THAI AGRICULTURAL STANDARD
TAS 4900-2010

GOOD AGRICULTURAL PRACTICES FOR PEANUT

National Bureau of Agricultural Commodity and Food Standards
Ministry of Agriculture and Cooperatives
ICS 65.020.20  ISBN
UNOFFICIAL TRANSLATION

THAI AGRICULTURAL STANDARD
TAS 4900-2010

GOOD AGRICULTURAL PRACTICES FOR PEANUT

National Bureau of Agricultural Commodity and Food Standards
Ministry of Agriculture and Cooperatives
50 Phaholyothin Road, Ladyao, Chatuchak, Bangkok 10900
Telephone (662) 561 2277 Fax (662) 561 3357
www.acfs.go.th

Published in the Royal Gazette Vol.127 Section 147D Special,
Dated 21 December B.E. 2553 (2010)
Technical Committee on the Elaboration of Thai Agricultural Standard for Peanut

1. Mrs. Wantana Tangpremsri Chairperson
   Department of Agriculture

2. Ms. Buppha Mongkolsilp Member
   Department of Agricultural Extension

3. Ms. Ing-orn Panyakit Member
   National Bureau of Agricultural Commodity and Food Standards

4. Mrs. Somchintana Toomsan Member
   Department of Agriculture

5. Associate Professor Juangjun Duangpatra Member
   Faculty of Agriculture, Kasetsart University

6. Mr. Suraporn Nanthasamroeng Member
   Crops Grower & Merchandise Association

7. Mr. Pranom Saisawat Member
   Seed Association of Thailand

8. Mr. Supoj Pongwachararak Member
   Modern Food Industries Co., Ltd.

9. Ms. Atchara Rungchamrat Member
   Maeruay Snack Food Factory Co., Ltd.

10. Mr. Phakdee Chuewongprom Member
    Peanut Farmer Group, Bantonpueng, Nakae District, Nakhonphanom Province

11. Mr. Kam Insuriya Member
    Northern Region Peanut Farmer Group

12. Associate Professor Sanun Jogloy Member

13. Mr. Sopone Wongkaew Member

14. Ms. Virachnee Lohachoompol Member and Secretary
    Office of Commodity and System Standards,
    National Bureau of Agricultural Commodity and Food Standards
Peanut, the food popular among consumers, causes the risk from aflatoxin in case the production practices are not of good quality. To establish the recognition of Thai peanut nationally and internationally, to produce safe food for consumers, and to promote export, the Agricultural Standards Committee deems it necessary to establish an agricultural standard on Good Agricultural Practices for Peanut.120

The standard is based on the information of the following document:

NOTIFICATION OF THE MINISTRY OF AGRICULTURE AND COOPERATIVES

SUBJECT: THAI AGRICULTURAL STANDARD:
GOOD AGRICULTURAL PRACTICES FOR PEANUT
UNDER THE AGRICULTURAL STANDARDS ACT B.E. 2551 (2008)

Whereas the Agricultural Standards Committee deems it necessary to establish an agricultural standard on good Agricultural Practices for Peanut as a voluntary standard in accordance with the Agricultural Standards Act B.E. 2551 (2008) to promote such agricultural commodity to meet its quality, standard and safety.

By virtue of Section 5, Section 15 and Section 16 of the Agricultural Standards Act B.E. 2551(2008), the Minister of Agriculture and Cooperatives hereby issues this Notification on the Establishment of Agricultural Standard: Good Agricultural Practices for Peanut (TAS 4900-2010) as a voluntary standard, details of which are attached herewith.

Notified on 4 October B.E. 2553 (2010)
Mr. Theera Wongsamut
Minister of Agriculture and Cooperatives
1 SCOPE

This agricultural standard covers the good agricultural practices for peanut production at every step starting from planting, harvest to post-harvest handling in order to obtain the dry in-pod peanut that is of good quality, safe and suitable to be used as raw materials in processing for consumption by taking into account the environment, health and safety of workers.

2 DEFINITIONS

For the purpose of this standard:

2.1 Peanut or groundnut, commonly known in Thai as Tualisong, means a crop in the Fabaceae or Leguminosae Family with the scientific name of *Arachis hypogaea* L. It is also named as Tuadin, Tuayisong, Tuataidin or Tuakhut.

2.2 Peanut pod means the fruit of peanut consisting of hard but fragile pericarp containing 1 to 4 seeds inside depending on the varieties. The seeds are covered by seed coat or testa.

2.3 Peanut at pod-filling stage means the stage after the fertilized ovary has transformed into peg penetrating into the soil (generally called pegging stage) and the pod has reached its maximum size but the seeds are still developing.

2.4 Peanut at pod-developing stage means the stage between pod initiation and harvesting.

2.5 Fresh in-pod (in-shell) peanut means a fully mature peanut pod that has been stripped from the stem but has not yet been dried. It normally has between 45-60% moisture.

2.6 Dry in-pod (in-shell) peanut means a stripped peanut pod that has been sun-dried or dried by using a dryer.

2.7 Defected pod means a pod that is immature or germinating or moldy or broken or damaged by pests or discoloured.

2.8 Sound pod means a mature pod that does not show any sign of defected pod.

2.9 Peanut kernel means a kernel obtained after the dried pod has been shelled.

2.10 Farmer means a peanut grower.
2.11 Hazardous substance means a substance or any articles including chemicals, microorganisms or microbial toxins which may be harmful to human, animal, plant, property or environment.

2.12 Pesticide means a hazardous substance used in agriculture regulated by the Department of Agriculture in accordance with the Notification of the Ministry of Industry entitled the List of Hazardous Substances issued by virtue of the Hazardous Substance Act B.E.2535 (1992) and its amendments.

2.13 Aflatoxin means a toxic secondary metabolite produced by some fungi, especially *Aspergillus flavus* and *Aspergillus parasiticus*. Those commonly found in nature are B1, B2, G1 and G2 aflatoxins.

2.14 Plot means an area in which a crop is planted and is not connected to other areas. In case the area is connected to others, the production management including inputs, cultural practices and personnel of the area is clearly distinctive.

2.15 Visual inspection means an inspection of external appearances of an entity such as a produce, product or apparent environment condition. This is basically examined by eyes but other sensory evaluation may be applied depending on the quality factors to be inspected. Additional tools such as a magnifying glass could also be used. Inspection of working procedure and process are also included.

2.16 Traceability means an ability to trace, whereto and wherefrom of an agricultural commodity and food through one or several steps of production, management/processing and distribution.

2.17 Foreign matter means any component other than dry in-pod peanut.

### 3 REQUIREMENTS AND INSPECTION METHODS

Requirements and inspection methods are as in Table 1.

<table>
<thead>
<tr>
<th>Items</th>
<th>Requirements</th>
<th>Inspection methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.Water sources</td>
<td>1. Water shall be from a source where its environment is safe from contamination of hazardous substances and pesticides that may leave residues or contaminate peanut kernels to the level harmful to consumers (Appendix A.1)</td>
<td>1. Visual inspection of the environment. If there is any risk, the water quality shall be analysed</td>
</tr>
<tr>
<td>Items</td>
<td>Requirements</td>
<td>Inspection methods</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2. Planting area</td>
<td>2. The area shall be free from hazardous substances and pesticides that may leave residues or contaminate peanut kernels to the level harmful to consumers. (Appendix A.2)</td>
<td>2. Visual inspection of the environment. If there is any risk, the soil quality shall be analysed.</td>
</tr>
<tr>
<td>3. Pesticide application</td>
<td>3.1 The worker shall have knowledge to apply pesticides properly.</td>
<td>3.1 Evaluate worker’s knowledge and understanding, or inspect the operation, or training evidence.</td>
</tr>
<tr>
<td></td>
<td>3.2 In case a pesticide is used, the application shall follow the recommendations of the Department of Agriculture, Ministry of Agriculture and Cooperatives or the directions on the registered labels authorized by the Department of Agriculture.</td>
<td>3.2.1 Inspect the pesticide storage. 3.2.2 Check the record of pest survey and pesticide application. 3.2.3 In case of doubt or having an evidence of misapplication of pesticides, the produce shall be sampled and analysed for pesticide residue.</td>
</tr>
<tr>
<td>4. Pre-harvest Quality management</td>
<td>4. Survey the outbreak of peanut pests affecting peanut quality and causing the infection of aflatoxin-producing fungi such as subterranean ants, white grub or plant parasitic nematodes. If found, the pest shall be controlled as recommended in the Appendix A Sections A.4.1.3, A.4.3.4, A.4.4.3 and Appendix D.</td>
<td>4. Check the record of pest survey and control.</td>
</tr>
<tr>
<td>5. Harvest and post-harvest handlings</td>
<td>5.1 Harvest peanut at proper stage by estimating the age or when 60-65 % of the total pods are mature. (Appendix A.5.1)</td>
<td>5.1 Visual inspection of the pod appearances and ratio of the mature pods</td>
</tr>
<tr>
<td>5.1 Harvesting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2 Post-harvesting</td>
<td>5.2.1 In case pods are stripped before sun-drying, only the sound pods shall be selectively stripped. Care shall be taken during handling so as not to cause any physical damage affecting the fresh in-pod peanut quality. (Appendix A Sections A.5.2 and A.5.3.2)</td>
<td>5.2.1 Visual inspection of the stripped fresh in-pod peanut.</td>
</tr>
</tbody>
</table>
5.2.2 Sun-drying or drying by other means before or after pod-stripping shall be done as recommended in the Appendix A Section A.5.3.1 or A.5.3.3. After drying, the kernels shall have less than 9% moisture content. The moisture shall be reduced to less than 12% within the first 4 days of drying which includes the time used for windrowing (if any).

5.2.2.1 Visual inspection of the drying process.
5.2.2.2 Visual inspection and/or measure moisture content of the kernels with a tester. Check the record of peanut drying as shown in the Record Form 4 in the Appendix B.
5.2.2.3 If in doubt of aflatoxin contamination, the produce shall be sampled and analysed for aflatoxin.

5.3 Pod sorting
5.3 Defected pods and foreign matters shall be sorted out.

5.3 Visual inspection and check the record of the operation.

6. Storage of the dry in-pod peanuts
6. The dry in-pod peanuts shall be packed in clean, well ventilated containers and stored in well ventilated dry area which is free from disease carrier animals. The dry in-pod peanuts shall not be in the areas where hazardous substances are stored. The preventive measure for dampness shall be in place (Appendix A.6.1)

6. Visual inspection of packaging, storage area and practices in which the dry in-pod peanuts are stored before shelling.

7. Record keeping and traceability
7. The following data shall be recorded for inspection and traceability:
(1) Pre-harvest practices affecting yield and quality
(2) Production inputs
(3) Pest survey and pesticide application.
(4) Drying process and sorting of defected pods and foreign matters.

7. Check the record of the farmers in the Appendix B.

4 GUIDANCE ON GOOD AGRICULTURAL PRACTICES FOR PEANUT

The recommendations on good agricultural practices for peanut are to provide farmers with good practices for their peanut production at every step starting from planting, harvesting and post-harvest handling in order to obtain dry in-pod peanuts which are of good quality, safe and suitable to be used as raw materials in processing for consumption. Details of the recommendations are given in Appendix A.
APPENDIX A

GUIDANCE ON GOOD AGRICULTURAL PRACTICES FOR PEANUT

(Section 4)

A.1 Water Sources

A.1.1 Water used for peanut cultivation shall be from the source that the surroundings are not at risk of contamination with hazardous substances. The water quality shall be suitable for agricultural production. The use of waste water from industry or other activities which will cause contamination of hazardous substances is prohibited. In case such water has to be used, there shall be clear evidence or proof that the water has already been treated and is safe for production.

A.1.2 At the initial stage of production, the water shall be analysed at least once by an official or officially accredited laboratory for contamination of the concerned hazardous substances.

A.1.3 Water for agricultural usage shall not be from a source causing any damage to the environment.

A.2 Planting area

A.2.1 Data shall be assigned to each plot indicating name of the farmers, address, name of the plot keeper (if any), address, map of plot location, layout of the plot, layout of types of crops and varieties and history of land use at least 3 years.

A.2.2 In case the planting area is within the proximity of an industrial or associated with risk, soil should be analysed for contamination of potential hazardous substances at least once by an official or officially accredited laboratory at the initial stage of production.

A.3 Pesticide Application

A.3.1 If pesticide is used, the application 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. Pesticide application shall correspond to the pest species found and be in accordance with official recommendation. The application shall be recorded as shown in Appendix B Record Form 3.

A.3.2 Pesticide application shall be abided by law with registration number and directions on label for peanut. The pesticides prohibited for production, import, export or having in possession in accordance with the Hazardous Substances Act B.E. 2535 (1992) and its amendments including those prohibited by trading–partner countries shall not be used. The
pesticide application shall be withheld before harvest in accordance with the withdrawal period indicated on the label of each pesticide or as officially recommended.

A.3.3 Recommendation on the pesticide label shall be read to understand its property and application method prior to the application.

A.3.4 Farmers and workers responsible for pest management should have knowledge on the pests, and be able to select proper pesticides and their application rate, type of sprayer and nozzle for the specific pest and know how to spray pesticides. Sprayers should be kept in good condition and ready for use. Spraying operators shall wear protective clothing and personal protective equipment such as masks, gloves, hats and boots to protect themselves from pesticides.

A.3.5 The proper dose of pesticide shall be prepared by adjusting the amount of added water and stirring until the mixture becomes homogeneous before spraying. The pesticide should be sprayed in the morning or in the evening when the wind is calm. Spraying during sunny or windy period should be avoided. Spraying workers shall be on the windward side while spraying at all time.

A.3.6 Prepare sufficient amount of pesticide mixture to be used up in each operation. The left-over mixture in the spraying tank shall be avoided.

A.3.7 After the pesticide container is empty, rinse the container 3 times with water and pour the water into a spraying tank. Spray the rinsed water on the field in which the pesticide is allowed as stated on the label, or in a specified area. Agricultural produces or water sources should not be at risk of being contaminated by this rinsed water. The empty containers of the pesticides shall be destroyed in order to prevent the reuse. They shall be discarded in the area allocated for their disposal or buried in the location that is at least 50 meters away from water sources and living quarter with the depth to prevent animal digging. It is prohibited to dispose of the empty containers by burning.

A.3.8 The spraying worker shall take a shower, shampoo hair, and change clothes immediately after finishing the operation. Clothes worn during the spray shall be cleaned after each operation.

A.3.9 Pesticide which is not used up in one operation shall be kept in the container with the lid tightly closed in the pesticide storage.

A.3.10 Pesticides shall be stored in well ventilated, closed and secured place to protect from sunlight and rain.

A.3.11 Separate the area used for pesticide storage from the others to prevent the contamination to food and environment.
A.3.12 Each pesticide shall be kept in tightly closed container with clear label and separated into groups. They shall be kept separated from fertilizers¹, plant growth regulators and other plant nutrient supplements. After use, the remaining pesticide shall be kept in its original container.

A.3.13 Storage area for pesticides should be fully equipped with tools and materials such as eyewash, clean water, sand and fire extinguishers for handling accidents.

A.3.14 Substances prohibited for production, import, export or having in possession in accordance with the Hazardous Substances Act B.E. 2535 (1992) and its amendment shall not be present in the proximity.

A.4 Quality Management in the Pre-harvest Production

A.4.1 Selection of planting area

A.4.1.1 Soil suitable for peanut growing should be a loam or sandy loam type without water-logging. It should have adequate essential nutrients i.e. more than 8 mg/kg of phosphorus, more than 50 mg/kg of potassium, more than 100 mg/kg of calcium, and more than 0.12 mg/kg of boron. Its pH should be 5.5 to 6.8. If the soil has nutrients and/or pH lower than required, it should be adjusted to maintain peanut good growth and resistance to infection by aflatoxin-producing fungi. Details of soil conditioning and fertilizer application shall be recorded.

A.4.1.2 Peanuts should not be grown in the area previously used for growing corns or peanuts to reduce the chance of fungal infection and subsequent aflatoxin contamination of peanuts. In case it is necessary to grow peanuts in such areas, the recommendations in Sections A.4.2.1 and A.2.2 shall be followed.

¹ According to the Fertilizers Act (Vol. 2) B.E. 2550 (2007)

Chemical fertilizers mean fertilizers obtained from inorganic or synthetic organic chemicals including single fertilizers, mixed fertilizers, compound fertilizers and organic chemical fertilizers, but excluding the followings:

(1) Lime, marl, plaster, gypsum, dolomite or other substances as promulgated by the Minister and published in the Royal Gazette.

(2) Inorganic or organic chemicals whether they naturally occur or are synthesized for industrial purposes or other activities as promulgated by the Minister and published in the Royal Gazette.

Organic fertilizers mean fertilizers obtained from organic materials that have been processed by moistening, chopping, decomposing, macerating, sieving and extracting or by other means. The organic materials have been undergone complete biological degradation process but are neither chemical nor biological fertilizers.

Organic chemical fertilizers mean fertilizers containing approved nutrient contents and a certain amount of organic matter as promulgated by the Minister and published in the Royal Gazette.
A.4.1.3 Peanuts should not be grown in the area known to be affected by the soil pests such as subterranean ants, white grubs, or plant parasitic nematodes in the previous season to reduce the chance of pods being wounded and predisposing to fungal infection. Various pest symptoms are shown in Appendix C Figures C.1 and C.2. In case it is necessary to grow peanuts in such area, the soil pests should be controlled as Sections A.4.3.4 and A.4.4.3.

A.4.1.4 Peanuts shall not be grown in the area contaminated with hazardous substances causing residues or contamination.

A.4.2 Land preparation for planting

A.4.2.1 Clear crop debris such as corn cobs or stubbles that may be a source of aflatoxin-producing fungi accumulation from the planting area.

A.4.2.2 Land shall be roughly ploughed and cross-ploughed at least once to eliminate soil-borne pathogens and pests. For peanuts grown in irrigated paddy fields, it may be necessary to make furrows after tilling to facilitate irrigation and drainage.

A.4.2.3 In case pH of the soil is less than 5.5 or higher than 6.8, the soil should be adjusted and recorded.

A.4.3 Planting

A.4.3.1 To obtain vigorous seedlings and uniform crop stands, seed shall be of more than 70 % germination without abnormality such as damaged testa or seed by pest.

A.4.3.2 In case seeds are treated with fungicides to control seed-borne fungi and prevent seedlings from sclerotium stem rot and seedling blight diseases, official recommendations shall be followed and the application shall be recorded.

A.4.3.3 To obtain optimum population per unit area suitable for normal growth, peanuts shall have proper spacing according to the variety, growing season and location as officially recommended.

A.4.3.4 Insect and animal pest control according to Appendix D shall be conducted and recorded.

A.4.3.5 In case pre-emergence herbicides are applied, the official recommendations should be followed and recorded.

A.4.4 Crop management

A.4.4.1 In case of no pre-emergence herbicides and the planting area becoming weedy, weeding should be done at least once when peanuts are about 3 to 4 weeks old or before pegging. A post-emergence herbicide could be used by following the official recommendations with care so as not to injure the plants from the herbicides or the weeding tools and keep the weeding record.
A.4.4.2 In case the soil has nutrient content below the levels indicated in Section A.4.1.1, fertilizers shall be applied one more time.

A.4.4.3 In the area known to be affected by soil insect and animal pest, a pest control as recommended in Appendix D should be repeated after flowering. Details of the pest control shall be recorded in Record Form 3 Appendix B.

A.4.4.4 Make a regular pest survey. If found, the pests shall be controlled following recommendations in Appendix D and recorded in the Record Form 3 Appendix B.

A.4.4.5 Precaution shall be taken to avoid drought stress during flowering, pegging and pod developing stages. Lack of water during these critical stages will weaken the plants and cause Aspergillus infection.

A.4.5 Production input management

A.4.5.1 Production inputs, sources of origin and specific details of important inputs such as peanut variety, fertilizers and pesticides used shall be listed. Such production inputs, amount and purchasing dates shall be recorded in the Record Form 2 Appendix B.

A.4.5.2 Production inputs should be well managed to avoid contamination to the produce with microbes, chemicals and foreign matters to the level that make it unfit for consumption.

A.4.6 Agricultural tools and equipment management

A.4.6.1 Agricultural tools and equipment shall be listed and kept properly.

A.4.6.2 Appropriate types of equipment in sufficient number for the operation shall be provided.

A.4.6.3 A separate storage area for tools and equipment shall be provided, secured, and easily accessed when needed.

A.4.6.4 A maintenance plan for tools and equipment shall be set up, implemented and recorded.

A.4.6.5 Tools and equipment such as pesticide sprayers or harvesting equipment shall be checked before use. Tools and equipment that need precision in application such as pesticide spraying nozzles shall be regularly checked for the precision. In case there is any deviation, they shall be repaired or changed to retain their efficiency according to the standard. Proper tools and equipment shall be used accordingly.

A.4.6.6 Tools and equipment, as well as packaging and transporting containers shall be cleaned every time before and after use prior to storage.
A.4.7 Disposal of Waste and By-Products

A.4.7.1 Infected plant parts shall be removed and destroyed outside the plot.

A.4.7.2 Other non-infected plant debris could be used as green manure or processed into compost.

A.4.7.3 Types of rubbish such as cardboard cartons, plastic, glass, oils, chemicals and plant debris shall be clearly separated. Sufficient number of trash cans should be provided or disposal area should be clearly designated.

A.5 Harvest and Post-harvest Handlings

A.5.1 Peanuts shall be harvested at optimum maturity by judging from the age which may be different according to the varieties and the growing seasons. Harvesting period can also be judged by randomly uprooting the plants and count the number of mature pods of at least 60% of the total mature pods or 6 mature pods out of 10. Pod maturity can be collated as shown in Figure C.3 Appendix C.

A.5.2 During the harvest, caution shall be taken to avoid pod wounding. If wounded, they shall be sorted out.

A.5.3 Post-harvest handling

Drying is the most critical step affecting peanut pod quality. Drying can be achieved by 2 methods i.e. windrow drying and stripped pod drying.

A.5.3.1 Windrow drying

Kernels from windrow dried pod will have better aroma and flavour than those dried after being stripped off the plants. Windrow drying should be done as follows:

(1) Windrow the pulled peanut plants for 1-2 days before stripping the pods until the kernel moisture content is reduced to 30%. This may be done by bundling the bush and turning upside down so as to let the pods expose to sunlight and better aeration as shown in the Figure C.4(A) Appendix C or

(2) Dry the bush in thin layers on a ground covering sheet to prevent the pods from direct contact to the ground as shown in Figure C.4(B) Appendix C or

(3) After pulling the bush, cut it off keeping only the parts that bear pods and have them dried as recommended in (2) or hang them on wooden rails or wires to facilitate ventilation.

A.5.3.2 Pod stripping

In case pods are stripped by hands, damaged by soil pests as shown in Figure C.1 and Figure C.2 Appendix C as well as the pods that are rotten, germinated, broken, immature, and physically
damaged by harvesting tools shall not be stripped. In case stripping is done by machine, caution should be taken so as not to damage the pods. There shall be a sorting process to eliminate pods that are defected, broken, and physically damaged by harvesting tools as well as foreign materials that may be harmful to the consumers.

A.5.3.3 Stripped pod drying

Stripped peanut pods can be dried by sun-drying or using dryer.

A.5.3.3.1 Sun-drying

(1) Fresh in-pod peanuts shall be spread on a ground covering material such as a tarpaulin sheet, fine nylon mesh, or bamboo bed to reduce their chance of direct contact to the ground as shown in the Figure C.5 Appendix C.

(2) Peanut pods shall not be wetted by rain during the drying. In case of raining, the pods shall be either quickly moved away into a shelter or covered with a water-proof material.

(3) Peanut pods windrowed before stripping shall be continuously dried until the kernel moisture content is reduced to less than 12% within 2 days and less than 9% within 5 days.

For the pods that have been immediately stripped after pulling, dry them until kernel moisture content is reduced to less than 12% within 4 days and less than 9% within 7 days.

To determine moisture content, a tester or pod and kernel checking of the dried appearance shall be used. Pods that have dried kernels to the required moisture content when being shaken will cause shaking sound between the kernels and the shell and when being pressed the seed testa is easily peeled off.

A.5.3.3.2 Drying by dryer

Stripped pods are dried in a drying bin by blowing hot air through the heap for 2 to 3 days until the kernel moisture content is less than 9%. The hot air temperature should be around 40°C. After drying, the moisture content is checked as indicated in Section A.5.3.3.1 (3).

A.6 Storage and Transport of Dry In-pod Peanuts

A.6.1 Packing and storage area

A.6.1.1 Store dry in-pod peanuts in well-ventilated container such as gunny bags.

A.6.1.2 Clean containers or the containers fumigated with officially approved pesticides shall be used. Do not use the containers that have been used for hazardous substances.

A.6.1.3 A storage for dry in-pod peanuts shall be well ventilated, rain-proof, free from disease carrier animals and separated from the hazardous substance storage.
A.6.1.4 A storage with concrete or earth floor shall have materials such as wooden or concrete poles supporting the lowest bags to prevent them from direct contact to the ground. Since dry in-pod peanuts can reabsorb moisture from the floor and become moldy.

A.6.1.5 Spacing between rows of containers is required to facilitate ventilation when storing large quantity of dry in-pod peanuts. Do not stack the containers too close to the walls or pile them up too many layers.

A.6.2 Transport

A.6.2.1 Clean and hazardous substance free equipment or containers shall be used for collecting and moving harvested peanut plants, fresh in-pod peanuts, and dry in-pod peanuts.

A.6.2.2 Vehicles used for transporting dry in-pod peanuts shall be dampness-proof to prevent them from absorbing moisture and becoming moldy.

A.7 Record Keeping and Traceability

A.7.1 Updated documents or record forms for the current production season shall be recorded and made available as shown in the Example of Record Forms 1 to 4 and signed by the farmer each time the data is recorded.

A.7.2 In case of having more than 1 plot, the data of each plot shall be recorded individually.

A.7.3 Documents and/or record forms shall be kept orderly regarding production seasons so as to facilitate inspection and use.

A.7.4 For traceability, important records or documents relating to the crop production practices shall be kept at least 2 years or as required by the entrepreneurs or trading-partner countries.
APPENDIX B

SAMPLE OF RECORD FORM

RECORD FORM 1
GENERAL INFORMATION OF FARMERS AND PRE-HARVEST PRACTICES
AFFECTING THE PRODUCE QUALITY (Page 1/4)
(Section A.2.1)

Year ........................................................................
Farmer’s name (Mr./Mrs./Miss) .................................. Family name ........................
Registered No. of Farmer ........................................ Rai
Divided into ................................................................. Plot(s)
Address, Village Name ................................... Moo .................... No. ..............................
Soi.................................................. Street ...............................................................
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. ..............................
Soi.................................................. Street ...............................................................
Sub-district .................................... District ..................... Province ........................
Postal Code ................................. Tel ......................... Fax ....................................
E-mail ................................................................. Website ...........................................

Signature of Farmer ....................................................
(.......................................................)

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


Map of plot location, communication route and significant places in the vicinity for convenience in travelling to the plot.
Plot No............................................. Year .................................. Plot Code........................................
Plot Location, Moo ................... Sub-district …................................ District …................................
Province .................................................................. Area .................................................... Rai

1.1 Planting Variety
Variety …………… Spacing ……… No. of seed/hole ……… Planting Date ………
Variety …………… Spacing ……… No. of seed/hole ……… Planting Date ………
Variety …………… Spacing ……… No. of seed/hole ……… Planting Date ………

1.2 Water
- Risk of contamination from hazardous substances □ Yes □ No
- Result of water analysis □ Yes □ No
- Watering system □ Rain □ Underground □ Irrigation
- Drought period………………………………………………………………………………
- Watering □ No □ Yes
□ Yes 1\textsuperscript{st} time on ……………………….. 2\textsuperscript{nd} time on ………………………..
□ 3\textsuperscript{rd} time on ……………………….. 4\textsuperscript{th} time on ………………………..
□ 5\textsuperscript{th} time on ……………………….. 6\textsuperscript{th} time on ………………………..
□ 7\textsuperscript{th} time on ……………………….. 8\textsuperscript{th} time on ………………………..

1.3 Soil
- Risk of contamination from hazardous substances □ Yes □ No
- Result of water analysis □ Yes □ No
Soil type ……………………………………………………………………………………………

1.4 History of land use of the past 2 years
□ Area has never been used for agricultural production
□ Area has been used for agricultural production
Crops cultivated Year 1 …………………
Year 2 …………………

1.5 History of pest infestation and control measure
Name……………………………… Year…… Damaged area ………% Control action …………………
Name……………………………… Year…… Damaged area ………% Control action …………………
Name……………………………… Year…… Damaged area ………% Control action …………………

1.6 Other information …………………………………………………………………………………
…………………………………………………………………………………………………………
Plot number....................... Plot code.................................. Year ......................................

Layout of the plot indicating the followings:
- Planting area
- Areas for chemical mixing, storage, cleaning of spraying equipment
- Area for post-harvest chemical application
- Area or facilities for composting and storage of compost and soil amendment
- Water reservoir, drainage, and wastewater discharge point
- Other buildings and roads
Farmer’s name Mr./Mrs./Miss .................................. Family name ..........................................................
Registered no. of farmer or identification no. ..........................................................
Plot no. ..........................................................................................................................

<table>
<thead>
<tr>
<th>Item</th>
<th>List of production inputs</th>
<th>Purchasing Date</th>
<th>Amount</th>
<th>Source of purchasing</th>
<th>Trade name or trademark</th>
<th>Specific detail (manufacturer date/lot)</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Farmer personal data

Farmer’s name……………………………………Address……………………………………..Planting location……………………………

Variety…………………………………………………Planting date…………………………….Harvesting date……………………………

ID Number Plot code……………………………………

Planting area Planting variety Plot Plot size…………………………….Rai. Total plant number plants. Year……………………………

2. Pesticide application

2.1 Insecticides

<table>
<thead>
<tr>
<th>Period</th>
<th>Insect and animal pests</th>
<th>Pest survey</th>
<th>Pesticide application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not found</td>
<td>Found</td>
<td>Frequency/severity</td>
</tr>
<tr>
<td>Pre-planting</td>
<td>Ants</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(specified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>Insect and animal pests</td>
<td>Pest survey</td>
<td>Pesticide application</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------</td>
<td>-------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not found</td>
<td>Found</td>
</tr>
<tr>
<td>Pre-blooming</td>
<td>Aphids</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thrips</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leafhoppers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaf rollers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaf miners</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others (specified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pod developing to pod filling stage</td>
<td>Subterranean ants</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others (specified)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Insecticide common name, Application rate, and Date are placeholders for actual values.
## 2.2 Chemicals for plant disease control

<table>
<thead>
<tr>
<th>Period</th>
<th>Plant disease</th>
<th>Disease survey</th>
<th>Pesticide application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Not found</td>
<td>Do not apply</td>
</tr>
<tr>
<td>Pre-blooming</td>
<td>Seedling blight</td>
<td>Found</td>
<td>Apply</td>
</tr>
<tr>
<td></td>
<td>Peanut stripe and bud necrosis</td>
<td>Frequency/severity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others (specified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-blooming to harvest</td>
<td>Rust</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaf spots</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sclerotium stem rot</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others (specified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 2.3 Herbicides

<table>
<thead>
<tr>
<th>Period</th>
<th>Weed species</th>
<th>Weed survey</th>
<th>Pesticide application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Not found</td>
<td>Quantity (density)</td>
</tr>
<tr>
<td>Pre-emergence</td>
<td>Annual weeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perennial weeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others (specified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-emergence</td>
<td>Annual weeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perennial weeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others (specified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.4 Other hazardous agricultural chemicals

<table>
<thead>
<tr>
<th>Animal pests</th>
<th>Pest survey</th>
<th>Pesticide application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not found</td>
<td>Found</td>
</tr>
<tr>
<td>Rats</td>
<td></td>
<td>Rodenticides</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specified)</td>
<td></td>
<td>warehouse fumigants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specified)</td>
<td></td>
<td>container fumigants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specified)</td>
<td></td>
<td>Other chemicals</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Specify the rate according to its application character such as gram/plant or kilogram/plant or gram/20 litre of water or millilitre/20 litre of water.*
RECORD FORM 4
RECORD FORM FOR PEANUT MOISTURE REDUCTION AND SORTING
(Section 3)

1. Farmer personal data

Farmer’s name………………………….. Address…………………………..
Planting location…………………….. Variety………………………………
Planting date………………………….. Harvesting date…………………………..

2. Sun-drying before pod-stripping

☐ No (go to 3.)
☐ Yes  Beginning date……………………….. End date …………………………….

Practices during sun-drying
☐ Turning bush upside down to let the pods at the uppermost position
☐ Dry the bush on the field with ground covering material
☐ Dry the bush on the field without ground covering material
☐ Dry the bush on the concrete floor with ground covering material
☐ Dry the bush on the concrete floor without ground covering material
☐ Others (specified)……………………………………………………

Weather condition during sun-drying

<table>
<thead>
<tr>
<th>Date</th>
<th>Amount of sunlight</th>
<th>Raining condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strong sunlight</td>
<td>Cloudy half day</td>
</tr>
<tr>
<td></td>
<td>all day</td>
<td>more than half day</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1
2
3
4

3. Pod stripping

Date of pod stripping ………………………………….

Pod stripping method
☐ By hands
☐ By machine

In case pods are stripped by hands, are only sound pods stripped?
☐ No. No sorting
☐ No. Sorting is done later
☐ Yes. Only sound pods are stripped

4. Drying of in-pod peanuts

Methods
☐ Sun-drying  (go to 5.)
☐ Drying by dryer (go to 6.)
5. For sun-drying

Beginning date………………………..End date …………………………….

Practices during sun-drying

☐ Dry the bush on the field with ground covering material
☐ Dry the bush on the field without ground covering material
☐ Dry the bush on the concrete floor with ground covering material
☐ Dry the bush on the concrete floor without ground covering material
☐ Others (specified)…………………………………………………………

Weather condition during sun-drying of in-pod peanuts

<table>
<thead>
<tr>
<th>Date</th>
<th>Amount of sunlight</th>
<th>Raining condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strong sunlight all day</td>
<td>Heavy rain</td>
</tr>
<tr>
<td></td>
<td>Strong sunlight more than half day</td>
<td>Light rain</td>
</tr>
<tr>
<td></td>
<td>Cloudy half day</td>
<td>No rain</td>
</tr>
<tr>
<td></td>
<td>Cloudy more than half day</td>
<td></td>
</tr>
</tbody>
</table>

1
2
3
4
5
6
7

6. For drying by dryer

Drying time…………………………………….hours
Drying temperature…………………………..°C
**Figure C.1** Appearance of in-pod peanuts\(^2\) (A) Affected by subterranean ants causing cavity or large hole at the end or other parts of the pod, inside usually found dirt (B) Affected by molds causing darkened and decayed shells

\(^2\) Source: Data from the report of a collaboration project with Khon Kaen University on the Analysis/Revision of Information on Characteristics, Quality and Safety to Establish the Standard for Peanuts of the National Bureau of Agricultural Commodity and Food Standards
Figure C.2 Appearance of in-pod peanuts² (C) Affected by subterranean ants causing black or dark brown small and swollen spots on the shell (D) Sound in-pod peanuts

²Source: Data from the report of a collaboration project with Khon Kaen University on the Analysis/Revision of Information on Characteristics, Quality and Safety to Establish the Standard for Peanuts of the National Bureau of Agricultural Commodity and Food Standards
Figure C.3 Various maturity stage of in-pod peanut²

(A) Immature: inside of the shell is still white, the pod has not reached its maximum size and shrivelled when dried
(B) Mature: 30-80% of the inside of the shell has changed to brown and the pod has reached its maximum size
(C) Over mature: more than 80% of the inside of the shell has changed to brown or black, the pod has reached its maximum size and some seeds may germinate in case that the pod is damaged and moist

² Source: Data from the report of a collaboration project with Khon Kaen University on the Analysis/Revision of Information on Characteristics, Quality and Safety to Establish the Standard for Peanuts of the National Bureau of Agricultural Commodity and Food Standards
Figure C.4 Windrowing

(A) Sun-drying by turning bush upside down to let the pods at the uppermost position
(B) Sun-drying by laying the bush in thin layers on ground covering material

Source: Data from the report of a collaboration project with Khon Kaen University on the Analysis/Revision of Information on Characteristics, Quality and Safety to Establish the Standard for Peanuts of the National Bureau of Agricultural Commodity and Food Standards
Figure C.5 Stripped pod drying\(^2\) (A) Sun-drying on concrete floor (B) Sun-drying on the ground with fine nylon mesh (C) Sun-drying on the ground with fertilizer sack as ground covering material

\(^2\) Source: Data from the report of a collaboration project with Khon Kaen University on the Analysis/Revision of Information on Characteristics, Quality and Safety to Establish the Standard for Peanuts of the National Bureau of Agricultural Commodity and Food Standards
### APPENDIX D

**PESTS TO BE MONITORED, SURVEYED AND CONTROLLED**  
(Section A.4.4)

Pests affecting peanuts that should be monitored, surveyed and controlled are as follows:

<table>
<thead>
<tr>
<th>Duration</th>
<th>Pests to be monitored</th>
<th>Survey and control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Plant diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-planting</td>
<td>Seed and soil-borne diseases</td>
<td>Treat peanut seed with fungicides as officially recommended.</td>
</tr>
<tr>
<td>Pre-blooming</td>
<td>Seedling blight</td>
<td>If the stand loss is higher than 20% during the first 2 weeks, replant the missing stands. In case the loss is higher than 50%, plough off the entire crop and replant. Seed used for replanting shall be treated with fungicides as officially recommended.</td>
</tr>
<tr>
<td></td>
<td>Peanut stripe and peanut bud necrosis viruses</td>
<td>Pull the diseased plants, take them away from the plot and destroy. Resistant varieties should be grown or insecticides should be applied to control thrips, the bud necrosis vector, in the following season. The insecticide application should start after seed germination and stop after blooming.</td>
</tr>
<tr>
<td>Post-blooming to harvest</td>
<td>Rust and leaf spots</td>
<td>If symptoms are found on 2-3 lower leaves per plant at the beginning of blooming stage, spray peanut plants with fungicides as officially recommended. If the symptoms are found late during the pod-developing stage, there is no need to control the diseases.</td>
</tr>
<tr>
<td></td>
<td>Sclerotium stem rot</td>
<td>Pull the diseased plants, take them away from the plot and destroy. If the same plot has to be replanted in the next season, antagonistic <em>Trichoderma</em> spp. or fungicides should be applied as officially recommended, to control the disease.</td>
</tr>
<tr>
<td><strong>2. Insects and animal plant pests</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-planting</td>
<td>Ants</td>
<td>In the planting areas known to be affected by ants, apply chemicals or other control action as officially recommended.</td>
</tr>
<tr>
<td>Duration</td>
<td>Pests to be monitored</td>
<td>Survey and control</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pre-blooming</td>
<td>Aphids</td>
<td>If the injuries are higher than 10%, apply chemicals or other control action as officially recommended.</td>
</tr>
<tr>
<td></td>
<td>Thrips</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leafhoppers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaf rollers</td>
<td>If the damaged leaf area is higher than 30%, apply chemicals or other control action as officially recommended.</td>
</tr>
<tr>
<td></td>
<td>Leaf miners</td>
<td></td>
</tr>
<tr>
<td>Pod-developing to pod-filling</td>
<td>Subterranean ants</td>
<td>Check the epidemic of subterranean ants in every planting area of 2 Rai. Checking can be done by using baiting materials such as coconut shells with some meat or fraction-cut watermelon fruits. Place the baiting materials in 4 corners of the plot and 1 piece in the middle. If the subterranean ants are found, apply chemicals or other control action as officially recommended.</td>
</tr>
<tr>
<td></td>
<td>Termites</td>
<td>If the infestation is found, survey the surrounding area for their nest and apply chemicals or other control action as officially recommended.</td>
</tr>
<tr>
<td></td>
<td>Plant parasitic nematodes</td>
<td>In the planting areas known to be affected by plant parasitic nematodes, apply nematicides at the pegging stage as officially recommended.</td>
</tr>
<tr>
<td></td>
<td>White grubs</td>
<td>Make a survey during pod–developing stage. If found, control the pests with the same method used for controlling nematodes.</td>
</tr>
<tr>
<td></td>
<td>Rats</td>
<td>If the damage is higher than 10%, apply poison baits or other control action as officially recommended.</td>
</tr>
</tbody>
</table>
APPENDIX E
UNIT

The units and symbols used in this standard and the units recognized by the International System of units or *Le Système International d’Unités* or SI are as follows:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Unit</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>metre</td>
<td>m</td>
</tr>
<tr>
<td>Mass</td>
<td>kilogram</td>
<td>kg</td>
</tr>
<tr>
<td></td>
<td>gram</td>
<td>g</td>
</tr>
<tr>
<td>Volume</td>
<td>Litre</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>millilitre</td>
<td>ml</td>
</tr>
<tr>
<td>Temperature</td>
<td>degree Celsius</td>
<td>°C</td>
</tr>
<tr>
<td>Concentration</td>
<td>milligram/kilogram</td>
<td>mg/kg</td>
</tr>
<tr>
<td>Ratio</td>
<td>percent</td>
<td>%</td>
</tr>
</tbody>
</table>