved orchards only.
- (3) To monitor that the fruits are packed in insect-proofed cartons and be segregated from non-program articles.

3.1.3 Management at the treatment facility level

Receiving the articles

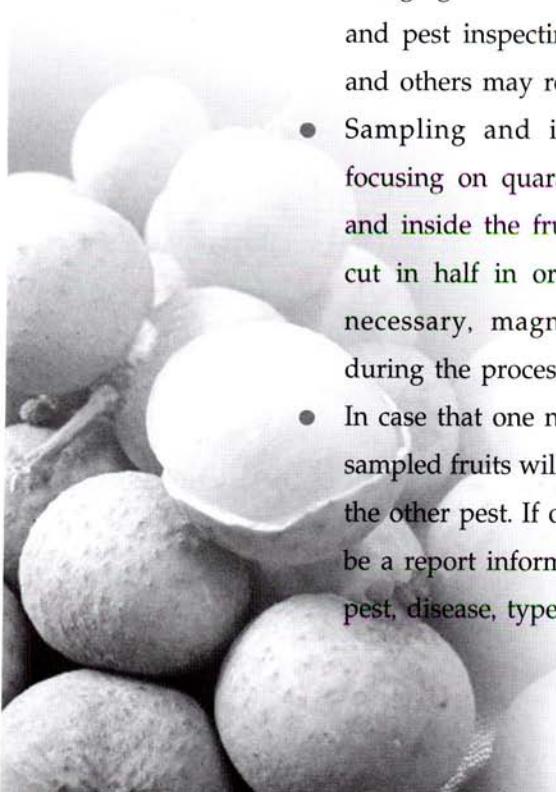
- In case that the fruits cannot be irradiated within 24 hours, it should be stored in the Cold Storage.
 - The non-program articles must not be irradiated.
 - Irradiated fruits must be segregated from the non irradiated fruits by wall or fence.
- (1) To examine that all pallet have the net which can prevent the pests, have the label identified “Treated by Irradiation” or “Treated with Radiation” and have PUC identified. If it is wooden pallet, it must be in comply with ISPM No. 15--Guidelines for Regulating Wood Packaging Material in International Trade 2002.
- In case of air freight sending the commodity through the LD-3 air cargo container, it is not necessary for exporters have to tie the pallet. The container must be sealed with DOA emblem or APHIS and the number should be record in PPQ 203.
- (2) To examine that conveyance be cleaned before storing the commodity in the conveyance.

Transportation and loading

- Container must be inspected and free from pest and dirt prior to transportation.
 - If pest is found, the container must be fumigated prior to transportation.
 - Container must be tightly sealed or fit to the receiving portal when loading. This is to prevent the entering of the pest.
 - DOA issues the phytosanitary certificate with DOA and APHIS emblem far accompanying the container.
- (3) To inform the concerned organization that all the sealed containers must not be broken to prevent the entering of the pest.

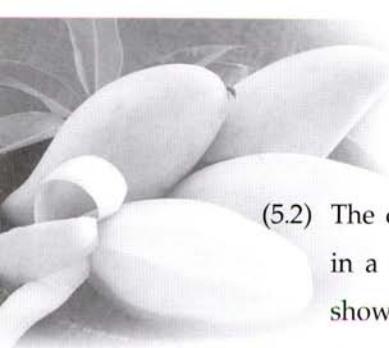
(In Transit)

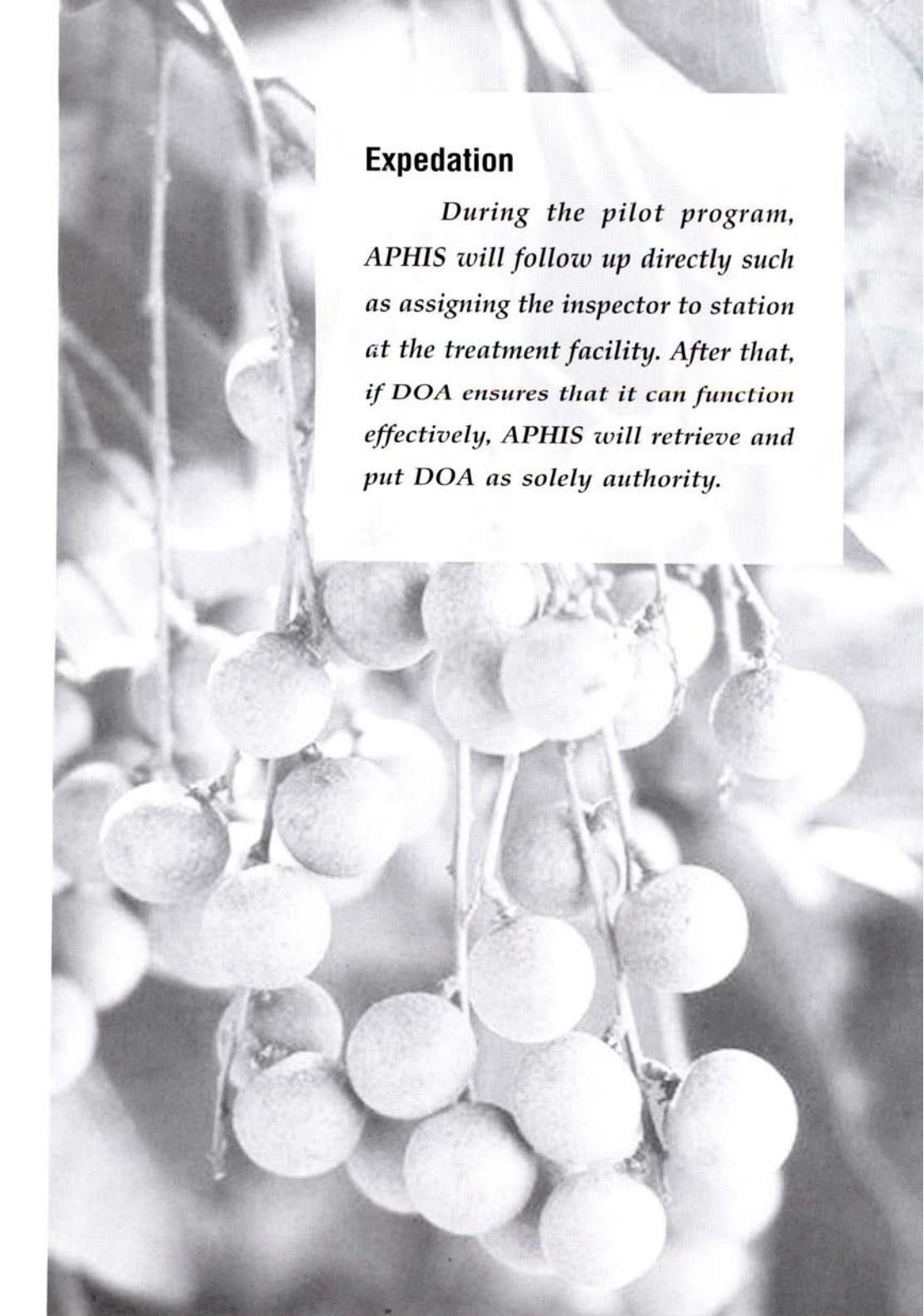
- The container will not be opened while transiting the commodity.
- Only an authorized officer of APHIS can open the container.
- In case where seal is broken, notify APHIS of circumstances and new seal number.
- If the container car has an accident or mechanical problems while shipping the commodity, it is the cooperator's duty to inform DOA and APHIS and must request for the new container car to transport the articles.

- 
- (4) DOA officers working at the facility must pass the training on irradiation treatment and the safety during irradiation treatment.
 - (5) To follow up and take sampling articles for exporting as follows:

5.1 Working with the APHIS officer in inspecting articles to be treated. This is to be certain that each lot is from the same production unit. The sampling is at the amount of 100 fruits from at least 5 boxes then sampling the 30 fruits to inspect the Internal Feeders before **irradiation treatment**.

- In case that the container carrying fruits from two production units or more, the packing house has to segregate each lot/production unit for sampling and pest inspecting. Finding of quarantine pests and others may result in rejection to irradiation.
- Sampling and inspecting are conducted by focusing on quarantine target pest both outside and inside the fruits. The sampled fruits will be cut in half in order inspect the Larvae and, if necessary, magnifying glasses may be used during the process.
- In case that one non target pest is found, the 100 sampled fruits will be thoroughly inspected to find the other pest. If other pest is found, there should be a report informing the detailed information of pest, disease, type and amount found.

- 
- (5.2) The detailed inspection in each lot must be recorded in a ledger with PHC identified. Below are the data shown in the ledger.
- i. Name and identification number of the inspector.
 - ii. Place of origin of the article.
 - iii. Production Unit Code-PUC and Packing House Code-PHC.
 - iv. Number of boxes and weight.
 - v. Phytosanitary Certificate number identifying the production area and orchard according to the requirements.
 - vi. Name and identification number of the inspector or accredited individual signing the Phytosanitary Certificate.
 - vii. Genus, species, and variety of the article sampled.
 - viii. Inspection results:
 - a. Any pests or diseases detected.
 - b. In the case of non-target quarantine pest presence, the number of infested articles detected.
 - c. Inform APHIS inspector for acknowledgement.
- (5.3) Conducting an investigation and regulatory correction measures for packing house or orchard. That is constant non-compliance. Also, keeping record and informing APHIS inspector.



Expedation

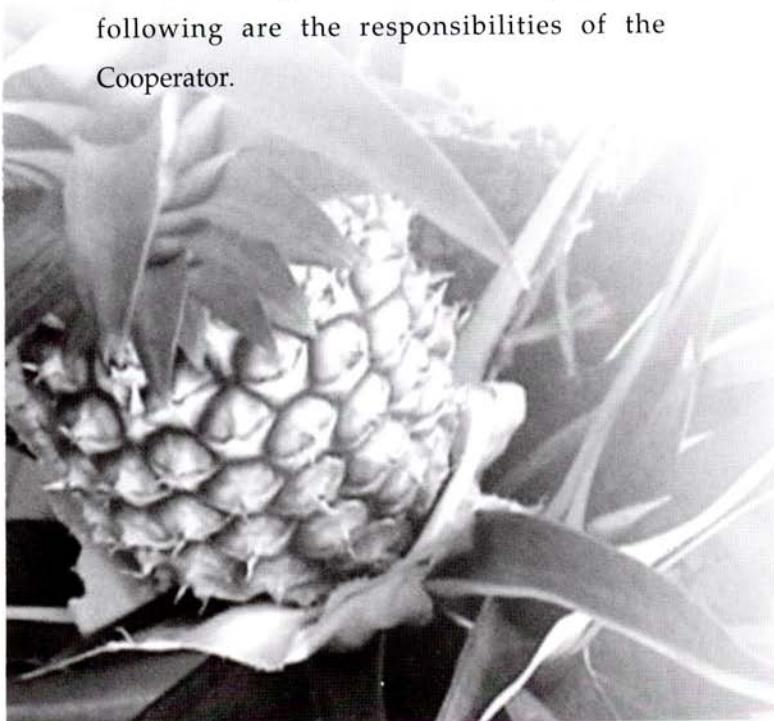
During the pilot program, APHIS will follow up directly such as assigning the inspector to station at the treatment facility. After that, if DOA ensures that it can function effectively, APHIS will retrieve and put DOA as solely authority.

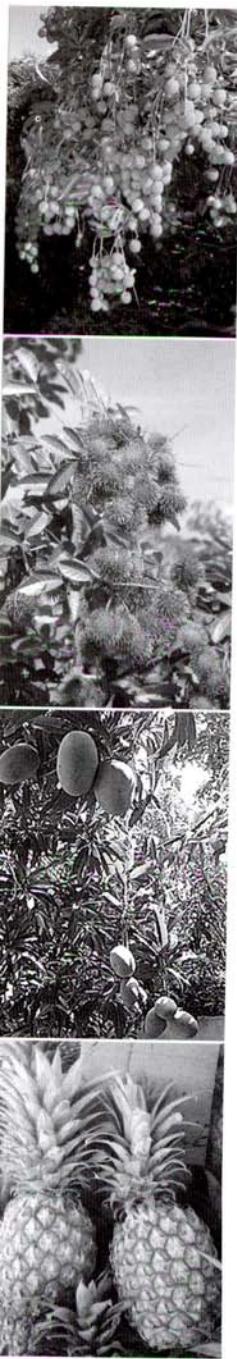
Precaution

1. Expected problems during program running are bringing the articles from non-GAP orchard, storing non-irradiated with irradiated articles within the same storage and exporting non-irradiated articles.
 - First violation, articles and treatment facility are rejected and cancelled radiation services from that facility for the period of 60 days.
 - Second violation within 1 year, articles and treatment facility are rejected and cancelled to the rest of the exporting season.
 - Treatment facility must inform the violations to DOA.
2. Non-compliance treatment
 - First violation, the non-compliance lot will be rejected and a letter of notice will be sent to treatment facility with a copy forwarded to a cooperator.
 - Second violation within 1 year, the non-compliance lot will be rejected and treatment facility will be cancelled its radiation services until the end of the exporting seasons. Furthermore, the facility certification could be revoked and omitted from the program for at least 60 days, if necessary. The facility could run the service again if DOA and APHIS have investigated and found the result satisfactory. If the problem persists, the certification must be revoked.

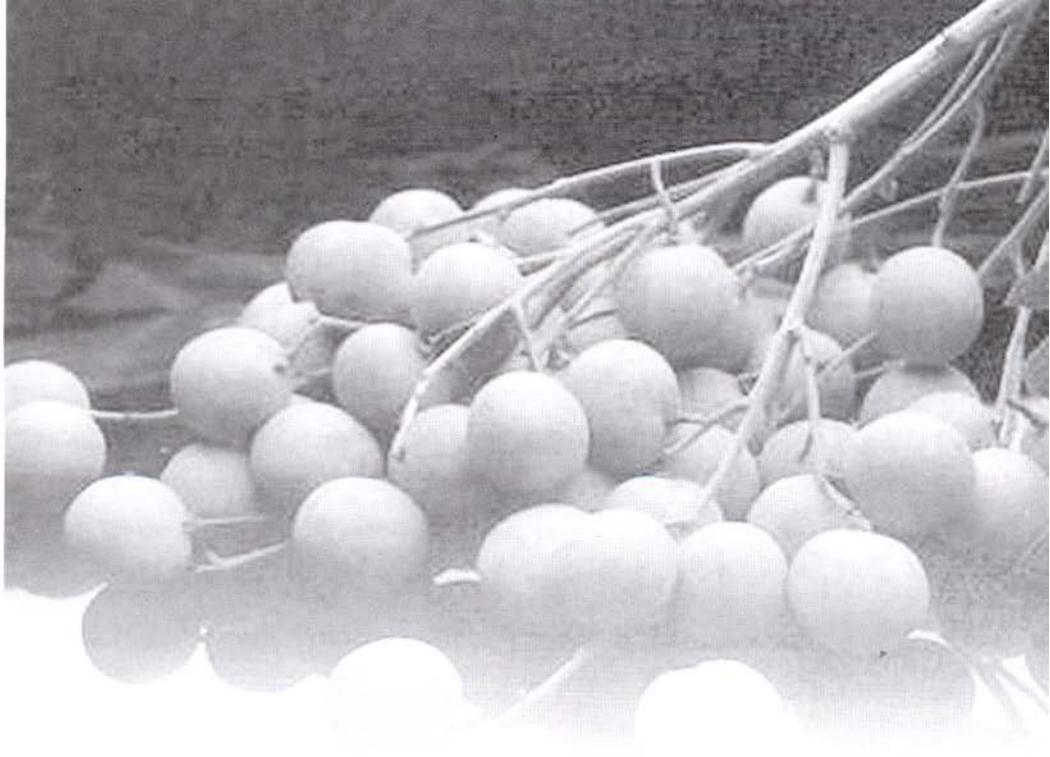
3.2 National Bureau of Agricultural Commodity and Food Standard (ACFS)

Generally, the Cooperator means the official organization consisting of the exporters, the packing house and the facility treatment. The Cooperator will be a representative signing the Cooperative Service Agreement and the Trust Fund agreement with APHIS. The latter agreement is to deposit the money as expenditure for APHIS inspector stationed in Thailand during the Preclearance Program. The following are the responsibilities of the Cooperator.





- (1) To submit an official request for participation to DOA identifying all registered participants in the Program.
- (2) To notify DOA and APHIS IS Program Manager of the proposed date for the start of the export season
- (3) To provide, in advance, funding for all costs necessary to support APHIS activities. These include, but are not limited to, APHIS administrative costs, APHIS Officer costs, The Center for Plant Health Science and Technology (CPHST) administrative and facilities approval cost, periodic audits, cost for supplies and equipment necessary to execute and supervise the Program, and other services associated with the Program.
- (4) To request APHIS/NPPO services for treatment facilities that have met the requirements of the Work Plan and the Cooperative Agreement.
- (5) To provide the DOA lists of candidate production areas for certification 60 days before the season starts.
- (6) To notify DOA and APHIS with relevant information related to phytosanitary problems associated with the Program.
- (7) To propose DOA and APHIS of packing house and treatment facility list 30 days prior to the commencing date and at least 3 days prior to cancellation.
- (8) To provide transportation for APHIS officers.



3.3 Thailand Institute of Nuclear Technology (TINT) and National Plant Protection Organization (NPPO or DOA)

TINT and NPPO/DOA are responsible for performing in accordance with guidelines and requirements regarding the use of irradiation as a phytosanitary measure.



The Documents for Exporting Irradiated Fruits

1. Phytosanitary Certificate issued by the NPPO accompanying each and every shipment.
2. PPQ 203 (Foreign Site Certificate of Inspection and or/treatment) especially, filling in item 11 with the number of Irradiation Processor's Certificate of Treatment (TFC) and treatment Identification Number (TIN) issued by APHIS.
3. Import Permit
4. Importer
 - Having Import Permit which is certified for not less than 30 days before first shipment to the port of entry.
 - Being responsible for result of port of entry inspection according to 7 CER 319.56.6

PPQ Form 203

(Foreign Site Certificate of Inspection and/or Treatment)

U.S. DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE FOREIGN SITE CERTIFICATE OF INSPECTION AND/OR TREATMENT		1. CERTIFICATE NO.	2. COUNTRY OF ORIGIN
		3. DATE LOADED	4. FOREIGN PORT OF EXPORT
5. CARRIER IDENTIFICATION		6. U.S. PORT OF ENTRY	
7. SHIPPER (Name & Address)		8. CONSIGNEE (Name & Address = Include Zip Code)	
9. COMMODITY		10. NO. CONTAINERS (Identify as box, sack, 1/2 Bruce box, flat, cardboard box, etc.)	11. CONTAINER IDENTIFICATION MARKS
12. LOCATION OF INSPECTION AND/OR TREATMENT		13. DATE	
This certifies that the shipment described above has been inspected and/or treated in accordance with agricultural requirements for entry into the United States.			
14. SIGNATURE OF PLANT PROTECTION AND QUARANTINE OFFICER		15. DATE ISSUED	
PPQ FORM 203 (AUG 78)			

Data entry table for the grower

Annex 1

(1)

Orchard History (production year.....)

Name.....Address.....Subdistrict.....District.....Province.....Code.....

(2)

Data entry : Orchard Management (*identify name and type of the fruit*)
Plantation No. Plantation area..... Rai Pesticide utilization

D/M/Y	Name of Pesticides	Quantity Used	Target Pest

(3)

Data entry : Orchard Management (*identify name and type of the fruit*)

Plantation No. Plantation area.....Rai Trapping

Note Identify pest and counting on a daily or weekly basis

(4)

Fruit transportation

D/M/Y	Quantity (Kg.)	Exporter/Packing House Operator	Packing House Code : PHC

Production Unit Code separated by type and harvesting

Code	Province	01 Lychee	02 Longan	03 Mango	04 Mangosteen	05 Rambutan	06 Pineapple
North-East							
1	Nakhon Phanom			●			
2	Sakon Nakhon			●		●	
3	Nong Khai	●	●	●		●	
4	Udon Thani	●	●	●			
5	Nong Bua Lamphu		●	●			
6	Loei	●	●	●			
7	Mukdahan			●		●	
8	Yasothon		●	●			
9	Ubon Ratchathani		●	●			
10	Amnat Charoen			●			
11	Kalasin			●			
12	Khon Kaen			●			
13	Maha Sarakham			●			
14	Roi Et			●			
15	Buri Ram			●			
16	Si Sa Ket		●	●			
17	Surin			●			
18	Chaiyaphum	●	●	●			
19	Nakhon Ratchasima	●	●	●			

Code	Province	01	02	03	04	05	06
		Lychee	Longan	Mango	Mangosteen	Rambutan	Pineapple
North							
20	Nakhon Sawan				●		
21	Phetchabun	●			●		
22	Uthai Thani			●			●
23	Kamphaeng Phet		●	●			●
24	Tak	●	●	●			
25	Phichit			●			
26	Phitsanulok		●	●			●
27	Nan		●	●			
28	Phrae		●	●			
29	Lampang	●	●	●			●
30	Sukhothai		●	●			
31	Uttaradit		●	●			●
32	Chiang Mai	●	●	●			
33	Chiang Rai	●	●	●			
34	Mae Hong Son	●	●	●			
35	Lamphun	●	●	●			
36	Phayao	●	●	●			



Code	Province	01	02	03	04	05	06
		Lychee	Longan	Mango	Mangosteen	Rambutan	Pineapple
Central							
37	Lop Buri			●			
38	Saraburi			●			
39	Chai Nat			●			
40	Nakhon Nayok			●			
41	Nakhon Pathom	●		●			
42	Nontahburi			●			
43	Pathum Thani			●			
44	Ayutthaya			●			
45	Sing Buri			●			●
46	Suphan Buri	●		●			
47	Ang Thong			●			
48	Bangkok			●			
49	Kanchanaburi	●		●		●	●
50	Prachuap Khiri Khan			●		●	●
51	Phetcahburi			●			●
52	Ratchaburi	●		●			●
53	Chachoengsao			●			
54	Prachin Buri	●		●	●	●	
55	Sa Kaeo		●	●			
56	Samut Prakan			●			
57	Samut Sakhon		●	●			
58	Samut Songkhram	●		●			
59	Chon Buri			●	●	●	●
60	Rayong			●		●	●
61	Chanthaburi		●	●	●	●	●
62	Trat			●	●	●	●

Code	Province	01	02	03	04	05	06
		Lychee	Longan	Mango	Mangosteen	Rambutan	Pineapple
South							
63	Chumphon			●	●	●	●
64	Nakhon Si Thammarat			●	●	●	
65	Phatthalung			●	●	●	
66	Songkhla			●	●	●	
67	Surat Thani			●	●		
68	Krabi				●	●	
69	Trang				●	●	
70	Phang Nga				●	●	
71	Phuket				●	●	
72	Ranong			●	●	●	
73	Satun			●	●	●	
74	Narathiwat				●	●	
75	Pattani				●	●	
76	Yala				●	●	



Harvesting Season

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pineapple												
Mango												
Lytchi												
Mangosteen												
Rambutan												
Longan												



Maximum Residue Limit



a) Longan

Pesticides	United States	Thailand
Azoxystrobin	2	-
Buprofezin	0.30 ^a	-
Carbarly	-	1
Carfentrazone-Ethyl	0.1	-
Chlorpyrifos	-	0.5
Cymoxanil	NA	-
Cypermethrin	-	0.5
Cyprodinil	2	-
Deltamethrin	NA	-
Fenvalerate	-	1
Fludioxonil	1	-
Glyphosate	0.2	-

a) Longan (continued)

Pesticides	United States	Thailand
Imidacloprid	3	-
Lambda-cyhalothrin	-	0.5
Methidathion	0.1 ^b	-
Methoxyfenozide	2	-
Pyriproxyfen	0.30 ^a	-
Spinosad	0.3	-

^aListed a "logan" presumed typo

^bRegional tolerance-Florida

NA, Not applicable





b) Litchi

Pesticides	United States	Thailand
Azoxystrobin	2	-
Buprofezin	0.3	-
Carbaryl	-	1
Carfentrazone-Ethyl	0.1	-
Chlorpyrifos	-	0.5
Cymoxanil	1.0 ^a	-
Cypermethrin	-	0.5
Cyprodinil	2	-
Deltamethrin	0.2 ^a	-
Fenvvalerate	-	1
Fludioxonil	1	-
Glyphosate	0.2	-
Imidacloprid	3	-
Lambda-cyhalothrin	-	0.5
Methoxyfenozide	2	-
Pyriproxyfen	0.3	-
Spinosad	0.3	-

^aimport tolerance

c) Mango

Pesticides	United State	Thailand
Benomyl (Carbendazim)	3.0 ^a	5
Captan	50 ^b	5
Carbaryl	-	1
Chlorothalonil	1	-
Cromazine	0.3 ^c	-
Cypermethrin	-	0.5
Deltamethrin	-	0.5
Dithiocarbamates	-	21
Etephon	-	2
Fenvalerate	-	1
Ferbam	7	-
Glyphosate	0.2	-
Inorganic Bromides (Methyl Bromide)	20.0 ^d	-
Lambda-cyhalothrin	0.5	
Lindane	1	-
Malathion	8	-



c) Mango (continued)

Pesticides	United States	Thailand
Methidathion	0.05	-
Phosphine	0.01	-
Piperonyl Butoxide	8 ^d	-
Profenofos	-	0.05
Pyrethrins	1 ^d	-
Thiabendazole	10	-

^a Time limited tolerance expires January 1,2008

^b Pre-and post-harvest application

^c Import tolerance

^d Post-harvest application

¹ Hazardous chemical dithiocarbamates including zineb, thiram, propineb, maneb and mancozeb

d) Pineapple

Pesticides	United State	Thailand
1-Naphthaleneacetic Acid	0.05 ^a	-
2,4 D	-	0.05
Ametryn	0.25	0.05
atrazine	-	0.1
Benomyl	35.0 ^b	-
Bromacil	0.1	-
Carbaryl	2.0 ^c	-
Cloprop	0.3 ^d	-
Diazinon	0.5	-
Diuron	1	-
Endosulfan	2.0 ^e	-
EPTC	0.1 ^f	-
Ethephon	2	2
Ethoprop	0.02	-
Fenamiphos	0.3	-
Fosetyl-al (Aluminum tris (o-ethylphosphonate))	0.1	-
Glyphosate	0.1	-
Hexazinone	0.5 ^g	-
Hydramethylnon	0.05	-
Inorganic Bromides	25	-
Inorganic Bromides (Methyl Bromide)	20.0 ^h	-
Lindane	1	-

d) Pineapple (continued)

Pesticides	United State	Thailand
Malathion	8	-
Metalaxyl	0.1	1
o-Phenylphenol	10 ^h	-
Oxamyl	1	-
Paraquat	0.05 ^f	-
Piperonyl Butoxide	8b	-
Propiconazole	0.1 ⁱ	-
Pyrethrins	1 ^h	-
Quizalofop-ethyl	0.1 ^j	-
Triadimefon	3.0 ^k	-

^a From application of the sodium salt to growing crop

^b Time limited tolerance expires January 1, 2008:post harvest application

^c Listed under pineapple tolerances

^d Time limited tolerance expires February 1, 2007

^e Proposal pending dated April 28, 2006 to reduce tolerance to 1.0

^f Negligible Residue Tolerance

^g Proposal pending dated June 7, 2006 for tolerance of 0.6 (hexazinon and plant metabolites)

^h Post-harvest application

ⁱ Time limited tolerance expires November 30, 2008

^j Regional tolerance-Hawaii only: Quizalofop-p ethyl ester and its acid metabolite Quizalafop-P[R-2-yl)oxy]phenoxy])Propanoic acid and S enantiomers of both the ester and the acid.

^k Fresh

e) Mangosteen

Pesticides	United State	Thailand
Carbaryl	-	1
Glyphosate	0.2	-
Phosalone	-	1
Profenofos	-	0.05





f) Rambutan

Pesticides	United State	Thailand
Azoxystrobin	2	-
Buprofezin	0.3	-
Carbaryl	-	1
Carbendazim / Benomyl	-	3
Carbosulfan	-	0.11
Carbosulfan	-	0.22
Carfentrazone-Ethyl	0.1	-
Chlorpyrifos	-	0.5
Cymoxanil	NA	-
Cyprodinil	2	-
Deltamethrin	NA	-
Dithiocarbamates	-	4
Fludioxonil	1	-
Folpet	-	0.1
Glyphosate	0.2	-
Imidacloprid	3	-
Lambda-cyhalothrin	-	0.5

f) Rambutan (continued)

Pesticides	United States	Thailand
Methidathion	NA	0.5
Methoxyfenozide	2	-
Pyriproxyfen	0.3	-
Spinosad	0.3	-

NA, Not applicable

¹ residue from using Carbosulfan which will be analyzed in carbofuran-3, hydroxy carbofuran and conjugated hydroxy carbofuran

² residue from using Carbosulfan which will be analyzed in carbofuran



GMP Standards for the Packing House

1. Packing House Location

(1) Premise

Packing house should locate separately from the non-program article and apply measure to prevent the pest risk, dust and the other materials which may contaminate the commodity.

(2) Building

- The building is suitable and separated from the residential area. The building should have adequate space for the segregation of non-program and program article. The production area should be organized in working order.
- The floor must be firm and smooth and easy to clean.
- Inside wall and ceiling must be made from durable solid material and easy to clean.
- Windows and doors must be closed. In case of open packing house, there must be plastic curtains at the doors and nets at the windows.
- There must be a system control to prevent pest and animal from outside the building.
- Production area must not be sweltering and stuffy. Fan or air-conditioned must be placed so that the wind could direct from the clean area to dirty area.
- There must be sufficient light during operating especially in the inspection area.



2. Equipment, machine and manufacturing mechanic

- (1) There should be sufficient equipment, machine and manufacturing mechanic while operating and packing. Any equipment that is to be contacted with food (such as basket, knife, table, scale etc.) must be ready and clean at all time.
- (2) Equipment, machine and manufacturing mechanic must made from any smooth material, rustless, non-toxic and non corrosion.

3. Manufacturing control

(1) Raw material

- There should be sampling for inspection and data recording on result of residue analysis and general data collecting.
- Container used during transportation should be clean and never before been exposed to toxic chemicals.
- The receiving area of raw material must be clean, no waste. The receiving basket must not be put on the floor directly.
- In case that the raw material is over supplied and cannot be processed on time, these material must be kept in a clean cold room and the basket must not be put on the floor directly. Furthermore, the room must be tidied and there must be label identifying material and lot. Bringing out the material must be done on chronological order. Cold room containing raw material must be separated from product store room.

(2) Container

There should be quality control for container and packaging including the condition of the store room which must be clean and safe.



(3) Manufacturing procedure

- Cutting must be done carefully and the equipment must be clean.
- Cleaning of the raw material must be done according to sanitation requirements. Employees must wear gloves when sorting defective products.

(4) Packing and Sealing

- Film or plastic used in packing and sealing process must be allowable food contact material type.
- There should be sampling for weight checking, packaging and other deficiency.

(5) Labeling

Labeling must be done in a correct manner in accordance with requirements of importing country. These are correct name and type of the product, manufacturer, net weight, manufacturing and expiring date.

(6) Packaging

Packaging must be in proper size, clean and durable during transportation.

(7) Finish product control

Finish product must be kept in a proper stored room and there should have sampling inspection occasionally.



4. Maintenance and sanitation

(1) Cleaning

- Production building cleaning must be done regularly. By this, you can assign the responsible person, method and cleaning regularity.
- Mechanic, machine and equipment must be clean both before and after operating. Cleaning devices must be neatly stored.

(2) Pest control

- There should be pest control and eradication within the production area.
- There must be regular monitoring.

(3) Hazardous chemical control

Hazardous and toxic chemicals should be stored with clear label in a safety place apart from the production area. In addition, non-food chemical should be alienated from others.

(4) Drainage and waste disposal management

- There should be a good drainage system to prevent blockage.
- There should be a good waste disposal management and sufficient solid waste storage.





(5) Restroom for employees

- Restroom should separately locate apart from the production area and number should be sufficient.
- Restroom must be kept according to sanitation requirements.

(6) Toiletry and hand dryer

Toiletry such as basin, soap, hand dryer and hand towel should be sufficiently provided to employees at the entrance of the production area so that they can clean theirs hands before entering.

5. Personnel (production line)

- (1) Personnel should wear proper attire according to packing house requirements.
- (2) Personnel should not smoke, spit, chewing gum while working. If the personnel is wounded, should inform supervisor for proper care.
- (3) Personnel and visitors must wash hands every time before enter into the working area.
- (4) Personnel must be regularly trained and reviewed of the correct production procedures as well as general sanitation

6. Storage and transportation

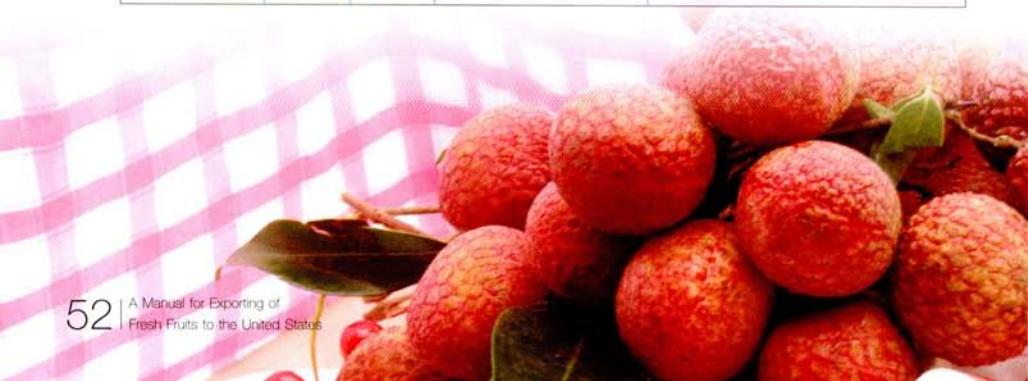
- (1) The program article waiting for transportation should be stored in suitable area and have easy access for inspection.
- (2) The container should made of safety material, clean and never contain any hazardous or toxic chemicals.
- (3) The container must be good condition and ready to use at all time.

7. Data recording

Data recording should be done neatly and thoroughly in all aspects; raw material, production flow diagram, production flow chart and others that are necessary for future traceability, if needed.

Recommendation for storage room

Type of fruits	Tempurature		Relative humidity (%)	(week)
	C°	F°		
Litchi	1.5	35	95-90	5-3
Longan	1.5	35	95-90	5-3
Rambutan	12	54	95-90	3-1
Mango	13	55	90-85	3-2
Pineapple	13-7	45-55	90-85	24
Mango (ripe)	13	55	90-85	3-2



Guidelines for the use of Irradiation as a Phytosanitary Measures

(ISPM No. 18, 2003)



GUIDELINES FOR THE USE OF IRRADIATION AS A PHYTOSANITARY MEASURES

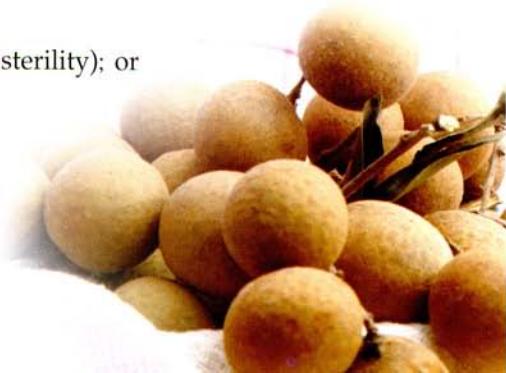
1. Authority

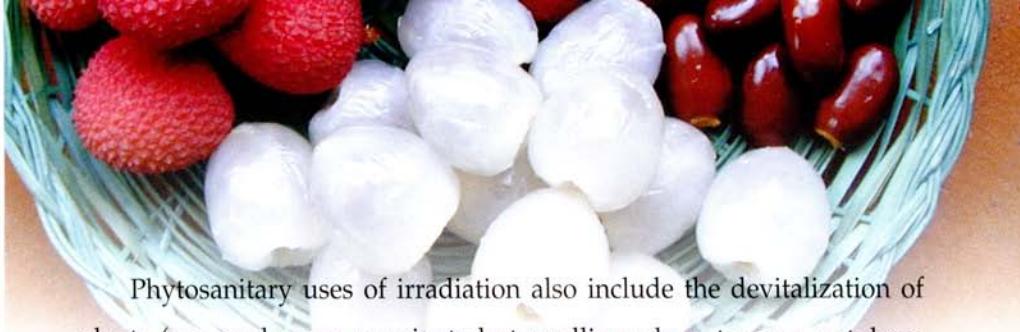
The NPPO is responsible for the phytosanitary aspects of evaluation, adoption and use of irradiation as a phytosanitary measure. To the extent necessary, it is the NPPO's responsibility to cooperate with other national and international regulatory agencies concerned with the development, approval, safety and application of irradiation, or the distribution, use or consumption of irradiated products. Their respective responsibilities should be identified to avoid overlapping, conflicting, inconsistent or unjustified requirements.

2. Treatment Objective

The objective of using irradiation as a phytosanitary measure is to prevent the introduction or spread of regulated pests. This may be realized by achieving certain responses in the targeted pest(s) such as:

- mortality;
- preventing successful development (e.g. non-emergence of adults);
- inability to reproduce (e.g. sterility); or
- inactivation.





Phytosanitary uses of irradiation also include the devitalization of plants (e.g. seeds may germinate but seedlings do not grow; or tubers, bulbs or cuttings do not sprout).

2.1 Efficacy

The required treatment efficacy should be specifically defined by the NPPO of the importing country. It consists of two distinct components:

- a precise description of required response;
- the statistical level of response required.

It is not sufficient to only specify a response without also describing how this is to be measured. The choice of a required response is based on the risk as assessed through PRA, considering in particular the biological factors leading to establishment and taking into account the principle of minimal impact. A response such as mortality may be appropriate where the treatment is for the vector of a pathogen, whereas sterility may be an appropriate response for pest(s) that are not vectors and remain on or in the commodity. If the required response is mortality, time limits for the effect of the treatment should be established. A range of specific options may be specified where the required response is the inability of the pest to reproduce. These may include:



- limited fertility of only one sex;
- egg laying and/or hatching without further development;
- altered behaviour; and
- sterility of F1 generation.

3. Treatment

Ionizing radiation may be provided by radioactive isotopes (gamma rays from cobalt-60 or cesium-137), electrons generated from machine sources (up to 10 MeV), or by x-rays (up to 5 MeV) (limits set by Codex Alimentarius³). The unit of measurement for absorbed dose should be gray (Gy). Variables to consider when implementing treatments include the dose rate, treatment time, temperature, humidity, ventilation, and modified atmospheres; these should be compatible with treatment effectiveness. Modified atmospheres may reduce treatment efficacy at a prescribed dose. Treatment procedures should also ensure that the minimum absorbed dose (D_{min}) is fully attained throughout the commodity to provide the prescribed level of efficacy. Owing to the differences in the configuration of treatment lots, higher doses than the D_{min} may be required to ensure that the D_{min} is achieved throughout the configured consignment or lot.

The intended end use of the product should be considered when conducting irradiation treatments. Because mortality will rarely be technically justified as the required response, live target pests may be found. Therefore it is essential that the irradiation treatment ensures they are unable to reproduce. In addition, it is preferable that such pest(s) are unable to emerge or escape from the commodity unless they can be practically distinguished from nonirradiated pest(s).

3.1 Application

Irradiation can be applied:

- as an integral part of packing operations;
- to bulk unpackaged commodities (such as grain moving over a belt);
- at centralized locations such as the port of embarkation.

When safeguards are adequate and transit movement of the untreated commodity is operationally feasible, treatment may also be performed at:

- the point of entry;
- a designated location in a third country;
- a designated location within the country of final destination.





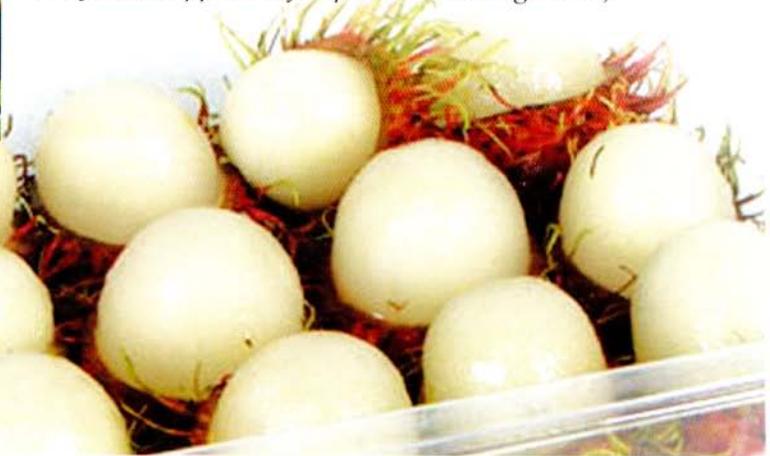
Treated commodities should be certified and released only after dosimetry measurements confirm that the D_{min} was met. Where appropriate, re-treatment of consignments may be allowed, provided that the maximum absorbed dose is within the limits allowed by the importing country.



The purpose of Annex 1 [to be completed] is to list the doses for specific approved treatments as part of this ISPM. Appendix 1, which is attached for information only, provides some published information on absorbed dose ranges for certain pest groups.



According to the pest risks to be addressed and the available options for pest risk management, irradiation can be used as a single treatment or combined with other treatments as part of a systems approach to meet the level of efficacy required (see ISPM No. 14: *The use of integrated measures in a systems approach for pest risk management*).





4. Dosimetry

Dosimetry ensures that the required D_{min} for a particular commodity was delivered to all parts of the consignment. The selection of the dosimetry system should be such that the dosimeter response covers the entire range of doses likely to be received by the product. In addition, the dosimetry system should be calibrated in accordance with international standards or appropriate national standards (e.g. Standard ISO/ASTM 51261 *Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing*).

Dosimeters should be appropriate for the treatment conditions. Dosimeters should be evaluated for stability against the effects of variables such as light, temperature, humidity, storage time, and the type and timing of analyses required. Dosimetry should consider variations due to density and composition of the material treated, variations in shape and size, variations in orientation of the product, stacking, volume and packaging. Dose mapping of the product in each geometric packing configuration, arrangement and product density that will be used during routine treatments should be required by the NPPO prior to the approval of a facility for the treatment application. Only the configurations approved by the NPPO should be used for actual treatments.

4.1 Calibration of components of the dosimetry system

All components of the dosimetry system should be calibrated according to documented standard operating procedures. An independent organization recognized by the NPPO should assess performance of the dosimetry system.

4.2 Dose mapping

Dose mapping studies should be conducted to fully characterize the dose distribution within the irradiation chambers and commodity, and demonstrate that the treatment consistently meets the prescribed requirements under defined and controlled conditions. Dose mapping should be done in accordance with documented standard operating procedures. The information from the dose mapping studies is used in the selection of locations for dosimeters during routine processing. last process loads is required to determine if the absorbed-dose distribution is significantly different from a routine load and to adjust the treatment accordingly.



4.3 Routine dosimetry

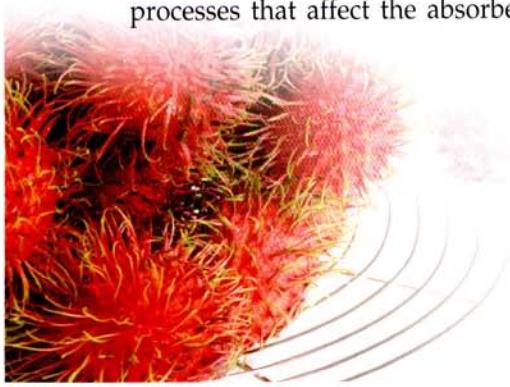
An accurate measurement of absorbed dose in a consignment is critical for determining and monitoring efficacy and is part of the verification process. The required number, location and frequency of these measurements should be prescribed based on the specific equipment, processes, commodities, relevant standards and phytosanitary requirements.



5. Approval of Facilities

Treatment facilities should be approved by relevant nuclear regulatory authorities where appropriate. Treatment facilities should also be subject to approval (qualification, certification or accreditation) by the NPPO in the country where the facility is located prior to applying phytosanitary treatments. Phytosanitary approval should be based on a common set of criteria plus those specific to the site and commodity programmes (see Annex 2).

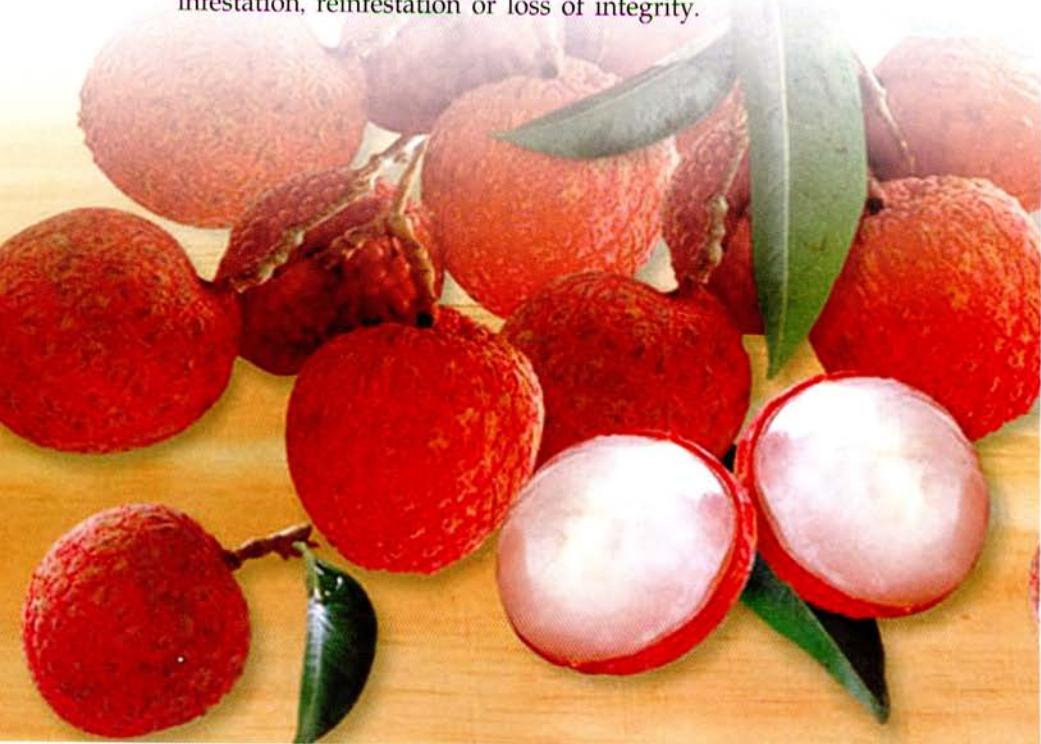
Phytosanitary re-approval should be done on an appropriate regular basis. Documented dose mapping should be done following repairs, modifications or adjustments in equipment or processes that affect the absorbed dose.



6. Phytosanitary System Integrity

Confidence in the adequacy of an irradiation treatment is primarily based on assurance that the treatment is effective against the pest(s) of concern under specific conditions and the treatment has been properly applied and the commodity adequately safeguarded. The NPPO of the country where the facility is located is responsible for ensuring system integrity, so that treatments meet the phytosanitary requirements of the importing country.

Efficacy research and dosimetry provide assurance that only effective treatments are used. Well-designed and closely monitored systems for treatment delivery and safeguarding assure that treatments are properly conducted and consignments protected from infestation, reinfestation or loss of integrity.





6.1 Phytosanitary security measures at the treatment facility

Because it is not usually possible to visually distinguish irradiated from nonirradiated products, treated commodities should be adequately segregated, clearly identified, and handled under conditions that will safeguard against contamination and/or infestation, or misidentification. A secure means of moving the commodity from receiving areas to treatment

Areas without misidentification or risk of cross-contamination and/or infestation is essential. Appropriate procedures specific to each facility and commodity treatment programme should be agreed upon in advance. Commodities that are unpackaged or exposed in packaging require safeguarding immediately following treatment to ensure that they are not subject to infestation, reinfestation or contamination afterwards. Packaging prior to irradiation may be useful to prevent reinfestation if irradiation is done prior to export, or to prevent the accidental escape of target pest(s) if treatment is done at the destination.

6.2 Labelling

Packages should be labelled with treatment lot numbers and other identifying features allowing the identification of treatment lots and trace-back (i.e. packing and treatment facility identification and location, dates of packing and treatment).



6.3 Verification

The adequacy of treatment facilities and processes should be verified through monitoring and audit of facility treatment records that include, as necessary, direct treatment oversight. Direct, continuous supervision of treatments should not be necessary provided treatment programmes are properly designed to ensure a high degree of system integrity for the facility, process and commodity in question. The level of oversight should be sufficient to detect and correct deficiencies promptly.

A compliance agreement should be concluded between the facility and the NPPO of the country where the facility is located. Such an agreement may include the following elements:

- approval of the facility by the NPPO of the country where the facility is located;
- the monitoring programme as administered by the NPPO of the country where treatments are conducted;
- audit provisions including unannounced visits;
- free access to documentation and records of the treatment facility; and
- corrective action to be taken in cases of non-compliance.

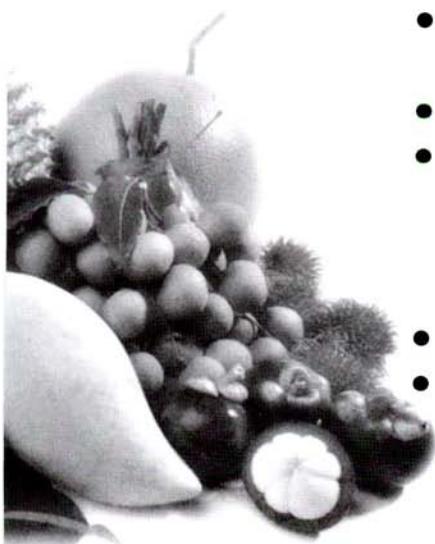
7. Documentation by the Treatment Facility

The NPPO of the country where the facility is located is responsible for monitoring recordkeeping and documentation by the treatment facility and ensuring that records are available to concerned parties. As in the case of any phytosanitary treatment, trace-back capability is essential.

7.1 Documentation of procedures

Documented procedures help to ensure that commodities are consistently treated as required. Process controls and operational parameters are usually established to provide the operational details necessary for a specific authorization and/or facility. Calibration and quality control programmes should be documented by the facility operator. At a minimum, an agreed written procedure should address the following:

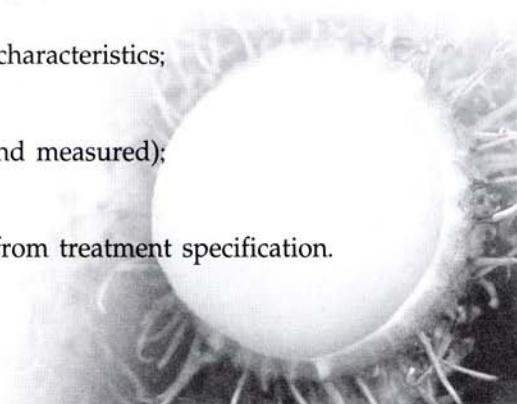
- consignment handling procedures before, during and after treatment;
- orientation and configuration of the commodity during treatment
- critical process parameters and the means for their monitoring;
- dosimetry;
- contingency plans and corrective actions to be taken in the event of treatment failure or problems with critical treatment processes;
- procedures for handling rejected lots;
- labelling, recordkeeping, and documentation requirements.



7.2 Facility records and traceability

Packers and treatment facility operators should be required to keep records. These records should be available to the NPPO for review, e.g. when a traceback is necessary. Appropriate treatment records for phytosanitary purposes should be kept by the irradiation facility for at least one year to ensure traceability of treated lots. The facility operator should keep all records for every treatment. Dosimetry records should be kept by the treatment facility for at least one full year after treatment. In most cases, these records are required under other authorities, but these records should also be available to the NPPO for review. Other information that may be required to be recorded includes:

- identification of facility and responsible parties;
- identity of commodities treated;
- purpose of treatment;
- target regulated pest(s);
- packer, grower and identification of the place of production of the commodity;
- lot size, volume and identification, including number of articles or packages;
- identifying markings or characteristics;
- quantity in lot;
- absorbed doses (target and measured);
- date of treatment;
- any observed deviation from treatment specification.





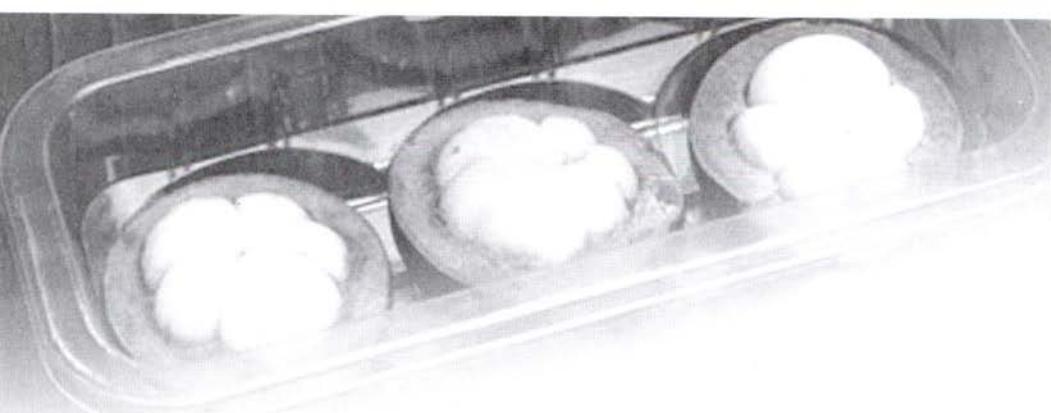
8. Inspection and Phytosanitary Certification by the NPPO

8.1 Export inspection

Inspection to ensure the consignment meets the phytosanitary requirements of the importing country should include:

- documentation verification; and
- examination for non-target pests.

Documentation is checked for completeness and accuracy as the basis for certifying the treatment. Inspection is done to detect any non-target pests. This inspection may be done before or after the treatment. Where non-target pests are found, the NPPO should verify whether these are regulated by the importing country. Live target pests may be found after treatment but should not result in the certification being refused except when mortality is the required response. Where mortality is required, live target pests may be found during the period immediately following the treatment application depending on the specification for efficacy (see section 2.1). If live pests are found, certification could be based on audit checks which confirm that mortality will be attained.



When mortality is not the required response, it is more likely that live target pests may persist in the treated consignment. This should also not result in the certification being refused. Audit checks, including laboratory analyses, may be undertaken to ensure that the required response is achieved. Such checks may be part of the normal verification programme.

8.2 Phytosanitary certification

Certification in accordance with the IPPC validates the successful completion of a treatment when required by the importing country. The Phytosanitary Certificate or its associated documentation should at least specifically identify the treated lot(s), date of treatment, the target minimum dose and the verified D_{min}. The NPPO may issue Phytosanitary Certificates based on treatment information provided to it by an entity approved by the NPPO. It should be recognized that the Phytosanitary Certificate may require other information supplied to verify that additional phytosanitary requirements have also been met (see ISPM No. 7: Export certification system and ISPM No.12: Guidelines for Phytosanitary Certificates).

8.3 Import inspection

When mortality is not the required response, the detection of live stages of target pests in import inspection should not be considered to represent treatment failure resulting in non-compliance unless evidence exists to indicate that the integrity of the treatment system was inadequate. Laboratory or other analyses may be performed on surviving target pest(s) to verify treatment efficacy. Such analyses should only be required infrequently as part of monitoring unless there is evidence to indicate problems in the treatment process. Where mortality is the required response, this may be confirmed. Where mortality is required, live target pests may be found when transport times are short, but should not normally result in the consignment being refused, unless the





established mortality time has been exceeded. The detection of pests other than target pest(s) on import should be assessed for the risk posed and appropriate measures taken, considering in particular the effect the treatment may have had on the non-target pest(s). The consignment may be detained and any other appropriate action may be taken by the NPPO of the importing country. NPPOs should clearly identify the contingency actions to be taken if live pests are found:

- target pests-no action to be taken unless the required response was not achieved;
- non-target regulated pests:
 - no action if the treatment is believed to have been effective;
 - action if there is insufficient data on efficacy or the treatment is not known to be effective;
- non-target non-regulated pests-no action, or emergency action for new pests.

In case of non-compliance or emergency action, the NPPO of the importing country should notify the NPPO of the exporting country as soon as possible (see ISPM No. 13: *Guidelines for the notification of non-compliance and emergency action*).

8.4 Verification methods for treatment efficacy in export and import inspection

Verification methods, including laboratory tests or analysis to determine if the required response has been achieved should be described by the exporting country at the request of the importing country.

8.5 Administration and documentation by the NPPO)

The NPPO should have the ability and resources to evaluate, monitor, and authorize irradiation undertaken for phytosanitary purposes. Policies, procedures and requirements developed for irradiation should be consistent with those associated with other phytosanitary measures, except where the use of irradiation requires a different approach because of unique circumstances.

The monitoring, certification, accreditation and approval of facilities for phytosanitary treatments is normally undertaken by the NPPO where the facility is located, but by cooperative agreement may be undertaken by:

- the NPPO of the importing country;
- the NPPO of the exporting country; or
- other national authorities.



Memoranda of Understanding (MOUs), compliance agreements, or similar documented agreements between the NPPO and the treatment applicator/facility should be used to specify process requirements and to assure that responsibilities, liabilities and the consequences of non-compliance are clearly understood. Such documents also strengthen the enforcement capability of the NPPO if corrective action may be necessary. The NPPO of the importing country may establish cooperative approval and audit procedures with the NPPO of the exporting country to verify requirements.

All NPPO procedures should be appropriately documented and records, including those of monitoring inspections made and Phytosanitary Certificates issued, should be maintained for at least one year. In cases of non-compliance or new or unexpected phytosanitary situations, documentation should be made available as described in ISPM No. 13: Guidelines for the notification of noncompliance and emergency action.

9. Research

Appendix 2 provides guidance on undertaking research for the irradiation of regulated pests

CHECKLIST FOR FACILITY APPROVAL

This annex is a prescriptive part of the standard. The following checklist is intended to assist persons inspecting or monitoring facilities seeking to establish/maintain facility approval and certification of irradiated commodities for international trade. The failure to receive an affirmative response to any item should result in the refusal to establish, or the termination of, an approval or certification.



Criteria	Yes	No
<i>1. Premises</i>		
Irradiation facility meets the approval of the NPPO as regards phytosanitary requirements. The NPPO has reasonable access to the facility and appropriate records as necessary to validate phytosanitary treatments.		
Facility buildings are designed and built to be suitable in size, materials, and placement of equipment to facilitate proper maintenance and operations for the lots to be treated.		
Appropriate means, integral to the facility design, are available to maintain non-irradiated consignments and/or lots separate from treated consignments and/or lots.		
Appropriate facilities are available for perishable commodities before and after treatment.		
Buildings, equipment, and other physical facilities are maintained in a sanitary condition and in repair sufficient to prevent contamination of the consignments and/or lots being treated. Effective measures are in place to prevent pests from being introduced into processing areas and to protect against the contamination or infestation of consignments and/or lots being stored or processed.		

Criteria	Yes	No
Adequate measures are in place to handle breakage, spills, or the loss of lot integrity.		
Adequate systems are in place to dispose of commodities or consignments that are improperly treated or unsuitable for treatment.		
Adequate systems are in place to control non-compliant consignments and/or lots and when necessary to suspend facility approval.		
<i>2. Personnel</i>		
The facility is adequately staffed with trained, competent personnel.		
Personnel are aware of requirements for the proper handling and treatment of commodities for phytosanitary purposes.		
<i>3. Product handling, storage and segregation</i>		
Commodities are inspected upon receipt to ensure that they are suitable for irradiation treatment.		
Commodities are handled in an environment that does not increase the risk of contamination from physical, chemical or biological hazards.		

Criteria	Yes	No
Commodities are appropriately stored and adequately identified. Procedures and facilities are in place to ensure the segregation of treated and untreated consignments and/or lots. There is a physical separation between incoming and outgoing holding areas where required.		
<i>4. Irradiation</i>		
Facility is able to perform required treatments in conformity with a scheduled process. A process control system is in place providing criteria to assess irradiation efficacy.		
Proper process parameters are established for each type of commodity or consignment to be treated. Written procedures have been submitted to the NPPO and are well known to appropriate treatment facility personnel.		
Absorbed dose delivered to each type of commodity is verified by proper dosimetric measurement practices using calibrated dosimetry. Dosimetry records are kept and made available to the NPPO as needed.		

Criteria	Yes	No
<i>5. Packaging and labeling</i>		
Commodity is packaged (if necessary) using materials suitable to the product and process.		
Treated consignments and/or lots are adequately identified or labeled (if required) and adequately documented.		
Each consignments and/or lot carries an identification number or other code to distinguish it from all other consignments and/or lots.		
<i>6. Documentation</i>		
All records about each consignment and/or lot irradiated are retained at the facility for the period of time specified by relevant authorities and are available for inspection by the NPPO as needed.		
The NPPO has a written compliance agreement with the facility.		

Appendix 1

This appendix is for reference purposes only and is not a prescriptive part of the standard. The list is not exhaustive and should be adapted to specific circumstances. The references here are widely available, easily accessible and generally recognized as authoritative. The list is not comprehensive or static; nor is it endorsed as a standard under this ISPM.

ESTIMATED MINIMUM ABSORBED DOSES FOR CERTAIN RESPONSES FOR SELECTED PEST GROUPS 4

The following table identifies ranges of minimum absorbed dose for pest groups based on treatment research reported in the scientific literature. Minimum doses are taken from many publications that are in the references listed below. Confirmatory testing should be done before adopting the minimum dose for a specific pest treatment. To ensure the minimum absorbed dose is achieved for phytosanitary purposes, it is recommended to seek information about the D_{min} for a particular target species and also to take into consideration the note in Appendix 2.



Pest group	Required response	Minimum dose range (Gy)
Aphids and whiteflies (Homoptera)	Sterilize actively reproducing adult	50 - 100
Seed weevils (Bruchidae)	Sterilize actively reproducing adult	70 - 300
Scarab beetles (Scarabidae)	Sterilize actively reproducing adult	50 - 150
Fruit flies (Tephritidae)	Prevent adult emergence from 3rd instar	50 - 250
Weevils (Curculionidae)	Sterilize actively reproducing adult	80 - 165
Borers (Lepidoptera)	Prevent adult development from late larva	100 - 280
Thrips (Thysanoptera)	Sterilize actively reproducing adult	150 - 250
Borers (Lepidoptera)	Sterilize late pupa	200 - 350
Spider mites (Acaridae)	Sterilize actively reproducing adult	200 - 350
Stored product beetles (Coleoptera)	Sterilize actively reproducing adult	50 - 400
Stored product moths (Lepidoptera)	Sterilize actively reproducing adult	100-1,000
Nematodes (Nematoda)	Sterilize actively reproducing adult	~4,000

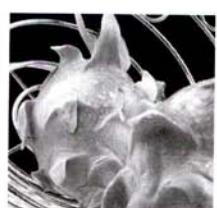
Annex 8



Banana



Cantaloupe



Dragon fruit



Durian



Guava



Jackfruit



Java Apple



Jujube



Longan

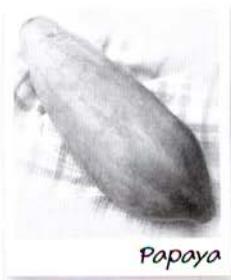


Mango

Passion of Thailand



Pummelo



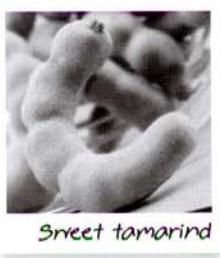
Papaya



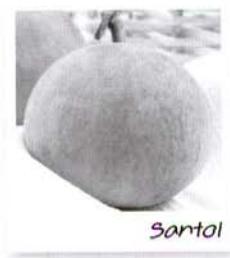
Pineapple



Pomegranate



Sweet tamarind



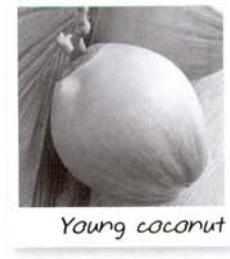
Santol



Sapodila



Sugar apple



Young coconut



Watermalon

Banana





Banana

Thai name : kluai-hom

Shape : long, thick skin, approximately 150 g/fruit

Color : bright yellow skin; yellowish white flesh

Taste : sweet with appetizing fragrance

Preparation and eating

1. Use a knife to cut off one end of banana from its bunch.
2. Peel the remaining part of the banana.
3. Discard the skin.

Usage

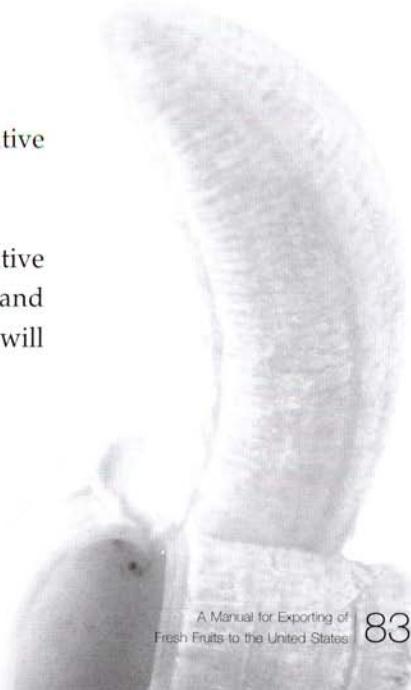
- Eaten fresh, added in fruit salad and desserts, made pies, cakes and blender drinks

Storage

- **Mature green banana :**
2-3 weeks at 15-20 °C, 90-95% Relative Humidity
- **Ripe banana :**
5-10 days at 15-20 °C, 90-95% Relative Humidity depending on cultivar and maturity stage if refrigerated, the skin will turn black rapidly.

Season

Availability : all year



Cantaloupe





Cantaloupe

Thai name : can-ta-loup

Shape : round and elongated with a stiff rind

Color : orange to light green

Taste : sweet

Preparation and eating

1. The flesh can be sliced, cuped and scooped into ball.
2. Use a knife to slice the fruit lengthways from its stalk into 6 pieces.
3. Peel with a knife by passing the blade between the skin and the flesh. **keep the flesh stay on the skin.**
4. Cut the flesh into pieces crosswise, arrange them on a plate.

Usage

- Eaten fresh, added in fruit salad, made juice. Storage 4-7 days at ambient temperature

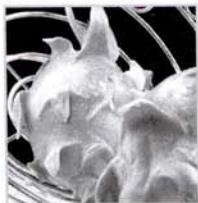
Season

Availability : all year



Dragon fruit





Dragon fruit

Thai name : kaeo-mang-kon

Shape : pear shape

Color : (white fresh) pink skin; white soft and juicy flesh
with tiny black seeds

(red flesh) pink skin; pink soft and juicy flesh with
tiny black seeds

Taste : sweet with a touch of sour flavor

Preparation and eating

1. Cut the fruit in half lengthwise
2. Cut each half into two pieces
3. Slice lengthwise into four pieces

Usage

- Eaten fresh, added in fruit salad
and made juice

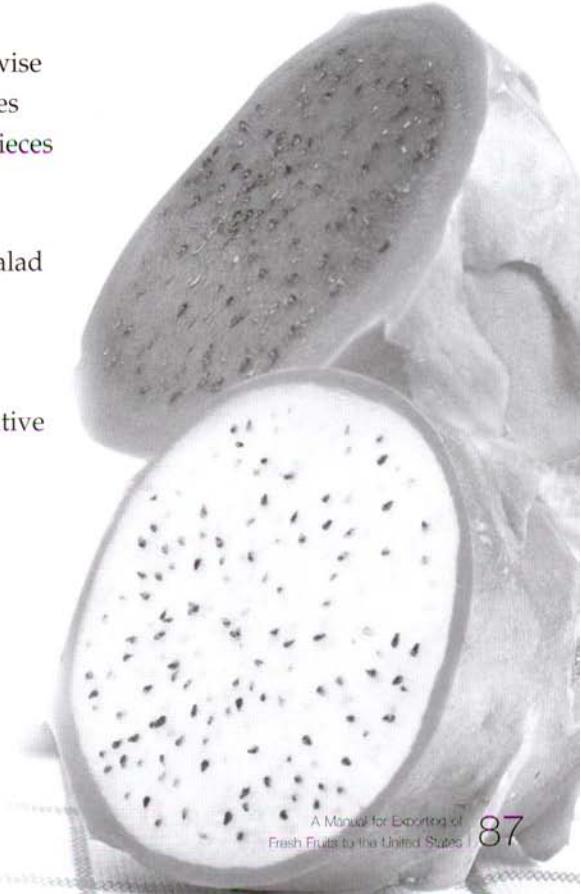
Storage

- 14 days at 10 °C, 90% Relative
Humidity

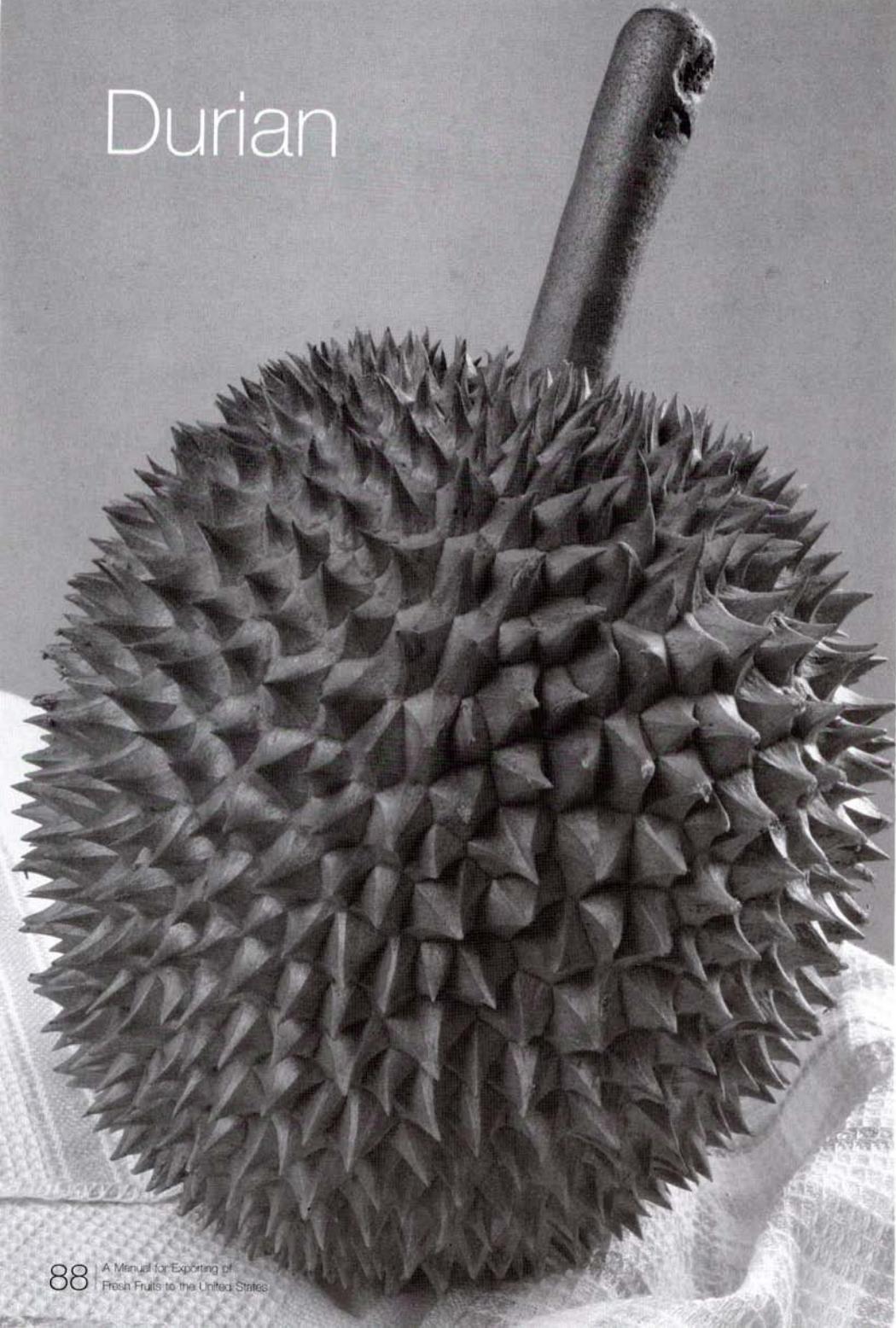
Season

Availability : all year peak

Period : May-October



Durian





Durian

Thai name : too-rain

- Shape** : elongated with spiny rind, the base has a pronounced beak
- Color** : golden brown skin; creamy yellow flesh
- Taste** : sweet with strong smell

Preparation and eating

1. The fruit ready for eating must have a good smell
2. Slit the fruit with a knife from end to end, along two of the grooves in the skin in the center of the sections, on opposite sides of the fruit.
3. Prise apart the slits to open the fruit.
4. Separate the sections.
5. Take out the segments and remove the seed.

Usage

- Eaten fresh and frozen.
- Make cakes, ice-cream

Storage

- 10-15 days at 14-16°C, 85-90% Relative Humidity ripen durian (whole fruit)
- 7-14 days at 13-15°C, 90-95% Relative Humidity without refrigeration the ripen fruit has a shelf life only 2-5 days. The pulp can be refrigerated up to 7 days in closed packaging or frozen for later use.

Season

Availability : year round

Peak period : April - August

Guava





GUAVA

Thai name : fa - rang

Shape

: globular

Color

: light green skin, white flesh

Taste

: crunchy, sweet and slightly sour

Preparation and eating

1. Use a knife to slice the fruit lengthwise into 4-6 pieces.
2. Slice off the part containing seeds.

Usage

- Eaten fresh.
- Made juice.
- Added in fruit salad, green salad and made guava in brine

Storage

- **Mature-green and partially-ripe :**
2-3 weeks at 8-10°C, 90-95% Relative Humidity
- **Fully ripe :**
1 week at 5-8°C, 90-95% Relative Humidity

Season

Availability : all year

Jackfruit





Jackfruit

Thai name : kha-nun

Shape : ovate or oblong, approximately 7-15 kg/fruit

Color : yellowish brown skin; golden yellow flesh

Taste : sweet and fragrant

Preparation and eating

1. Cut the fruit in half lengthwise.
2. Wipe out all the latex with paper.
3. Remove the core.
4. Place each the half fruit on a table or a flat surface; press the skin along the edge down with your hands to separate fruit sections.
5. Pull out each section, cut to open the flesh and remove the seed.

Usage

- Eaten fresh and frozen, added in fruit salad smoothie, ice cream and desserts.

Storage

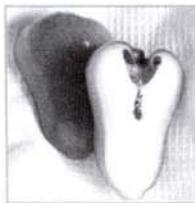
- 2-3 weeks at 15-20 °C, 90-95% Relative Humidity, depending on cultivar and maturity stage. The pulp can be refrigerated up to 7 days in closed packaging.

Season

Availability • all year

Java Apple





Java Apple

Thai name : chom-phu

Shape : (green) cone shape (red) big bell shape

Color : shiny and pale green, dark red skin; white thick firm and crispy flesh

Taste : sweet with a touch of flavor

Preparation and eating

1. Cut the fruit in half lengthwise.
2. Slice each half lengthwise into two pieces.
3. Arrange the pieces on a plate.

Usage

- Eaten fresh, added in fruit salad, green salad.

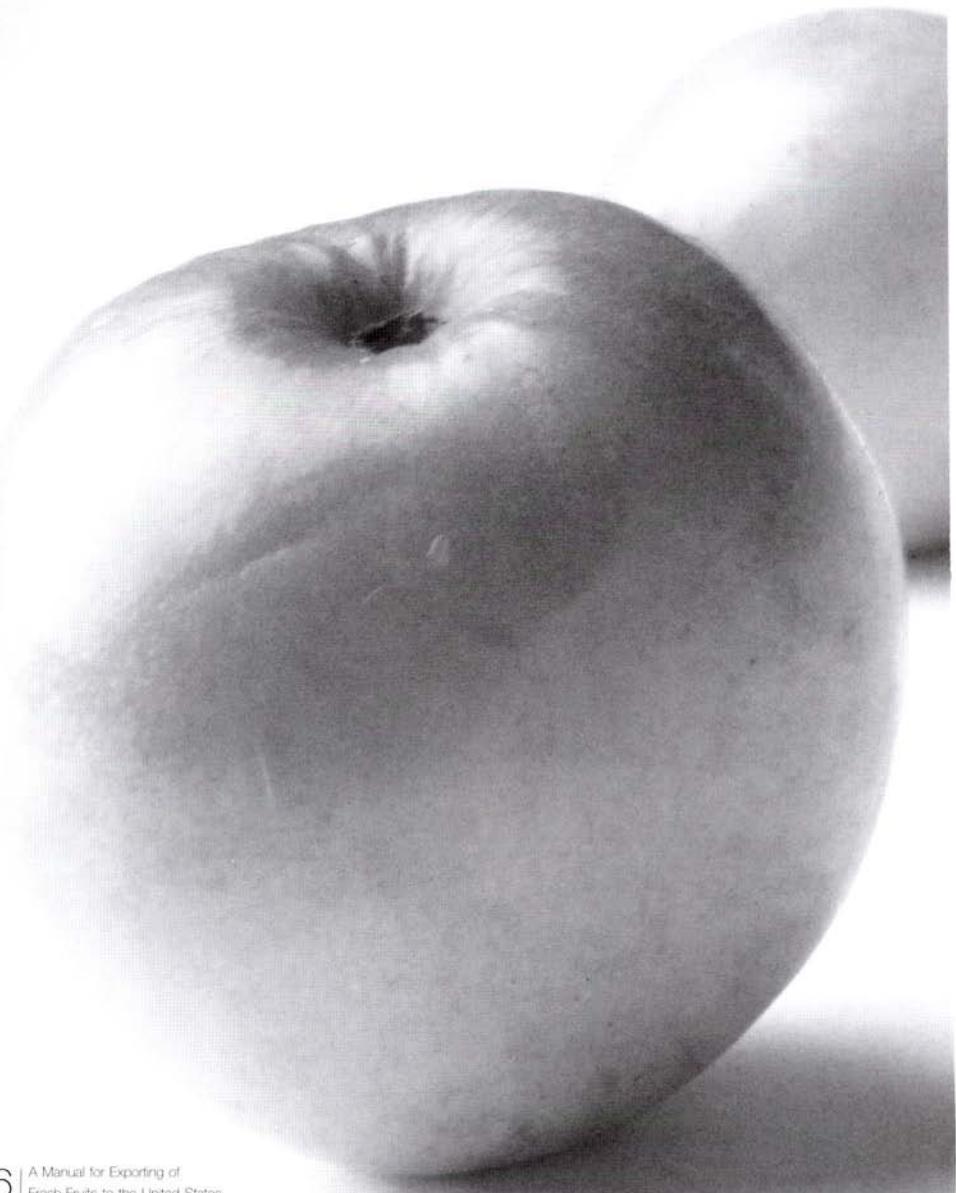
Storage

- 1-2 weeks at 12-14°C, 90-95% Relative Humidity.

Season

Availability : all year

Jujube





Jujube

Thai name : put-sa

Color : green skin; white flesh

Taste : firm and crispy

Shape : round or oval shape

Preparation and eating

- Eat or slice the fruit into small pieces.
- Beware of the seed

Usage :

- Eaten fresh, added in fruit salad.

Storage :

- 2-3 weeks at 4-7°C, 90-95% Relative Humidity

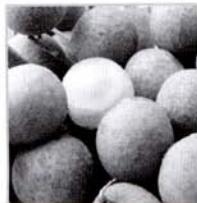
Season

Availability : all year

Peak period : June-December

Longan





Longan

Thai name : lam-yai

- Shape** : globular, but the top distorted
Color : brown skin; white flesh
Taste : sweet and fragrant

Preparation and eating

1. Slit the skin with a knife or using a strong thumb-nail around the fruit from end to end.
2. Remove the skin.
3. Remove the seed.

Usage

- Eaten fresh and frozen.
- Added in fruit salad desserts.

Nutrition

- High in sugar and vitamin C.

Storage

- 2-3 weeks at 4-7°C, 90-95% Relative Humidity

Season

- Availability** : year round
Peak period : June-August

Mango





Mango

Thai name : ma-muong

Shape : ovate with sharp pointed tip

Color : golden yellow skin; deep yellow flesh

Taste : sweet and fragrant

Preparation and eating for ripe mango

1. Carve the flesh lengthwise on both sides, keeping the knife as close as possible to the seed.
2. Chop into squares.

Usage

- Eaten fresh and frozen.
- Made juice, jam and sauce.
- Added in fruit salad and desserts.

Storage

- 2-3 weeks at 10-13°C, 85-90% Relative Humidity

Season

Availability : year round

Peak period : March - May

Pummelo





Pummelo

Thai name : som-o

Shape : globular

Color : dark green skin; pink or yellowish flesh

Taste : sweet and juicy

Preparation and eating

1. Use a knife to curve the outer green skin off.
2. Use a knife to peel off the white fleshy part of the skin.
3. Use a knife to separate the fruit into two pieces.
4. Separate the segment and remove the skin and seeds.

Usage

- Eaten fresh.
- Made juice.
- Added in fruit salad.

Storage

- 4-6 weeks at 12-15°C, 95% Relative Humidity

Season

Availability : year round

Peak period : October - December

Papaya





Papaya

Thai name : ma-la-kor

Shape : cylindrical shape with a pointed tip

Color : reddish orange skin; red flesh

Taste : sweet

Preparation and eating

1. Cut the fruit crosswise into rings.
2. Peel with a knife.
3. Remove seeds.
4. Cut into pieces for eating.

Usage

- Eaten fresh, made juice, added in fruit salad and desserts, Raw papaya can be added in Thai Salad.

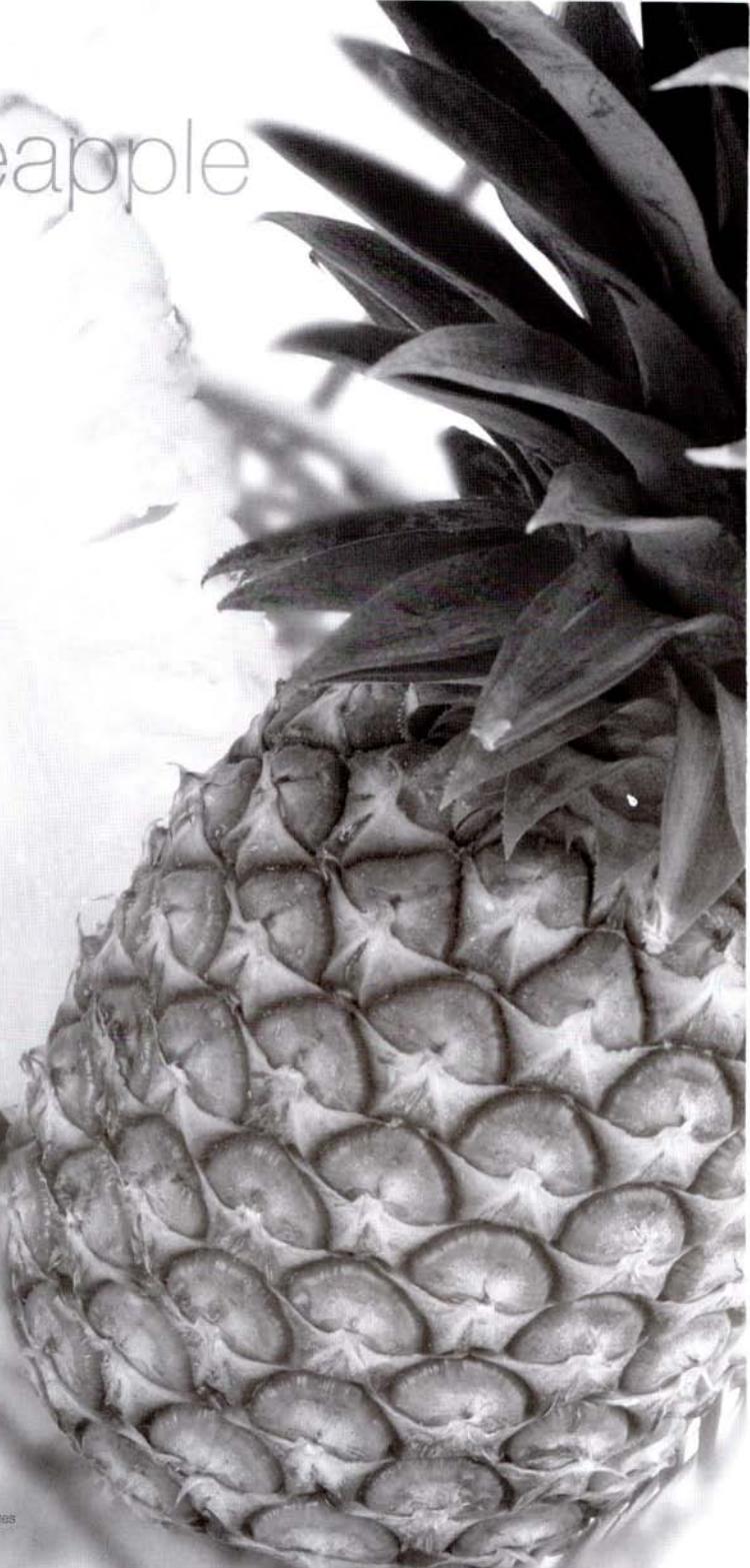
Storage

- 1-3 weeks at 13-15 °C, 85-90%
Relative Humidity

Season

Availability : all year

Pineapple





Pineapple

Thai name : sup-pa-rot

Shape : cylindrical, and shallow seedy

Color : dark green or yellowish orange rind; mild yellow flesh

Taste : sweet and sour

Preparation and eating

1. Remove the rind with a knife and make sure to cut off the enough skin to get the eyes.
2. Slice the fruit lengthwise into 8-10 pieces.
3. Remove the core
4. Cut up the pieces crosswise and arrange them on a plate.

Usage

- Eaten fresh, made juice and jam, added in fruit salad, green salad, Thai cuisine and desserts and canned pineapple.

Storage

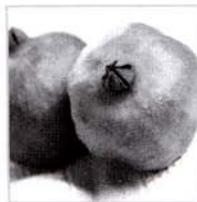
- 2-4 weeks at 7-13°C, 85-90% Relative Humidity

Season

Availability : all year

Pomegranate





Pomegranate

Thai name : tub-tim

Shape : round

Color : reddish-pink skin with translucent red; pink and light pink pulp encased seeds

Taste : sweet or sweet and slightly sour

Preparation and eating

1. Cut the fruit in half.
2. Pry out the pulp-encased seeds.
3. Remove any of the light-colored membrane that adheres.

Usage

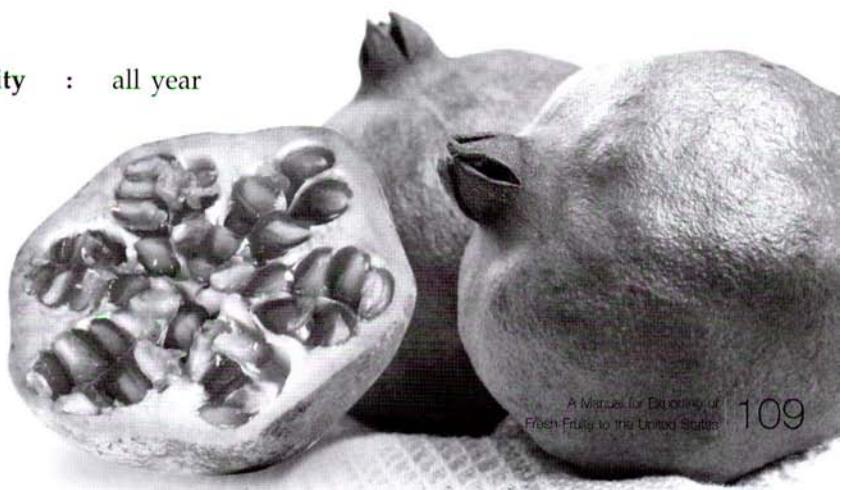
- Eaten fresh, made juice, garnished on sweet and desserts.

Storage

- Keep in cool and dark place for up to month.
- Pomegranate seeds packed in an airtight container and stored in the freezer can be kept for up to 3 months.

Season

Availability : all year



Sweet tammarind





Sweet tamarind

Thainame : ma-kham-wan

Pod shape : big and slightly curved pod

Color : brown and dusty shell; thick and soft with light brown flesh

Taste : sweet

Preparation and eating

1. Pick up a sweet tamarind pod.
2. Crack the pod and remove the shell.
3. Remove lateral vein fiber from the flesh.
4. Arrange all sweet tamarind flesh on a tray.

Usage

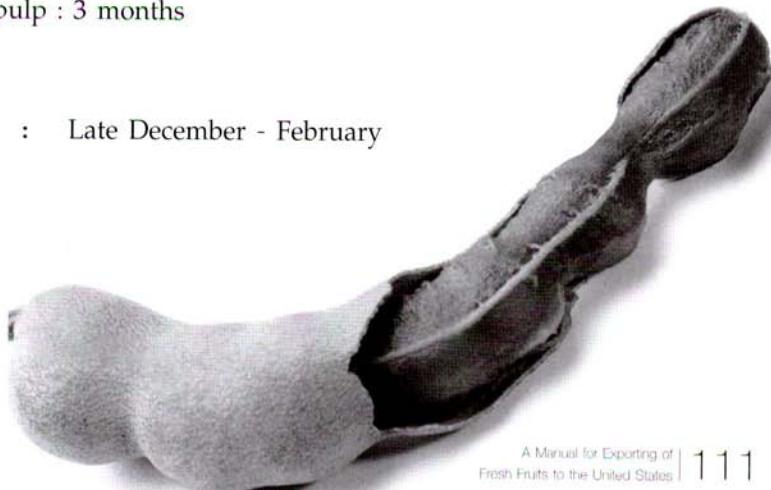
- Eaten fresh.

Storage (in plastic bags at the ambient condition)

- dry ripe pods : 4 months
- dry ripe pulp : 3 months

Season

Availability : Late December - February



Santol





Santol

Thai name : kra-tawn

Shape : round with a very thick velvety skin

Color : mature fruit; golden yellow-brown; flesh-creamy yellow

Taste : sweet

Preparation and eating

1. Cut the fruit around in the middle.
2. Open the fruit, the segments inside will stick to the base part.
3. Lift out the segment.

Usage

- Eaten fresh, eaten with syrup as desserts.

Storage

- Keep the fresh fruit at ambient temperature (25-30 °C)

Season

Availability : June - September



Sapodila





Sapodila

Thai name : la-mood

Shape : oval round and elongated

Color : light brown or yellowish brown

Taste : juicy and sweet

Preparation and eating

1. The ripe fruit can be eaten when soft.
2. Peel with a knife
3. Slice the fruit lengthwise into four pieces and remove seeds.

Usage

- Eaten fresh.

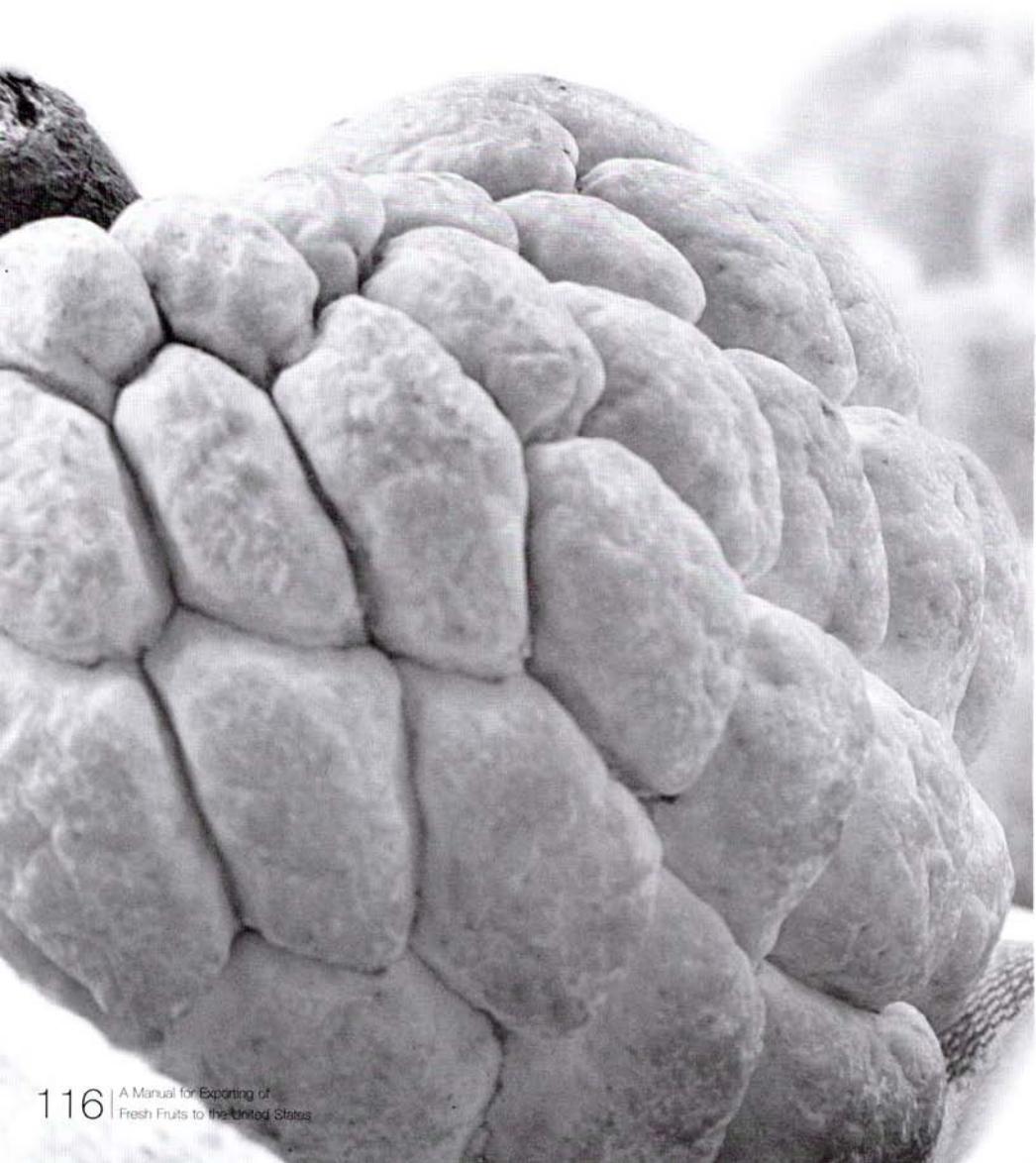
Storage

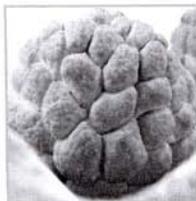
- Keep the fresh fruit at ambient temperature (25-30 °C)
It can be kept for 2-3 days.

Season

Availability : September - December

Sugar apple





Sugar apple

Thai name : noi-na

Shape : heart shape

Color : mature fruit-green; white flesh

Taste : sweet and scented

Preparation and eating

1. The fruit is soft fragrant when ripen.
2. Break the fruit open with hands.
3. Eat the flesh with a spoon discarding seeds and skin.

Usage

- Eaten fresh.

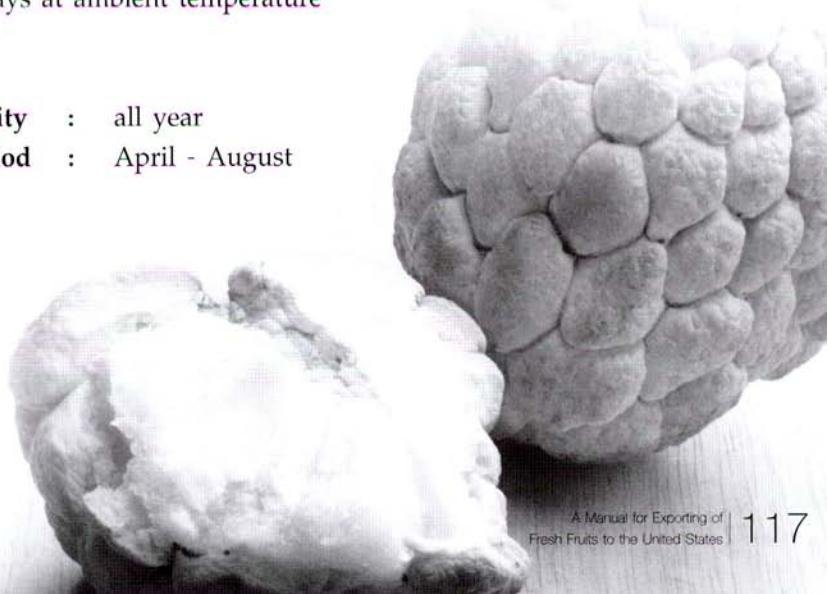
Storage

- 5-7 days at 12-15°C, 90-95% Relative Humidity
- 2-3 days at ambient temperature

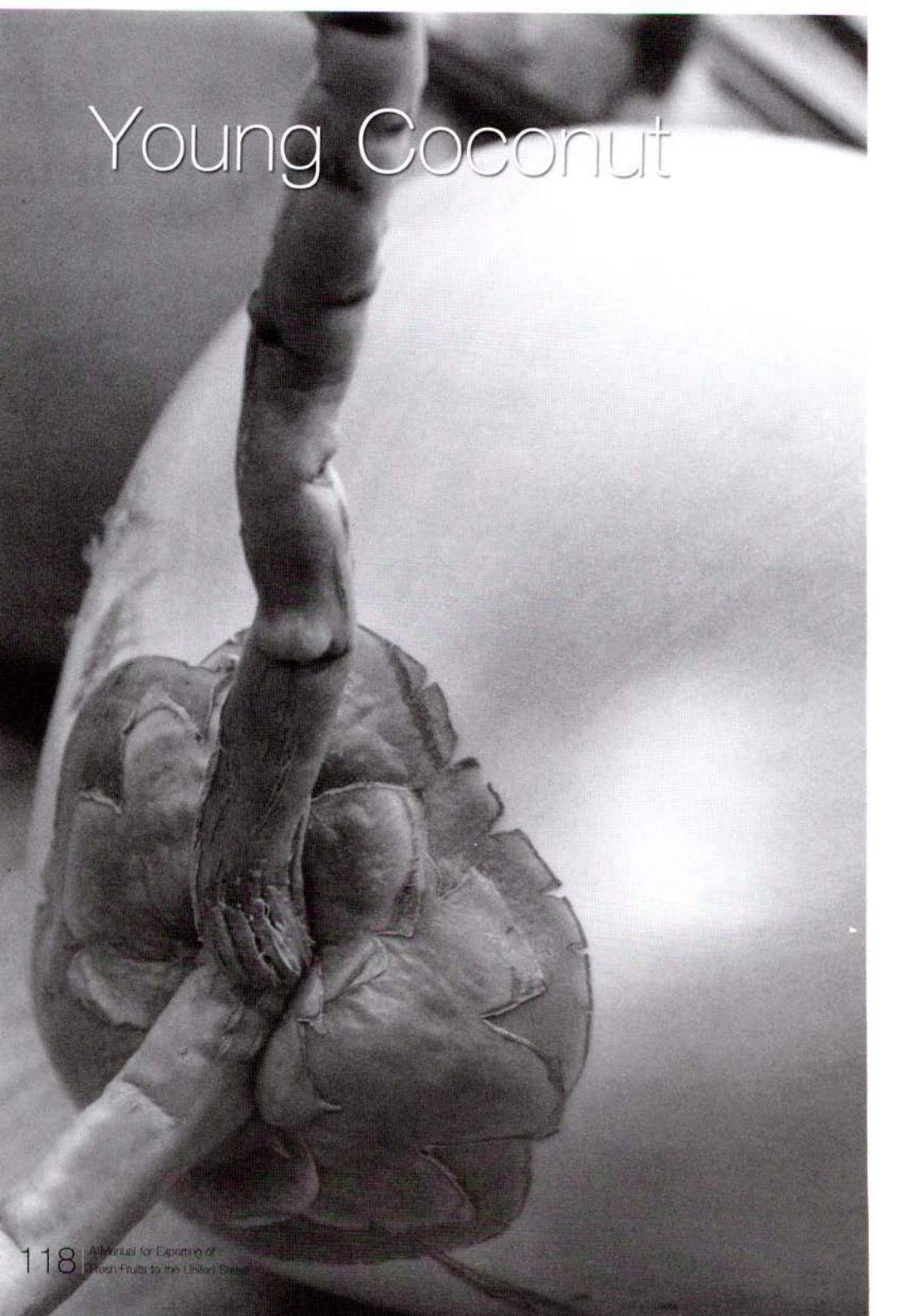
Season

Availability : all year

Peak period : April - August



Young Coconut





Young Coconut

Thai name : maphrao on

Shape : globular

Color : green skin; white flesh

Taste : tender and sweet flesh; sweet and scented water

Preparation and eating

1. Pare the outer rind from the bottom of the coconut (opposite the stalk).
2. Cut the bottom of the fruit wide enough for a spoon to scrape the flesh inside.
3. Drink the juice with a straw and eat the flesh with a spoon.

Usage

- Eaten fresh (water and white flesh.)
- Made pie, jelly and desserts.

Storage (de-husked or shaped young fruit)

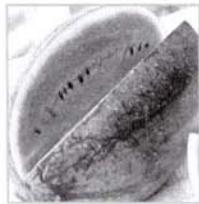
- wrapped : 3-4 weeks at 3-6 °C, 90-95% Relative Humidity
- now wrapped : 2-7 days at ambient temperature

Season

Availability : all year

Watermalon





Watermalon

Thai name : taeng-mo

Shape : globular

Color : dark green skin; flesh-red and yellow depending on varieties

Taste : sweet and juicy

Preparation and eating

1. The flesh can be sliced, cuped and scooped into ball.
2. Use a knife to slice the fruit lengthwise from its stalk into six pieces.
3. Peel with a knife by passing the blade between the skin and the flesh, keeping the flesh stay on the skin.
4. Cut the flesh into pieces crosswise.

Usage

- Eaten fresh, made fruit salad and juice.

Storage

- Keep fresh fruit at ambient temperature (25-30 °C)
It can be kept for 5-7 days.

Season

Availability : all year

Peak period : October - March





National Bureau of Agriculture Commodity and Food Standards

Tel. 0 2629 8970, 0 2629 8977

Fax. 0 2629 8978

www.acfs.go.th