



## **HORTIN II Co Innovation Programme**

### ***Towards cost effective, high quality value chains***

#### **Extending shelf life and freshness of rambutan with modified atmosphere packaging and antifogging LDPE – Supermarket Trial and Workshop Report**

HORTIN-II Mission Report nr. 35

Iskander Zulkarnain  
Rara Dewayanti  
Jeroen Knol  
Sri Yuliani

Wageningen, The Netherlands, Jakarta / Bogor, Indonesia, April 2010



---

The purpose of the HORTIN-II programme is to contribute to the development of cost effective high quality value chains for vegetables and fruits. Among others this can be achieved when technology development takes place in close collaboration between public institutions, farmers and private companies.

On the Indonesian side the programme is carried out by the Indonesian Centre for Horticultural Research and Development (**ICHORD**), Jakarta, with the Indonesian Vegetable Research Institute (**IVEGRI**), Lembang, and the Indonesian Centre for Agricultural Postharvest Research and Development (**ICAPRD**) in Bogor.

In the Netherlands the Agricultural Economics Research Institute (**AEI**), Den Haag, Wageningen UR Food & Biobased Research (**FBR**), Wageningen, Applied Plant Research (**APR**), Lelystad, and WUR-Greenhouse Horticulture (**WUR-GH**), Bleiswijk, all partners in Wageningen University and Research centre, are involved in the programme.

Addresses:

**Indonesian Centre for Horticultural Research and Development (ICHORD)**

Address : Jl. Ragunan 29A, Pasarmingu, Jakarta 12520, Indonesia  
Tel. : +62 21 7890990  
Fax : +62 21 7805135  
E-mail : [pushor@rad.net.id](mailto:pushor@rad.net.id) or [pushorti@yahoo.com](mailto:pushorti@yahoo.com)  
Internet : [www.liitbanghortikultura.go.id](http://www.liitbanghortikultura.go.id)

**Indonesian Vegetable Research Institute (IVEGRI)**

Address : Jl. Tangkuban Perahu 517, Lembang-Bandung 40391, West Java, Indonesia  
Tel. : +62 22 2786 245  
Fax : +62 22 2786 416  
E-mail : [dir\\_ivegri@balitsa.org](mailto:dir_ivegri@balitsa.org) or [balitsa@balitsa.org](mailto:balitsa@balitsa.org)  
Internet : [www.balitsa.org](http://www.balitsa.org)

**Indonesian Centre for Agricultural Postharvest Research and Development (ICAPRD)**

Address : Kampus Penelitian Pertanian, Cimanggu, Bogor 16114, West Java, Indonesia  
Tel. : + 62 251 321762  
Fax : + 62 251 350920  
E-mail : [bb\\_pascapanen@litbang.deptan.go.id](mailto:bb_pascapanen@litbang.deptan.go.id) or [bb\\_pascapanen@yahoo.com](mailto:bb_pascapanen@yahoo.com)  
Internet : [www.pascapanen.litbang.deptan.go.id](http://www.pascapanen.litbang.deptan.go.id)

**Agricultural Economics Research Institute (AEI)**

Address : Alexanderveld 5, Den Haag, The Netherlands  
: PO Box 29703, 2502 LS Den Haag, The Netherlands  
Tel. : +31 70 335 83 30  
Fax : +31 70 361 56 24  
E-mail : [informatie.lei@wur.nl](mailto:informatie.lei@wur.nl)  
Internet : [www.lei.wur.nl](http://www.lei.wur.nl)

**Wageningen UR Food & Biobased Research (FBR)**

Address : Building 118, Bornse weilanden 9, Wageningen, The Netherlands  
: PO Box 17, 6700 AA, Wageningen, The Netherlands  
Tel. : +31 317 480 084  
Fax : +31 317 483 011  
E-mail : [info.fbr@wur.nl](mailto:info.fbr@wur.nl)  
Internet : [www.fbr.wur.nl](http://www.fbr.wur.nl)

**Applied Plant Research (APR)**

AGV Research Unit

Address : Edelhertweg 1, Lelystad, The Netherlands  
: PO Box 430, 8200 AK Lelystad, The Netherlands  
Tel. : +31 320 29 11 11  
Fax : +31 320 23 04 79  
E-mail : [infoagv.ppo@wur.nl](mailto:infoagv.ppo@wur.nl)  
Internet : [www.ppo.wur.nl](http://www.ppo.wur.nl)

---

**WUR-Greenhouse Horticulture (WUR-GH)**

Address : Violierenweg 1, Bleiswijk, The Netherlands  
: PO Box 20, 2665 ZG Bleiswijk, The Netherlands  
Tel. : +31 317 48 56 06  
Fax : +31 10 52 25 193  
E-mail : [glastuinbouw@wur.nl](mailto:glastuinbouw@wur.nl)  
Internet : [www.glastuinbouw.wur.nl](http://www.glastuinbouw.wur.nl)

The HORTIN-II programme is sponsored by the Indonesian Agency for Agricultural Research and Development of the Ministry of Agriculture, Indonesia, and by the Ministry of Agriculture, Nature and Food Quality of the Netherlands (under project nr. BO-10-006-031.02).

© 2010 Wageningen UR Food & Biobased Research, Wageningen, The Netherlands; Indonesian Centre for Agricultural Post Harvest Research and Development Bogor, Indonesia; Horti Chain Centre, Jakarta, Indonesia.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form of by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of Wageningen UR Food & Biobased Research, Wageningen, The Netherlands; Indonesian Centre for Agricultural Post Harvest Research and Development Bogor, Indonesia; Horti Chain Centre, Jakarta, Indonesia.

Wageningen UR Food & Biobased Research, Wageningen, The Netherlands; Indonesian Centre for Agricultural Post Harvest Research and Development Bogor, Indonesia; Horti Chain Centre, Jakarta, Indonesia, take no responsibility for any injury or damage sustained by using data from this publication.

## Programme Team

	Indonesia	The Netherlands
Programme management	Dr. Yusdar Hilman, Director ICHORD Telephone +62 21 7890990 Fax +62 21 7805135 E-mail: <a href="mailto:YHILMAN@INDO.NET.ID">YHILMAN@INDO.NET.ID</a>	Dr. Arij Everaarts, APR, General management Telephone +31 320 291 671 Fax +31 320 230 479 E-mail: <a href="mailto:ARIJ.EVERAARTS@WUR.NL">ARIJ.EVERAARTS@WUR.NL</a>  Mrs. Myrtille Danse, AEI, Supply Chain Management
Sweet pepper pilot project	Dr. Nikardi Gunadi, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: <a href="mailto:NGUNADI@BDG.CENTRIN.NET.ID">NGUNADI@BDG.CENTRIN.NET.ID</a>	Mrs. Marieke van der Staaij, Ruud Maaswinkel, WUR-Greenhouse Horticulture Telephone +31 317 485 537 Fax +31 105 225 193 E-mail: <a href="mailto:MARIEKE.VANDERSTAAIJ@WUR.NL">MARIEKE.VANDERSTAAIJ@WUR.NL</a> <a href="mailto:RUUD.MAASWINKEL@WUR.NL">RUUD.MAASWINKEL@WUR.NL</a>
Shallot pilot project	Dr. Rofik Sinung Basuki, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: <a href="mailto:ROFIK@HOTMAIL.COM">ROFIK@HOTMAIL.COM</a>	Lubbert van den Brink, APR Telephone +31 320 291 353 Fax +31 320 230 479 E-mail: <a href="mailto:LUBBERT.VANDENBRINK@WUR.NL">LUBBERT.VANDENBRINK@WUR.NL</a>
Hot pepper pilot project	Dr. Witono Adiyoga, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: <a href="mailto:VICIANTI@YAHOO.CO.ID">VICIANTI@YAHOO.CO.ID</a>	Herman de Putter, APR Telephone +31 320 291 614 Fax: +31 320 230 479 E-mail: <a href="mailto:HERMAN.DEPUTTER@WUR.NL">HERMAN.DEPUTTER@WUR.NL</a>
Supply chain management	Dr. Witono Adiyoga, Dr. Nikardi Gunadi, Dr. Rofik Sinung Basuki, IVEGRI	Mrs. Myrtille Danse, Mrs. Rolien Wiersinga, Dr. Dave Boselie, AEI Telephone +31 70 3358 341 Fax +31 70 3615 624 E-mail: <a href="mailto:MYRTILLE.DANSE@WUR.NL">MYRTILLE.DANSE@WUR.NL</a> <a href="mailto:ROLIEN.WIERSINGA@WUR.NL">ROLIEN.WIERSINGA@WUR.NL</a> <a href="mailto:DAVE.BOSELIE@WUR.NL">DAVE.BOSELIE@WUR.NL</a>
Quantitative Economic Analysis	Dr. Witono Adiyoga, IVEGRI	Marcel van der Voort, APR Telephone +31 320 291 312 Fax +31 320 230 479 E-mail: <a href="mailto:MARCEL.VANDERVOORT@WUR.NL">MARCEL.VANDERVOORT@WUR.NL</a>
Fruit supply chains	Dr. Sri Yuliani, ICAPRD Telephone +62 251 321762 Fax +62 251 350920 E-mail: <a href="mailto:S.YULIANI@GMAIL.COM">S.YULIANI@GMAIL.COM</a>	Dr. Jeroen Knol, FBR Telephone +31 317 480177 Fax +31 317 483011 E-mail: <a href="mailto:JEROEN.KNOL@WUR.NL">JEROEN.KNOL@WUR.NL</a>



---

## CONTENTS

<b>Executive summary</b> .....	<b>7</b>
<b>1. Introduction</b> .....	<b>9</b>
1.1. Background .....	9
1.2. Objective supermarket trial .....	9
1.3. Objective workshop.....	9
<b>2. Results supermarket trial</b> .....	<b>11</b>
2.1. Methodology .....	11
2.2. MAP film description.....	11
2.3. Participant .....	11
2.4. Product .....	11
2.5. Location .....	11
2.6. Time .....	12
2.7. Proces .....	12
2.8. Recommendations.....	12
<b>3. Workshop</b> .....	<b>13</b>
3.1. Participants .....	13
3.2. Programme .....	13
3.3. Conclusions.....	14
3.4. Recommendations.....	14
<b>Annex I. Observation</b> .....	<b>17</b>
<b>Annex II. Observation time</b> .....	<b>19</b>
<b>Annex III. Questionnaire</b> .....	<b>21</b>
<b>Annex IV. Pictures</b> .....	<b>23</b>
<b>Annex V. Invitation list by Horti Chain Centre</b> .....	<b>27</b>
<b>Annex VI. Photos workshop</b> .....	<b>29</b>



---

## **Executive summary**

In strengthening Fruit Supply Chains in Indonesia, taking place in Bogor on 20th – 21st April 2010, Indonesian Center for Agricultural Postharvest Research and Development cooperated with Wageningen University and Research Center, supported by Horti Chain Centre has conducted a workshop of rambutan (*Nephelium lappaceum*) postharvest technology for accelerating its local and export marketing, attended by more than 100 participants representing Government, Research Institution, University, Farmer, Business Association, Chamber of Commerce, Retail, Fruit and Vegetable Exporter, Logistics Provider, Media, and Packaging Manufacturer. Research results were presented with main purpose to disseminate result of the research in extending the shelf life and freshness of rambutan with Modified Atmosphere Packaging and Antifogging LDPE.



---

# 1. Introduction

## 1.1. Background

Horticultural Research Cooperation between Indonesia and The Netherlands (HORTIN) II Program focus on supply chain innovation of horticultural products, fruits and vegetables. Indonesia is rich of tropical fruits resources, whose potency to earn high economical value. One of these tropical fruits is rambutan (*Nephelium lappaceum*). Comparatively, rambutan potency is quite big with production in year 2007 reached 705,823 tons within area of 86,741 ha. However, only around 396,093 kgs that was exported due to its low competitiveness and lack of knowledge faced by the players regarding the export potency and opportunity, and the low support showed by government policy.

The main problem in developing rambutan is in its low quality. The quality is not stable and easy to get damaged, while the good and proper handling and processing technology is not yet well known or used, especially technologies to lengthen storage period and prevent damage, also technologies in processing rambutan in form of juice, concentrate, canned rambutan, etc. By using the proper processing and handling technologies, it is expected that rambutan can compete within domestic and export markets, to bring wealth to farmers and other rambutan business players as consequence.

To examine the advantages of this technology at real market condition, private sectors such as Indonesian Fruits Exporter, Importer from the Netherlands, Modern Market (Super Market) have participated in this research. To get access to the private sector, both parties, FBR and ICAPRD called on the assistance of Horti Chain Centre (HCC) to arrange research collaboration based on each role and responsibility.

To disseminate the results of processing and handling technologies of rambutan, the Indonesian Center of Agricultural Postharvest Research and Development, cooperated with Wageningen University and Research Center The Netherlands conducted Workshop, titled "Workshop on Postharvest Technology Application to Stimulate Domestic and Export Markets". To spread the results of applied research on extending self life of fresh Rambutan during transporting for export and display in modern retail shelf using LDPE with micro perforation and antifogging that involve private sector,. Horti Chain Centre was assigned by both parties mentioned above to invite private sectors such as Modern Retail, Business Association, Chamber of Commerce, Fruit and Vegetable Exporter, Logistics Provider, Media, and Packaging Manufacturer to be involved in the workshop.

## 1.2. Objective supermarket trial

The objectives of this trial are:

1. To identify retail (supermarket) customer preference to fresh rambutan packed with MAP film comparing with conventional packaging.
2. To identify retail management response to MAP film technology.
3. To try rambutan with MAP film packaging in real condition of supermarket.

## 1.3. Objective workshop

The objectives of this workshop are:

1. To explore the potency and opportunity if rambutan in domestic and export markets.
2. To disseminate processing and handling technology of rambutan as result of the research from Indonesian Center of Agricultural Postharvest Research and Development, cooperated with Wageningen University and Research Center The Netherlands.
3. To initiate partnership and cooperation in agribusiness.
4. To gain feedback from this cooperation in research and development of rambutan.



---

## 2. Results supermarket trial

### 2.1. Methodology

In this trial, two types of packaging (MAP with antifogging LDPE and Net Packaging) and two varieties of Rambutan (Lebak Bulus and Rapih) are used. Each variety is packed into 0.5 kg/pack using MAP+Antifogging technology and Net Packaging. All of pack display in the Super Market in Jakarta under room temperature condition. To get feedback from buyer, questioner form is spread out to the visitor of super market. Observation to the rambutan's appearance during trial is carried out at first day, fourth day and seventh day by taking picture.

### 2.2. MAP film description

The MAP film description as follow:

- Film is made from LDPE (thickness of 0.04 mm) with some laser perforation and antifog layer.
- Its function is to create modified atmosphere inside the packaging.

### 2.3. Participant

This trial is conducted by:

- As Research Institute: Balai Besar Pasca Panen Bogor and Wageningen UR Food & Biobased Research The Netherlands.
- As Retail/Super market: Matahari Group
- Facilitator: Horti Chain Centre

### 2.4. Product

The varieties that are being displayed are: Lebak Bulus & Rapih with quantity totally of 100 kg/outlet with details as follow:

- 25 kg Lebak Bulus with MAP Film (gross weight, including the film weight)
- 25 kg Lebak Bulus with net (gross weight, including the net & twig weight)
- 25 kg Rapih with MAP Film (gross weight, including the film weight)
- 25 kg Rapih with net (gross weight, including the net & twig weight)

The price is the same as the current's supplier price and is decided by Matahari. There is one package of each variety that isn't sold, as a comparison control. The sticker attached on the MAP Film packaging is prepared by Balai Besar Pasca Panen.

### 2.5. Location

The location is chosen in Jakarta due to assumption consideration that Jakarta residents usually shops more often at the supermarket (and not to traditional market) comparing to Bogor residents. There are 3 outlets available for this experiments, they are: 2 outlets whose high end segment (Food Mart) and 1 outlet whose medium-low segment (Hypermart).

For Food Mart, the locations are:

1. Cilandak Town Square. Jalan TB Simatupang KV. 17, Cilandak Jakarta Selatan.
2. Atrium Plaza. Jalan Senen Raya No. 135, Jakarta Pusat.

---

For Hypermart, the locations are:

1. Cibubur Junction. Jalan Jambore, Cibubur.

## 2.6. Time

The experiment is conducted from Thursday 18th February until Wednesday 24th February 2010. Rambutan is distributed to outlets between 10.00 – 14.00 AM. It is displayed for 5 working days and 2 weekend days. The first day of display is the same day as the Matahari's current supplier sending their own rambutan.

We allocate our observers based on Matahari customer's peak-time as follow:

- For working days: 11.00 – 14.00 AM and 15.00 – 18.00 AM
- For weekend days: 14.00 – 17.00 AM

## 2.7. Proses

To be able to supply to Matahari, we should be registered as supplier. As the experiment is short-term one, we use their current supplier registration (UD Berkah Jaya). During the experiment, questionnaires are distributed to the customers. The observer is 1 -2 students (from IPB) with working time is 3 hours/day. Observation / photos taken are conducted on Day 1, 4, and 7. These students are equipped with an Assignment Letter, agreed by Matahari management. The observer briefing is conducted by HCC on Wednesday 17th February 2010.

## 2.8. Recommendations

There are some recommendation suggestion arose from the trial as follow:

- Usually research is only conducted in short term, not continued with applicable result. It is hoped that this research could be applied in real business. The customers already saw and bought it, and if there is future demand from them to buy the same package (with MAP Film), the supplier can provide it.
- Retail is interested in possibility of trying it with fresh vegetables product, which is expected to be kept fresh within 7-8 days.
- In the future we should pay more attention to the quality of the rambutan itself. By packing the fresher rambutan, it's hoped that it can be sold easily, too. So it can reduce the cost of research.
- There should be more information on the packaging such as harvested form selected fruit, pre wash etc.
- The temperature at the shelf is +/- 27-28 degree in Celcius so it is not suitable for map film packaging, while the temperature should be 10-12 degree in Celcius. Rapih is more suitable with map comparing to Lebak Bulus.

---

## 3. Workshop

### 3.1. Participants

The participants were coming from various backgrounds as follow:

- Indonesian Ministry of Agriculture
- Indonesian Agency for Agricultural Research and Development
- Indonesian Center of Agricultural Postharvest Research and Development
- PT Matahari Putra Prima, Tbk (Retail)
- CV Sumber Buah (Fruit Exporter)
- Study Centre of Tropical Fruit Institut Pertanian Bogor
- Indonesian Tropical Fruit Research Institute
- Assessment Institute Agricultural Technology of Subang, Ciamis, Banjar (West Java), Bogor, Tangerang, Lebak, Semarang, Blitar, Banjar (South Kalimantan), Langkat, Sambas, Batanghari
- Indonesian Small Business Exporters Consortium
- Indonesian Vegetable and Fruit Exporter Association
- Indonesian Fresh Fruit and Vegetable Exporter and Importer Association
- Indonesian Cold Chain Association
- Indonesian Netherlands Chamber of Commerce
- PT Agung Mustika Selaras (Fruit Exporter)
- CV Surya Alam Sejahtera (Fruit Exporter)
- CV Arsam Pratama (Fruit Exporter)
- Bina Usaha Al Ikhsan (Farmer Cooperative)
- PT Hokomega Transportama (Logistics/Freight Forwarder)
- AGRINA (Biweekly Agribusiness Tabloid)
- PT Century Mitra Sukses Sejati (Packaging Manufacturer)
- PT Poros Nusantara Utama (Exporter)
- PT Mulia Raya (Fruit Trader)

Participants that coming from private sector were invited by Horti Chain Centre as requested by Indonesian Center of Agricultural Postharvest Research and Development

### 3.2. Programme

The 1st Day

Venue : Auditorium of Indonesian Center of Agricultural Postharvest Research and Development, Bogor.

Time : 08.00 – 17.00 AM

Participant : All

Activity : Paper presentation, Discussion

Paper presented :

- Policy Direction and Development Program of Rambutan (Directorate of Horticulture, Ministry of Agriculture)
- Potency of Resource and Research Development of Rambutan (Study Centre of Tropical Fruit Institut Pertanian Bogor)
- Market Opportunity of Rambutan in Europe and Potential New Processing Technology for Rambutan (Wageningen University and Research Center The Netherlands)
- Domestic Market Opportunity of Rambutan at Supermarket Segmen (PT Matahari Putra Prima, Tbk)
- Application of MAP and CA Technology for Rambutan (Wageningen University and Research Center The Netherlands)
- Handling and Processing Technologies and Market Trial of Rambutan at Supermarket (Indonesian Center of Agricultural Postharvest Research and Development)

- Good Agricultural Practices Application to produce Fruit with Export Quality (Indonesian Tropical Fruit Research Institute)
- Rambutan Flower Stimulation Technical (Study Centre of Tropical Fruit Institut Pertanian Bogor)
- Prospect and Experience in Exporting Rambutan (CV Sumber Buah)
- Fresh Rambutan Handling Technology (Indonesian Center of Agricultural Postharvest Research and Development)

The 2nd Day

Venue : Hall of Indonesian Center of Agricultural Postharvest Research and Development, Bogor.

Time : 08.00 – 13.00 AM

Participant : Farmer, Researcher, Fruit Exporter, Facilitator

Activity : Paper presentation, Fruit processing demonstration, Discussion

Paper presented :

- Rambutan Juice Processing Technology (Indonesian Center of Agricultural Postharvest Research and Development)
- Rambutan Processing Technology / in Heavy Syrup (Indonesian Center of Agricultural Postharvest Research and Development)

### 3.3. Conclusions

The workshop has been successfully attended by more than 100 participants representing relevant stakeholders in rambutan marketing: Government, Research Institution, University, Farmer, Business Association, Chamber of Commerce, Retail, Fruit and Vegetable Exporter, Logistics Provider, Media, and Packaging Manufacturer. They are very much interested in having the MAP film available, so that they can use it for their export/trading activities. A request from retail regarding this film utilization possibility for vegetables was also identified.

Our team also conclude:

1. Indeed the continuous availability of relatively cheap and high quality plastic films in Indonesia is crucial. Apart from Peak Fresh (Australia) Stepac from Israel and Amcor (France) are potential suppliers. Most films can also be used for topsealing which is another promising development.
2. It seems to us that cold chain management is the key for improving quality and extending shelf life of rambutan. MAP plastic films are developed for optimal results with a constant temperature regime of 10 °C (as an example). Fluctuating temperature conditions or a constant too high temperature are detrimental for the rambutan quality, regardless MAP packaging. MAP films can never compensate for lack of pre cooling and poor cold chain management.
3. MAP packaging for export markets. Best results were obtained with the MAP bag in a box and repacking in the Netherlands after arrival. This is however a sub optimal and expensive solution and is only compensating – according to us - for poor cold chain management during the export process. In this experiment 500 gram pre packed Rambutan in MAP bags was sub optimal in terms of quality but this was likely to be caused by the fluctuating temperature conditions in the supply chain.
4. Obviously sea transport of rambutan is not an option, because none of the treatments (CA nor MAP) results in longer shelf life than 14 – 18 days (depending on the variety).
5. The so called sea-air bridge is also no option because the distance from Jakarta to Dubai by sea transport is too distant.

### 3.4. Recommendations

We suggest;

1. We consider that instead of focussing on the optimization of MAP plastic films only we should simultaneously focus on cold chain management. Once Indonesian traders and exporters control the conditions during transport we could combine this with the best MAP option. We can try export / trade

---

Indonesian rambutan with the Thai way, by doing a cold chain audit first and decide whether to use pre cooling facilities close to the farms; whether to use foam boxes and dry ice or gel packs; whether to use insulating blankets; cooling facilities at the airport etc and combine these measures with the application of MAP films. The Thai are quite successful in keeping their products (such as asparagus, baby corn and fruits) cool all the way to the UK or Australia. Their methods are well documented and HCC could support this.

2. MAP films for domestic markets. To date there are no benefits using MAP film for the domestic market in Indonesia when rambutan is of poor quality and not pre cooled and kept under cold transport conditions. This was illustrated in the Matahari experiment. In the same experiment it was also learnt that MAP packed rambutan should be displayed under chilled conditions for optimum performance and extended shelf life. Apart from the (non) availability of plastic film is a major problem the discontinual supply of high quality rambutan to the supermarket.
3. MAP packaging for other vegetables in Indonesia. When films are available in the market in Indonesia it can be calculated which product should be packed in which film. The OTR of most products at a particular temperature is known and can be found on the internet. Some verification experiments can be conducted to fine tune the technology for Indonesian products and circumstances. However the key for a solution is good cold chain management and how to avoid temperature fluctuations. Only then it can be beneficial to deploy MA films and CA technology.



---

## **Annex I. Observation**

### **CIBUBUR JUNCTION**

*Day 1: Thursday 18th Feb 2010*

Rambutan appearance is not so fresh, already with the fog. The temperature inside the retail is quite warm. The package is priced per 1 kg/package, while the actual weight/package is around 600 gr (MAP) and 750 gr (conventional).

*Day 3: Saturday 20th Feb 2010*

Rambutan is replaced by Lebak Bulus only, with the fresher ones.

*Day 4: Sunday 21st Feb 2010*

Consumers have impression that packaging of Rambutan in conventional way (including leaves) looks fresh because the leaves are still exist. Other customers assume that Rambutan in plastic bag is ready to eat because it has been washed and never touched by other visitors.

*Day 7: Wednesday 24th Feb 2010*

The condition of fruits is very bad, both in the map and net. In the map packaging, the fruit becomes juicy while in the net packaging the fruit becomes too dry already.

### **CILANDAK TOWN SQUARE**

*Day 1: Thursday 18th Feb 2010*

Rambutan appearance is not so fresh, already with the fog. It arrives late (around 16.30 AM). The package is priced correctly or per actual weight as Matahari regulation. We get the best display-location. It's in the front and together with import and hot item-fruits. Other fresh rambutan from other Matahari supplier that came also that morning looks fresher than ours and customers prefer to buy it instead.

*Day 3: Saturday 20th Feb 2010*

Rambutan that is being replaced only Lebak Bulus.

*Day 7 : Wednesday 24th Feb 2010*

Only Rapih in MAP left at display. Condition: varies, some still can be eaten, some in bad condition already. Likely all will be taken out that day by Matahari.

### **ATRIUM PLAZA SENEN**

*Day 1: Thursday 18th Feb 2010*

Rambutan appearance is not so fresh, already with the fog. The package is priced correctly or per actual weight as Matahari regulation. Other fresh rambutan from other Matahari supplier that came also that morning looks fresher than ours and customers prefer to buy it instead.

*Day 3: Saturday 20th Feb 2010*

Rambutan is not replaced at all, because there were many packages that are already sold.

*Day 4: Sunday 21st Feb 2010*

Rambutan is already in a very bad condition, dry, and gathered by flies. Balai Besar Pasca Panen confirms that they will not send any more replacements, so by that day the experiment at that location is finished.



---

## ***Annex II. Observation time***

**Table 1. Oxygen and carbon dioxide concentrations applied to the 3 varieties of rambutans during the control atmosphere experiment (at 10°C)**

No.	Day	Date	Time		
			Cibubur junction	Cilandak Town Square	Atrium Plaza Senen
1	Thursday	18-02-2010	11:00 – 14:00	11:00 – 14:00	15:00 – 18:00
2	Friday	19-02-2010	15:00 – 18:00	15:00 – 18:00	15:00 – 18:00
3	Saturday	20-02-2010	14:00 – 17:00	14:00 – 17:00	14:00 – 17:00
4	Sunday	21-02-2010	14:00 – 17:00	14:00 – 17:00	14:00 – 17:00
5	Monday	22-02-2010	11:00 – 14:00	11:00 – 14:00	11:00 – 14:00
6	Tuesday	23-02-2010	15:00 – 18:00	15:00 – 18:00	15:00 – 18:00
7	Wednesday	24-02-2010	15:00 – 18:00	15:00 – 18:00	11:00 – 14:00





---

Harga ideal buah rambutan :

a. seperti sekarang      b. Kemahalan      c. bisa lebih mahal untuk produk eksklusif

Apakah Anda akan membeli kemasan baru kami dengan kenaikan Rp. 1,000/kg?

a. Ya      b. Tidak

Pertimbangan pemilihan kemasan:

a. Tampilan      b. Tahan lama      c. Harga      d. Isi sesuai kebutuhan (sebutkan)..... kg

Apakah ada daerah pilihan untuk rambutan : sebutkan....

Bila rambutan diolah apakah anda tertarik membeli :

a. Ya      b. Tidak

Jenis olahan apa yang disukai :

a. Jus      b. Rambutan kering      c. Dalam sirop      d. Beku      e. Lainnya....

Apakah ada hal menarik / komentar/ perbaikan yang ingin diung

---

**Annex IV. Pictures**



Figure 1. Rapih Variety with net packing (day-1).



Figure 2. Rapih Variety with MAP and Antifogging LDPE (day-1).



Figure 3. Lebak Bulus Variety with net packing (day-1).



Figure 4. *Lebak Bulus Variety with MAP and Antifogging LDPE (day-1).*



Figure 5. *Lebak Bulus Variety with net packing (day-4).*



Figure 6. *Lebak Bulus Variety with MAP and Antifogging LDPE (day-4).*



Figure 7. Rapih Variety with net packing (day-4).



Figure 8. Rapih Variety with MAP and Antifogging LDPE (day-4).



Figure 9. Rapih Variety with MAP and Antifogging LDPE (day-7).



Figure 10. *Lebak Bulus* Variety with MAP and Antifogging LDPE (day-7).

## Annex V. Invitation list by Horti Chain Centre

NO	GROUP	COMPANY	CONTACT PERSON	POSITION	Fax	Phone
1	Association	Indonesia Small Business Exporters Consortium	Ms. Lily Yuliani MBA	President	021 7541 222	021 754 1221
2	Association	Indonesia Small Business Exporters Consortium	Mr. Erwin Elias MM, PhD	Founder	021 7541 222	021 754 1221
3	Association	AESBI (Asosiasi Eksportir Sayur dan Buah Indonesia)	Mr. Rachman Ginting	Member, PT Momenta Agrikultura	62 21 7588 1953-4	62 21 7588 1950
4	Association	AESBI (Asosiasi Eksportir Sayur dan Buah Indonesia)	Mr. Martinus Dwi Cahyanto	Member, PT Momenta Agrikultura	62 21 7588 1953-4	62 21 7588 1950
5	Association	ASSIBSINDO (Asosiasi Eksportir - Importir Buah dan Sayuran Segar Indonesia)	Ms. Penny Fransiska	Representative	62 21 721 1357	62 21 721 1358
6	Association	Asosiasi Rantai Pendingin Indonesia	Mr. Hasanuddin Yasni	Executive Director	6221-8306705	021 830 6609
7	Association	Asosiasi Rantai Pendingin Indonesia	Mr. Sunandi Kertawijaya	Member, PT Royal Sun Fruit	62 260 470 638	62 260 470 638
8	Chamber of Commerce	Horti Chain Centre	Mr. M. Hariyadi Setiawan	Executive Director	62 21 5290 2178	62 21 5290 2177
9	Chamber of Commerce	Horti Chain Centre	Mr. Iskandar Zulkarnain	Applied Technology Manager	62 21 5290 2178	62 21 5290 2177
10	Chamber of Commerce	Horti Chain Centre	Ms. Rara Dewayanti	Marketing & Business Development Manager	62 21 5290 2178	62 21 5290 2177
11	Exporter	PT. Agung Mustika Selaras	Mr. Budi Waluyo	Operational Manager	021 690 7311	021 690 4140
12	Exporter	CV Surya Alam Sejahtera Indomerapi	Mr. Surya Agung, ST	Director	62 274 446 1617	62 274 820 7992
13	Exporter	CV Arsam Pratama	Mr. Arief Syamsul, S.Sos	Director	62 274 446 1617	62 274 820 7992
14	Farmer	Koperasi Bina Usaha Al Ihsan	Mr. Nanang Koswara	Manager	62-251-710-8845/642-799	0817 9036 730
15	Logistics	PT Hokomega Transportama	Mr. Hendra Lie	Sales Executive	021 6530 2848	021 6530 2856
16	Media	AGRINA Tabloid Agribisnis Dwimingguan	Mrs. Brenda Andriana	Manager	021 7883 8584	021 7883 7175
17	Plastics Manufacturer	PT Century Mitra Sukses Sejati	Mr. Budi Sampurno	General Manager	62 21 596 2299	62 21 596 3399
18	Trader	PT Poros Nusantara Utama	Mrs. Rina Agustine	Manager	62 251-8393246	62 251-8393245
19	Trader	Mulia Raya	Mr. Rully H.	Farm Manager (Local Fruit)	021 619 8326 / 545 5464	021 5436 7571
20	Trader	Mulia Raya	Mrs. Hanny	Export Manager	021 619 8326 / 545 5464	021 5436 7571



## Annex VI. Photos workshop



L to R:  
Meshvara Kanjaya (PT Matahari Putra Prima, Tbk),  
Susiami (Ministry of Agriculture), Wisnu Broto (IAARD),  
Dr. Sobir (Tropical Fruit Research Centre),  
Dr. Sri Yuliani ( IAARD)



Participants



Example of rambutan product development: in heavy  
Syrup and juice



2<sup>nd</sup> day of workshop, enthusiastic participants are  
trained to make rambutan juice and heavy syrup-fruit