



**THAI AGRICULTURAL STANDARD**

**TAS 1000-2003**

**GOOD AGRICULTURAL PRACTICES FOR  
LONGANS**

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

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Longans are the agricultural commodity that Thailand has the potential to produce and export. In order to provide the Thai longans with better acceptance by both national and international levels in term of food safety for consumers and export promotion, the Ministry of Agriculture and Cooperatives deems it proper to establish the Thai Agricultural Standard (TAS) on Good Agricultural Practices for Longans.

The provisions of this standard are based on the information of the following documents:

FAO/WHO. 2001. Draft Code of Hygienic Practice for Fresh Fruits and Vegetables (Alinorm 03/13 Appendix II). Joint FAO/WHO Food Standard Programme, FAO, Rome. 26p.

Department of Agriculture. B.E.2546. Quality Management System and Documentation for Quality Management System: GAP for Longans for farmer.

***Remark:***

The standard title has been amended from “Thai Agricultural Commodity and Food Standard (TACFS)” to “Thai Agricultural Standard (TAS)” in accordance with the enforcement of the Agricultural Standards Act B.E. 2551 (2008).



**NOTIFICATION OF THE NATIONAL COMMITTEE ON  
AGRICULTURAL COMMODITY AND FOOD STANDARDS  
SUBJECT: THAI AGRICULTURAL COMMODITY AND FOOD STANDARD:  
GOOD AGRICULTURAL PRACTICES FOR LONGANS  
B.E.2546 (2003)**

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It is deemed appropriate to establish the Thai Agricultural Commodity and Food Standard: Good Agricultural Practices for Longans to improve the quality, facilitate trade and protect consumers' health. Consequently, the notification on Thai Agricultural Commodity and Food Standard entitled Good Agricultural Practices for Longans is hereby issued as a voluntary standard by the National Committee on Agricultural Commodity and Food Standards. The details of which are attached herewith.

Notified on 9 July 2003 (B.E.2546)

Mr. Sora-at Glinpratun

Minister of the Ministry of Agriculture and Cooperatives  
Chairperson of the National Committee on Agricultural Commodity and Food Standards

**THAI AGRICULTURAL STANDARD  
GOOD AGRICULTURAL PRACTICES FOR LONGANS**

**1 SCOPE**

1.1 This Thai Agricultural Standard (TAS) on Good Agricultural Practices (GAP) for Longans applies to all production steps at farm level in order to obtain longans which are safe, free from pest and of good quality for fresh consumption.

1.2 This GAP for longans shall be jointly implemented with the Thai Agricultural Standard for Longans.

**2 DEFINITIONS**

For the purpose of this standard:

2.1 Longans mean fruits that are commercially grown from *Dimocarpus longan* Lour. of Sapindaceae family for fresh consumption.

2.2 Hazardous substances, referring to the Hazardous Substance Act, B.E. 2535 (1992), mean the following substances:

- explosive substances;
- flammable substances;
- oxidizing agents or peroxides;
- toxic substances;
- substances causing diseases;
- radioactive substances;
- mutagenic substances;
- other substances, either chemicals or anything which may cause harm to humans, animals, plants, properties or environments.

2.3 Pesticides mean any hazardous substances used in agriculture and regulated by the Department of Agriculture in accordance with the Notification of the Ministry of Industry regarding the list of hazardous substances issued under Hazardous Substance Act B.E. 2535 (1992).

2.4 An optimally mature longan fruit means the fruit that develops to its full size with smooth skin, and the taste is suitable for fresh consumption required by consumers.

**3 REQUIREMENTS AND INSPECTION METHODS**

Requirements and inspection methods on Good Agricultural Practices for longans are defined in Table 1.

**Table 1 Requirements and Inspection methods**

<b>Items</b>	<b>Requirements</b>	<b>Inspection methods</b>
1. Water sources	- Water source shall be from a source that its environment is safe from contaminations.	- Visual inspection of the environment. If there is any risk, water quality shall be analysed.
2. Plantation area	- The area shall be free from hazardous substances that can cause residues or contamination to the produce at harmful level to consumers.	- Visual inspection of the environment. If there is any risk, the soil quality shall be analysed.
3. Pesticide application	- If a pesticide is applied, it shall follow the recommendations of the Department of Agriculture, or follow the directions on the officially registered labels authorized by the Department of Agriculture, Ministry of Agriculture and Cooperatives.	- Examine the pesticide storage. - Check the records on the pesticide application. - If there is an evidence of misapplication of pesticide, the produce shall be analysed for pesticide residue.
4. Pest free produce management	- Survey the infestation of longan pests such as mealy bugs, scale insects, fruit rot diseases and other pests on the tree. When the amount of pests and the damage degree reach the economic threshold level, appropriate pest control shall be conducted.	- Check the records of longan pest survey. - Check the records on pesticide application data.
	- If pests are found along with the harvested longans, they shall be sorted out.	- Visual inspection of the sorting result.
5. Harvest and post-harvest handlings	- Harvest only optimally mature longans according to variety and planting location.	- Visual inspection of fruit characteristics.
	- Containers and equipment used in the harvest shall not damage the fruit quality and its keeping quality including contaminations that affects consumers' safety.	- Visual inspection of equipment, containers, harvesting method and its steps.
	- Fruit size grading and bunch trimming are carried out to obtain uniform size fruit in every bunch. Providing that fruits of smaller or larger than the average size in the designated size class are allowed not over 20% for fruit in bunch and 10% for individual fruit.	- Visual inspection of the harvested and graded fruits.
	- Bunch stem is trimmed to not	- Visual inspection of the



Items	Requirements	Inspection methods
	over 15 cm long from the top fruit of the bunch for longans in bunch, and pedicel of individual fruit is not over 5 mm long that the attachment is not broken.	trimmed fruits.
6. Produce holding and moving in the orchard	<ul style="list-style-type: none"> <li>- Produce holding area shall be clean with good ventilation and able to prevent contamination from foreign matter, hazardous substances and disease carrier.</li> <li>- Equipment and vehicles for moving of produce shall be clean, not contaminated with substances that affect consumers' safety.</li> <li>- Produce moving shall be hygienic and not cause damages to the produce.</li> </ul>	- Visual inspection of produce holding area, equipment, containers and steps/moving method.
7. Data recording	- Data recording shall be carried out on longan pest survey and application of pesticides with complete details in accordance with example of record form in Appendix A.	- Check the record.

#### 4 RECOMMENDATIONS ON GOOD AGRICULTURAL PRACTICES FOR LONGANS

The recommendations on good agricultural practices for longans are to advise farmers to produce longans which are free of pest, safe and suitable for consumption. The details are prescribed in Appendix B.

**APPENDIX A**

**EXAMPLE  
DATA RECORD FORM  
FOR LONGAN PEST SURVEY AND THE APPLICATION OF PESTICIDES**

Orchard Owner's Name \_\_\_\_\_ Family Name \_\_\_\_\_ Orchard Owner's Registration No.

Planting Variety \_\_\_\_\_ Planting Plot No. \_\_\_\_\_ Planting Area \_\_\_\_\_ Rai Amount of Tree \_\_\_\_\_ Year of Operation \_\_\_\_\_

Production Step	Longan Pest Survey			Pesticide Application					Other Control Measures (Specify)	Name of Operating Person
	Survey Date	Survey Result		Applied Date	Pesticide Names	% Active Ingredient and Applied Formula	Applied Rate*	Amount of Pesticide Applied in the Orchard		
		Pest Name	Not Found							
Tree Nourishment Period After Harvest										
Flowering and Fruiting Period										
Fruit Development Period										

\* N.B. Application Rate depends on application methods i.e. grams/tree or kilograms/tree or milliliters (cc)/20 liters of water.

## APPENDIX B

### RECOMMENDATIONS ON GOOD AGRICULTURAL PRACTICES FOR LONGANS

#### 1 DEFINITIONS

1.1 Orchard hygiene means necessary condition and measures of production processes in the orchard. These are to obtain produce which is safe and suitable for consumption.

1.2 Plantation area means an area in which crop is planted and is not connected to other areas. In case the area is connected to others, it shall be clearly different in the management of production processes including input, planning and personnel management,

#### 2 MANAGEMENT ON GOOD AGRICULTURAL PRACTICES

2.1 Orchard hygiene management.

2.1.1 Orchard history and land utilization.

2.1.1.1 Record data of the plantation area by indicating name and address of the orchard owner, name and address of the plantation area care-taker (if any), site, map and layout of the plantation area, kinds of crop and planting varieties, history of land use in the past for at least 3 years, and other details according to example of record form 1 (general data of orchard owner).

2.1.1.2 In case the plantation area is near or in industrial location or risky area, there should be soil analysis to check the soil property and contamination from hazardous substances at the beginning of production. This should be carried out once by taking soil sample and sending it to official laboratory or officially accredited laboratory for analysis. Record data in accordance with example of record form 2 (result of water and soil analysis). This analytical report shall be kept for further evidence.

2.1.2 Water source and quality.

2.1.2.1 Water used in the production process should not be obtained from sources where the environment is risky to contamination with any harmful substances and the quality is suitable for agricultural purpose. It shall not be waste water from industries or water from other processes contaminated with hazardous substances. If it is necessary to use such water, there shall be evidence that the water has been treated to improve the quality to suit the agricultural purpose.

2.1.2.2 Water sample should be collected at least once at the beginning of production and send it to official laboratory or officially accredited laboratory for analysis to check contamination. Record the data in accordance with example of record form 2 (result of water and soil analysis). Keep the water analysis report for further evidence.

2.1.2.3 Water source for agriculture should not cause any damage to the environment.

### 2.1.3 Pesticide storage.

2.1.3.1 Pesticides used in the production processes shall be stored in well closed, safe location with sunlight and rain proof, and good ventilation.

2.1.3.2 Pesticide storage site shall be separated and far away from residential area and food processing location. It shall not be in the upstream or water passing area in order to prevent chemical contamination to the water source.

2.1.3.3 Pesticides shall be stored in the well closed container with clearly identified label. They should be separately stored without mixing with fertilizers, plant growth regulators and other plant supplements. Once pesticide container is opened, it is prohibited to transfer the content out of the original container.

2.1.3.4 Pesticide storage site shall be fully equipped with tools and accidental prevention materials such as eye wash, clean water, sand and fire extinguisher.

2.1.3.5 Hazardous substances which are banned from production, import, export or possession in accordance with the Hazardous Substance Act B.E. 2535 (1992) are not allowed to be stored in the chemical storage site or within the orchard.

### 2.1.4 Good practices for pesticide application

2.1.4.1 Do not use pesticides that are not registered in accordance with the Hazardous Substance Act B.E. 2535 (1992) and those banned by trade partners.

2.1.4.2 Read direction on the label in order to understand the property and pesticide application method before every operation.

2.1.4.3 Entrepreneur and workers who are in the field of pest control measures should know about the longan pests, kinds and pesticide application rate, selection of sprayers and spraying nozzles including the right spraying method. The sprayer shall be maintained in workable condition at all time. To prevent hazardous substance contamination on garments and the body, the operator shall wear clothes with personal protective equipment i.e. mask, nose cover cloth, gloves, cap and shoes.

2.1.4.4 Measure the chemical into the mixing tank, adjust the water volume according to substance concentration, and agitate the mixture well before spraying. Pesticide should be sprayed in the morning or evening period while the wind is calm. Avoid spraying during strong sunlight or wind and during operation the operator should always be over the wind direction at all time.

2.1.4.5 Prepare the pesticide mixture and finish it within each time, do not leave any pesticide mixture in the spraying tank.

2.1.4.6 When pesticide is used up, rinse the empty pesticide container a few times with water, collect it in the spraying tank, and adjust the mixture with water accordingly before use.

2.1.4.7 After every pesticide spraying, the operator shall immediately take shower, shampoo and change clothes which shall be well laundered each time.

2.1.4.8 Stop spraying pesticide before harvest in accordance with the time specified on the label regulating its application.

2.1.4.9 Pesticide that cannot be finished in one time, the container shall be tightly closed after use, and stored in the chemical storage site.

## 2.1.5 Cleanliness, safety and disposal of waste and by-product material

2.1.5.1 The empty pesticide container shall be punctured in order to prevent its reuse. It is then discarded at the site provided for such container or destroyed by burying far from water source with sufficient depth that animal cannot dig it up, and burning it is prohibited.

2.1.5.2 Pathogenic infested plant branches shall be burnt outside the planting plot.

2.1.5.3 Plant materials or trimmed branches from non-pathogenic infested tree can be used for compost or green manure.

2.1.5.4 Clearly separate types of garbage such as paper, paper carton, plastic, glasses, oil, chemicals and plant wastes. There should be garbage drums in good order or clearly identified garbage dumping area.

## 2.2 Management of agricultural equipment and tools

### 2.2.1 Details and storage management for agricultural equipment and tools

2.2.1.1 There shall be suitable and sufficient agricultural equipment for the operation.

2.2.1.2 Agricultural equipment and tool storage area should be separated, safe and easy to be used with clearly identified label. Set up maintenance plan for all agricultural tools and equipment.

### 2.2.2 Inspection of equipment condition and maintenance

2.2.2.1 There shall be condition inspection of agricultural equipment and tools such as chemical sprayer, harvesting equipment prior operation. They shall be cleaned every time after use, and before stored in the storage location.

2.2.2.2 Inspection, repair and maintenance of agricultural equipment and tools shall be done in accordance with maintenance plan and recorded every check up and repair result.

2.2.2.3 Agricultural equipment and tools, containers used in the packaging and transport of produce shall be cleaned every time before use, after the work is done, and before storage.

2.2.2.4 Agricultural equipment and tools which require accuracy in the operation such as spraying nozzle for pesticide shall be regularly checked for its accuracy. If any discrepancy is found, it shall be corrected by repairing or replacing with a new one in order to operate such equipment with standard efficiency.

## 2.3 Management of production inputs.

2.3.1 Record details of production inputs and their sources. Record details and description particularly of important production inputs such as variety, fertilizers, pesticides which are used in the production processes. These include a list of amount and date of purchase, and record the data according to the example of record form 3 (list and description of production inputs).

## 2.4 Management in the production steps.

2.4.1 The management to obtain uniform and large size longan fruits in each bunch

2.4.1.1 Tree nourishment after harvest

(i) Fertilizer application

In order to apply fertilizer appropriately, there should be tree health evaluation after fruit harvest and tree growth characteristics i.e. new young leaf condition. Fertilizer application shall be in accordance with the recommendations of the Department of Agriculture and recorded as the example in record form 4 (data of fertilizers and other chemicals for growth promotion).

(ii) Pruning

Longan tree branches should be pruned according to their characteristics and age in order to obtain better light distribution of the canopy and to open up the hiding places of longan pests.

(iii) Watering longan orchard during tree nourishment after harvest

Watering longan orchard during tree nourishment after harvest period is usually in the rainy season. This period water is sufficient for the tree development. If the drought exists for over 7 days, irrigation is needed at the rate of 60% of water evaporation from water evaporation pan type A.

(iv) Longan pest control measures during tree nourishment period

The important pests are such as leaf miner, branch borer or red coffee borer, four-leg mite, phytophthora fruit rot and leaf blight, and witches' broom. Survey the pest infestation in accordance with the recommendation in Appendix C (examples of longan pests under surveillance and survey method). If the amount found is at the economic threshold level, control measures in accordance with the official recommendation shall be carried out, and record the data in the form as in Appendix A (example of data record form for longan pest survey and the application of pesticides).

#### 2.4.1.2 Control of flowering and fruiting.

(i) To induce flowering naturally

Natural flowering induction should be carried out when more than 60% of the leaves are fully grown after harvest, and the trees are well prepared. In order to induce flowering, stop watering and let the tree expose to temperature below 15 °C for more than 14 consecutive days.

(ii) To induce flowering with agricultural hazardous substance

It shall be done in accordance with the official recommendation. The data of such practice shall be recorded as Appendix A (example of data record form for longan pest survey and the application of pesticides).

(iii) Pest control at flowering stage

The important pest at this stage is longan stink bug. Pest infestation shall be surveyed in accordance with the recommendation in Appendix C (examples of longan pests that shall be under surveillance and survey method). If the amount found is at the economic threshold level, it shall be controlled in accordance with the official recommendation, and the data shall be recorded as attached form in Appendix A (example of data record form for longan pest survey and pesticide application).

#### 2.4.1.3 Management for fruit development.

(i) Fertilizer application

Fertilizer application for promoting fruit development is carried out as soon as the tree starts blooming in accordance with the official recommendation, and the data shall be recorded as attached form in form 4 (data of fertilizers and other chemicals for growth promotion).

(ii) Watering

The tree is watered when longan fruit is 2 weeks after blooming, and water evaporation rate is 70% from water evaporation pan type A.

(iii) Fruit thinning for uniform size

In case the tree is over flowering with more than 80 fruits per bunch or the fruit bunches are more than 70% of the total shoots of the tree, fruit thinning should be done to obtain better uniform size. When the fruit is about 1 month and there are fruit bunches more than 70% of the total shoots on the tree, fruit thinning should be done by cutting off 1/3 of the fruits on the bunch length or not more than 80 fruits per bunch. Only the batch with the highest yield is chosen for harvest.

#### 2.4.2 Management of pesticide use for safe produce

2.4.2.1 Pesticide application is in accordance with longan pests found from the survey, and complied with the official recommendation on pesticide application. The data shall be recorded as attached form in Appendix A (example of data record form for longan pest survey and pesticide application).

2.4.2.2 Pesticide shall be legally applied according to the registered pesticide and recommendations for use for longan. The banned pesticides from production, import, export, or possession in accordance with Hazardous Substance Act B.E.2535 (1992), including those listed by country trade partner, shall not be used. Prior to harvesting, the use of pesticide shall be stopped at an appropriate period as indicated on the label attached to each pesticide and complied with the official recommendations.

#### 2.4.3 Management for pest free longan.

2.4.3.1 There shall be a survey for the infestation of important longan pests, and their control measures in the developing stage of fruit as Appendix C (examples of longan pests under surveillance and survey method).

2.4.3.2 Examine the result of longan pest control measures, and record the data as record form 5 (Pre-harvest Data Record on Outcomes of Important Longan Pest Control). Longan fruits which are ready for harvest shall not be damaged or minimally damaged by longan pests, and live longan pests shall not be found on the fruit or in the bunch after harvesting from the tree. If found they shall be culled off.

#### 2.5 Management of the harvest and post-harvest handlings in the orchard.

##### 2.5.1 General practices in the harvest and post-harvest handlings:

2.5.1.1 Specific methods or tools should be used in order to prevent bruising or defect lesions due to harvest.

2.5.1.2 There shall be floor lining material in the holding area for harvested produce in the orchard in order to prevent contamination of microorganism, refuse, soil bits, and dirt or other harmful objects.

2.5.1.3 Containers for the packing and transport of produce shall be separated from those for moving or transporting of pesticides or fertilizers in order to prevent chemical, biological and physical contaminations which are harmful to consumer, and cause damages to the produce.

2.5.1.4 In case containers cannot be separated as mentioned in 2.5.1.3, they shall be cleaned to prevent the afore-mentioned contamination.

2.5.1.5 Appropriate containers used in primary packing for moving produce within the orchard to the sorting area shall be provided. There shall be lining material within the container to prevent bumping and rubbing.

2.5.1.6 Stacking produce in the holding area shall be able to prevent scratch wounds or fruits bumping including produce degrading problems due to heat and sunlight.

2.5.1.7 Moving of produce within the orchard should be carefully handled.

2.5.2 Harvesting method.

2.5.2.1 Harvest mature longans that are properly developed according to the variety and production site.

2.5.2.2 Carefully harvest longans with the first leaves attached to the bunch.

2.5.2.3 Collect harvested longan bunches in a container lined with clean material to prevent fruit bruising during transport to sorting area or holding area or in the shaded area within the orchard.

2.5.3 Post-harvest handlings.

2.5.3.1 Carefully transport longans from the harvesting area immediately after harvest to the sorting area within the orchard.

2.5.3.2 In case longans are sold as bunches, its stalk shall be trimmed off to 15 cm long. Fruits that deviate from the average size are thinned off to obtain uniform size in a bunch, whereas variation in size shall be allowed not more than 20% by count bunch. In case it is sold as individual fruits, each fruit shall have the pedicel with a maximum of 5 mm long, and variation in size shall be allowed not more than 10% by count in a basket.

2.5.3.3 Damaged fruits or bunches due to harvest or those with defects due to pests shall be culled off.

2.5.3.4 Longan bunches are arranged in container to obtain specified net weight cushioned with bumping prevention material as well as covered with bumping prevention material before closing the container lid.

2.5.3.5 Record data of harvest and packaging as shown in the example of record form 6 (harvest and packaging).

2.5.4 Transport of produce to collection site.

2.5.4.1 Carefully transport the packed to collection site immediately after harvest and post-harvest handlings in the orchard.



## 2.6 Management for produce segregation.

### 2.6.1 General management.

2.6.1.1 Sorting process to obtain good quality and standard produce shall be in place.

2.6.1.2 There shall be area for culling off inferior quality produce.

2.6.1.3 Inferior quality produce utilization plan shall be in place.

### 2.6.2 Examination of the off size longans.

2.6.2.1 Examine and observe the harvested longan bunches and the trimmed ones. If the fruits deviated from the average size are found in the bunch, such fruits shall be removed; or any bunch in the container is not uniform in size, such bunch shall be culled off.

2.6.2.2 Arrange the examined bunches in the containers and orderly place the containers on the pallet or clean material to prevent contamination.

### 2.6.3 Examination of infested longans.

2.6.3.1 Examine and cull off the infested longans or pest damaged longan bunches.

## 2.7 Record keeping.

2.7.1 Documents or record forms shall be updated for such production season to ensure complete data and to sign by the operator each time when recorded.

2.7.2 In case there is more than one planting plot, data recording shall be separated by each plot.

2.7.3 Documents shall be separately kept by season, in order to facilitate further inspection and utilization.

2.7.4 Keep the record and important documents for at least three consecutive years, or depending on the requirements of entrepreneur or trading partner for traceability.

**EXAMPLE**

**RECORD FORM 1 (PAGE 1/4)**

**GENERAL DATA OF ORCHARD OWNER**

Data of Year .....

Plantation Owner's Name (Mr./Mrs./Miss) ..... Family Name .....  
 Registered no. of plantation area owner  Area ..... Rai  
 Divided into ..... Planting plot(s)  
 Address, Village name ..... Moo ..... No. ....  
 Street ..... Alley .....  
 Sub-district ..... District ..... Province .....  
 Postal code ..... Tel ..... Fax .....  
 E-mail ..... Website .....

Contact Person or Representative

(Mr./Mrs./Miss) ..... Family Name .....  
 Address, Village name ..... Moo ..... No. ....  
 Street ..... Alley .....  
 Sub-district ..... District ..... Province .....  
 Postal code ..... Tel ..... Fax .....  
 E-mail ..... Website .....

Signature of Entrepreneur .....  
 (.....)

Signature of Contact Person or Representative .....  
 (.....)

**EXAMPLE**

**RECORD FORM 1 (PAGE 2/4)**

**GENERAL DATA OF ORCHARD OWNER**

Name, Plantation area owner Mr./Mrs./Miss .....Family name .....

Registered no. of plantation area owner

Planting plot location, no. .... Moo ..... Sub-district .....

District ..... Province ..... Postal Code .....

Total no. .... Planting plot(s) Area ..... Rai

Map of planting plot location, communication route and significant places in the vicinity for travel convenience to the planting plot.

**EXAMPLE**

**RECORD FORM 1 (PAGE 3/4)**

**GENERAL DATA OF ORCHARD OWNER**

Planting plot no..... Operating year .....

Planting plot location, Moo ..... Sub-district ..... District .....

Province ..... Area ..... Rai

1.1 Planting Variety

Variety .....	Spacing .....	Planting amount .....	Planting date (Plant age) .....
Variety .....	Spacing .....	Planting amount .....	Planting date (Plant age) .....
Variety .....	Spacing .....	Planting amount .....	Planting date (Plant age) .....
Variety .....	Spacing .....	Planting amount .....	Planting date (Plant age) .....

1.2 Irrigation system ..... Rate of water supply ..... Litre/Hour

1.3 Soil type .....

1.4 History of the production area utilization prior to present crop planting of the past 3 years

- Area has never been cultivated
- Area has been cultivated
 

Crops cultivated	Year 1 .....
	Year 2 .....
	Year 3 .....

1.5 History of Plant Pest Infestation and Control Measure

Name of plant pest .....	Infestation year .....	Infestation area percent .....	Control measure .....
Name of plant pest .....	Infestation year .....	Infestation area percent .....	Control measure .....
Name of plant pest .....	Infestation year .....	Infestation area percent .....	Control measure .....
Name of plant pest .....	Infestation year .....	Infestation area percent .....	Control measure .....
Name of plant pest .....	Infestation year .....	Infestation area percent .....	Control measure .....

1.6 Other data .....

.....

.....

.....

.....

**EXAMPLE**

**RECORD FORM 1 (PAGE 4/4)**

**GENERAL DATA OF ORCHARD OWNER**

Planting plot no. .... Operating year .....

Layout of the planting plot (indicating water source, buildings that exist in the planting plot)

A large empty rectangular box with a thin black border, intended for drawing the layout of the planting plot. In the top right corner of the box, there is a north arrow symbol consisting of the letter 'N' above a solid black triangle pointing upwards.

**EXAMPLE**  
**RECORD FORM 2**  
**RESULT OF WATER AND SOIL ANALYSIS**

Orchard Owner's Name \_\_\_\_\_ Family Name \_\_\_\_\_ Orchard Owner's Registration No.

Planting Plot No.	Sample Collection Date		Required Details	Collector Name	Analysis Unit's Name	Date	
	Soil	Water				Sample Submit	Analysis Result

Note; Keep every water and soil analysis report for evidence.









**EXAMPLE**  
**RECORD FORM 6**  
**HARVEST AND PACKAGING OF LONGAN FRUITS**

Orchard owner's name \_\_\_\_\_ Family name \_\_\_\_\_ Orchard owner's registration no.

Planting plot no. \_\_\_\_\_ Year of operation \_\_\_\_\_

Date of Harvest	Total Amount of Produce (kg or basket)	Damaged Amount by (kg or basket)			Grading Result* (kg or basket)							Grading Result Consistency ....units out of....units (kg or basket)		Working Inspector		
		Pest	Harvest Method	Others	1	2	3	4	5	6	Mixed	Fruit and/or Bunch Consistency (kg or basket)	Fruit and/or Bunch Not Consistency (kg or basket)			

Note: \*Grading refers to the Provisions Concerning Sizing in Thai Agricultural Standard on Longans (TAS 1-2003)

**APPENDIX C**  
**EXAMPLES OF LONGAN PESTS UNDER SURVEILLANCE AND SURVEY**  
**METHODS**

<b>Period</b>	<b>Longan Pests Under Surveillance</b>	<b>Survey and Determination on the Damage at Economic Level</b>
Tree nourishment after fruit harvest	<p><b>Leaf miner</b></p> <p>Eggs are very tiny and creamy in colour. They cannot be seen with naked eyes except with a magnifier, and can be found on unfolded young shoot. The creamy color larva bores into young shoot and damages young leaves, the midrib and damaged part become dry. A fully grown larva that has a body length of 1cm. enters pupa stage on mature leaf. The adult which is a small size butterfly moves quickly, and likes to hide under dense leaves.</p>	<p>Randomly survey 10% of the total number of trees at 10 bunches per tree, but do not exceed 20 trees per plot. When dry shoots or young leaves have been destroyed more than 25% of the surveyed young leaves per plot, control measures shall be carried out by using pesticides or other methods according to official recommendations.</p>
	<p><b>Stem borer larva</b></p> <p>It is a dark red color butterfly larva. At full size, the body is 3 to 5 cm long. When any branch or stem being destroyed, there will be larva's flaky crust at the boring area causing the branch dried up and broken.</p>	<p>When destruction is found, have the dry branch with the larva pruned and burnt. Whenever bored hole on any branch and stem is evident, control measure using pesticides or other methods shall be carried out according to official recommendations.</p>
	<p><b>Longan erineum mite</b></p> <p>A very tiny and light pink mite which cannot be seen with naked eyes. It is fed on young shoot and inflorescence sap, and hides among destroyed tissues. The new spray shoots of broom-like will be developed, at the destroyed tissue similar to the symptom of witches' broom disease. The severe epidemic infestation is found</p>	<p>When broom-like shoot is found, have it pruned and burnt. If the symptom is widely spread, control measures shall be carried out with pesticides or other methods according to official recommendations.</p>

Period	Longan Pests Under Surveillance	Survey and Determination on the Damage at Economic Level
	found in old plants causing tree decline.	
	<p><b>Phytophthora fruit rot disease</b></p> <p>It causes dark brown lesions of indistinctive size and shape on the affected area.</p>	<p>When destruction is found, have the fallen fruits and leaves on the ground burnt outside the planting plot. The control measures shall be carried out with pesticides or other methods according to official recommendations.</p>
	<p><b>Witches' broom disease</b></p> <p>It is caused by phytoplasma or mycoplasma which affects the new shoot to come out in spray of broom-like characteristic. If severe, the tree becomes declined.</p>	<p>When the symptom is evident, the diseased branch shall be pruned and burnt. Control measures shall be carried out using pesticides or other methods according to official recommendations.</p>
Flower development and fruit setting	<p><b>Longan stink bug</b></p> <p>It lays eggs in the bunch of 14 on inflorescence or young fruits. The nymph and adult will release pungent substances which damage young shoot, inflorescence and young fruit. The affected young shoot and inflorescence become dry, while young leaf and fruit are affected with blackish gray spot lesion.</p>	<p>Eggs and nymphs that stay in group are collected and destroyed. If eggs in large number are found without parasites' destruction, control measure with pesticides or other methods shall be carried out according to official recommendations.</p>
	<p><b>Longan erineum mite</b></p>	<p>When broom-like shoot is found, have it pruned and burnt. If the symptom is widely spread, control measures shall be carried out with pesticides or other methods according to official recommendations.</p>
	<p><b>Scale insect</b></p> <p>Eggs are hatched within the</p>	<p>Survey the infestation every 7 days from fruit age of 2</p>

Period	Longan Pests Under Surveillance	Survey and Determination on the Damage at Economic Level
	<p>mother's body. Nymphs spread out to feed on throughout the tree, and cling to the food source permanently. The insect will secrete creamy brown or white colour wax covering its body that causes more difficulty to control.</p>	<p>weeks after full bloom until 15 days before harvest. Randomly survey 10% of the total number of trees at 10 bunches per tree, but do not exceed 20 trees per plot. When more than 10 adult scale insects are found per fruit bunch, control measures shall be carried out with pesticides or other methods according to official recommendations.</p>
Fruit development	<p><b>Mealy bug</b></p> <p>Eggs are hatched within the mother's body. Nymphs spread throughout the tree. The insect will produce white puffy starch thread covering the body, and excrete sweet liquid which is black ant's food. The ant is not longan's pest, but it carries mealy bugs to fruits, They are often found at mealy bug infestation site.</p>	<p>Survey the infestation every 7 days from fruit age of 2 weeks after full bloom until 15 days before harvest. Randomly survey 10% of the total number of trees at 10 bunches per tree, but do not exceed 20 trees per plot. When 10 live bugs or more than 10% of live mealy bugs are found, control measures shall be carried out with pesticides or other methods according to official recommendations.</p>
	<p><b>Lychee stem-end borer</b></p> <p>The egg is creamy yellow in colour and very tiny which cannot be seen with naked eyes, except with a magnifier. The larva is greenish cream with the body length of 1.0 to 1.5cm. It bores into young shoot, flower and fruit causing fruit dropped. The destruction becomes severe when the fruit begins to have colour break until harvest stage.</p>	<p>Survey every 7 days from fruit age of 2 weeks after full bloom until 15 days before harvest by inspecting the dropped fruits. If the infestation is found, then randomly survey 10% of the total number of trees at 10 bunches per tree, but do not exceed 20 trees per plot. If 5 fruits or more than 5% of fruit are damaged, control measures shall be carried out with pesticides or other methods according to official recommendations.</p>

<b>Period</b>	<b>Longan Pests Under Surveillance</b>	<b>Survey and Determination on the Damage at Economic Level</b>
	<p><b>Fruit-piercing (sucking) moth</b></p> <p>It is nocturnal with wing spreading of 3 to 5cm. Wing colour of the anterior pair is brown, while the posterior pair is golden yellow with kidney shape or letter C pattern in black color. Eyes are red when reflecting light. This moth pierces and sucks juice from the fruit.</p>	<p>Survey the dropped fruits due to the damage caused by this fruit-piercing moth every 7 days during fruit maturation period whether any pierced mark or juice exuding out from the pierced hole. Control measures shall be carried out with pesticides or other methods according to official recommendations.</p>
	<p><b>Phytophthora fruit rot disease</b></p>	<p>Survey every 7 days from fruit age of 4 weeks after full bloom until 30 days before harvest. If one fruit bunch is evident of the disease, control measures shall be carried out with pesticides or other methods according to official recommendations.</p>