QUALITY AND FOOD SAFETY MANUAL FOR OILSEEDS STORAGE

COLLECTORS LEVEL

International Trade Centre

COMMERCE

STDF

About the Manual

This manual, as a result of shared technical knowledge, experiences, and perspectives of different experts and contributors, represents a comprehensive guide for Myanmar collectors and other key operators along the oilseeds value chain, on Good Warehousing Practices (GWP) needed for the storage of oilseeds.

The manual has been conceived to reflect the real structural conditions of local Myanmar warehouses and storage facilities, and therefore it addresses with pertinent recommendation the key aspects to preserve the quality and food safety of oilseeds products during storage.

It is expected to extend the use of this manual as a guideline for quality and food safety of oilseeds, beyond the project beneficiary collectors to all operators in Myanmar responsible for storage along the oilseeds value chain.

The relevant government departments, associations and other interested stakeholders are also encouraged to refer to this manual when performing their duties and offering their services for the collectors and other intermediary actors' businesses along the oilseeds value chain.

Title: Quality and Food Safety Manual for oilseeds storage

Publication date and place: 21 January 2019, Myanmar

Page count: 75

Language(s): English / Myanmar

For more information, contact:

Thit Thit Lwin, National Project Manager, ITC-STDF 486 Oilseeds Project Myanmar

ttlwin@gmail.com

Ludovica Ghizzoni. ITC Adviser on Export Quality Management

ghizzoni@intracen.org

Foreword

Myanmar is one of the world's largest producers of oilseeds, which account for the most significant portion of agricultural activity after cereals and pulses. The country's most important oilseeds crops are sesame, groundnut, mustard and sunflower seeds, and they are mostly grown in the regions of Mandalay, Sagaing and Magway.

Myanmar oilseeds exports rely on a few key markets including China, Japan, Thailand and South Korea, as most of Myanmar's oilseeds exports are destined for these markets. The major difficulty for many developing countries, including Myanmar, is the low quality produce and non-compliance with international standards. A study conducted for the National Export Strategy, concluded that Myanmar's oilseeds sector is facing significant challenges in dealing with its sanitary conditions. Non-compliance with food safety standards and inadequate quality control mechanisms have been identified by the public and private sector as a major issue affecting human health, export capacity and competitiveness in the sector. The issue of non-compliance with food safety standards is an issue along the entire oilseeds value chain, from agricultural production to processing, hindering access to foreign markets

In this context, the International Trade Centre (ITC) implemented the 3-year (2015-2018)[1] project for "Improving food safety and compliance with SPS measures to increase export revenues in the oilseeds value chain" funded by the Standards and Trade Development Facility (STDF) of the World Trade Organization (WTO), in partnership with the Myanmar Ministry of Commerce (MoC) and in collaboration with other key ministries and institutions. The project aims to raise awareness among producers, processors and exporters and strengthen capacities to improve compliance with Good Agricultural Practices and Sanitary and Phytosanitary measures as well as food safety control systems.

The expected outputs of the project are:

Output 1: Strengthen capacity to improve compliance with GAP and SPS measures (including pest control, harvest, and post- harvest practices and pesticide use) by farmers;

Output 2: Increased capacity for quality segregation of seeds and GHP at storage facilities;

Output 3: Enhanced capacity to apply food safety control systems based on GHP, GMP, HACCP in oilseeds processing;

Output 4: Increased linkages along the sector value chain and to export markets.

Among the above-mentioned outputs, the output No. 2 specifically targets the storage facilities and collectors, for which this manual has been developed.

Further, in order to use the locally available knowledge and strengthen local capacity, a pool of local advisers, namely Trainers-cum-Counsellors (TcCs), were selected and trained through classroom and on-the-job training while assisting the project beneficiaries' operators in implementing food safety systems and monitor the progress made.

[1] Beginning of 2018, the donor STDF, under request of MoC, extended the project until February 2019

Foreword of the Union Minister U Than Myint, Ministry of Commerce

Mingalabar,

In Myanmar, oilseeds are the second staple food after rice in daily meal. So, we could say that oilseeds are the most important farm products in our country. Furthermore, by exporting sesame and peanuts, among others, to foreign countries, farmers can fetch a good income from their farms.

However, there are still needs and requirements to export oilseeds as well as peanut and sesame oil. The main requirement is to be able to produce oilseeds and edible oil with good quality and reasonable price. In order to do so, we need to pay attention to quality management in the value chain from farmers to local and foreign consumers.

In the oilseed sector, under the umbrella of the National Export strategy, the International Trade Centre (ITC) implemented a three years' project "Improving food safety and compliance with SPS measures to increase export revenues in oilseeds value chain in Myanmar", funded by the Standard and Trade Development Facility (STDF) of the World Trade Organization (WTO), with the aim of increasing foreign revenue promoting food safety and overcoming the challenges of quality issues encountered by the farmers, collectors, millers and exporters in the whole value chain of oilseeds' production.

The Ministry of Commerce has been implementing the National Export Strategy in line with the State Economic policy, and one of the initiatives was the oilseeds value chain project.

The manual of Quality and Food Safety for oilseeds storage for collectors is also one of the outcomes/achievements of the NES.

Oilseeds' brokers and collectors can achieve quality of procurement and storage by following the recommendations of this manual.

I would like to strongly encourage all brokers and collectors across the country, to make good use of this manual, as it will definitively help them to use best practices to ensure quality of oilseeds, thereby improving food safety, market access and economic growth of the country, including better income for the farmers.

Than Myint

Union Minister

Foreword of the Director General U Aung Soe, Myanmar Trade Promotion Organization

Myanmar Trade Promotion Organization of the Ministry of Commerce has been implementing the National Export Strategy in line with the vision of supporting Myanmar to become a competitive nation in regional and international trade, by promoting Myanmar Business Enterprises, practicing the Export Oriented Development Strategy in accordance with the State Economic Objectives.

Within the National Export Strategy, beans and pulses including the oilseed sector, are identified ones of the priority sectors. Sesame and groundnuts are crucial export products among oilseeds and furthermore, for the future, when the edible oil will be exported, is necessary to have quality seeds to ensure the quality of the oil.

The National Export Strategy for the oilseeds sector has the aim of increasing export revenue and promoting food safety. Therefore, the project "*Improving Food Safety and Compliance with SPS Measures to increase Export Revenue in Oilseeds Value Chain in Myanmar*" implemented by ITC in cooperation with Myantrade, funded by the STDF under the WTO, was very timely to overcome the challenges of quality issues encountered by the farmer, collector, miller and exporters along the whole value chain of oilseed production.

In the whole value chain of oilseeds, from farmers to the tables of local and foreign consumers, oilseeds buyers, brokers and warehouse collectors have an important role to play to ensure the quality of the products.

By learning and following the recommendations of how to purchase, transport, store, handle and control the pest and hazards such as aflatoxins, quality oilseeds raw materials and final products can be produced.

As this quality and food safety manual for oilseeds storage has been prepared to be user-friendly, I wish all collectors, brokers, merchants and millers, success in following the recommendations of this manual in their daily business and trade.

Aung Soe

Director General,

Myanmar Trade Promotion Organization

Acknowledgements

The ITC-STDF 486 Myanmar Oilseeds Value Chain Project would like to thank all the persons and institutions that have contributed to the preparation of this manual.

The group of technical experts, for their contribution in drawing up each pertaining section of the manual, namely: U Myo Thu (Director, Myantrade), U Soe Win Maung (Adviser, Myanmar Pulses, Beans and Sesame Seeds Merchants Association - MPBSSMA), U Zaw Win (Retired Deputy Director, Commodity Testing and Quality Management Centre – CTQM, MoC), Dr. Lai Lai Moe (Staff Officer,CTQM, MoC), Dr. Ko Ko (Staff Officer, Plant Protection Department -PPD, DoA), U Maung Maung Myint (Assistant General Manager, OMIC Myanmar Inspection and Surveying), Daw Thin Thin Maw (Laboratory Manager, SGS Myanmar Inspection Company), U Than Tun Win (Inspector, MITS Laboratory)

Dr. Namrata Pandita Wakhaloo, ITC Food Safety Consultant, for her technical inputs, peer review and final compilation of all sections.

Marta Drago, ITC Individual Contractor, for the editorial production, design and layout.

The head quarter and regional departments staff of Ministry of Commerce, Myanmar Trade Promotion Organization, Department of Consumer Affair and National Export Strategy Unit, for the extensive support provided in preparation of Round Table Meetings, Experts Group Meetings, Collector Manual Workshops and Launching Events.

The Commodity Exchange Centre from Yangon, Mandalay, Sagaing and Magway Regions, for their availability to host the workshops and trainings within their facilities, and for inviting all interested stakeholders to participate.

Dr. Thit Thit Lwin, ITC National Project Manager, for supervising and coordinating all the actors involved in the preparation of the manual, for organizing Round Table Meetings, Expert Group Meetings, workshops and training, and for providing editorial assistance and inputs to the introductory section of the manual.

Ludovica Ghizzoni, ITC Adviser on Export Quality Management for her inputs and advice.

The Standard and Trade Development Facility (STDF), project donor and the Republic of the Union of Myanmar Government, for the in-kind contribution.

Contents

ANNEXES

REFERENCES

Figures

Tables

Sample records

Acronyms

ASEAN	Association of South East Asian Nations
AV	Acid Value
CEC	Commodity Exchange Centre
CODEX	Codex Alimentarius Commission
DoA	Department of Agriculture
DoCA	Department of Consumer Affairs
DoH	Department of Health
EU	European Union
FFA	Free Fatty Acid
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GHP	Good Hygiene Practices
GWP	Good Warehousing Practices
HACCP	Hazard Analysis and Critical Control Points
ITC	International Trade Centre
MoALI	Ministry of Agriculture, Livestock and Irrigation
MoC	Ministry of Commerce
NES	National Export Strategy
PPD	Plant Protection Division
PRP	Pre-Requisite Program
SOP	Standard Operating Procedure
SPS	Sanitary and Phytosanitary
STDF	Standard and Trade Development Facility
TcC	Trainer cum Counsellor
UV	Ultra Violet
WTO	World Trade Organization

CHAPTER 1 INTRODUCTION TO THE MANUAL

Myanmar is one of the world's largest producers of oilseeds. Oilseeds cultivation accounts for the most significant portion of agricultural activity in Myanmar today, after cereals and pulses. The vast majority of oilseeds are grown during the monsoon and cool seasons in the country's lowland and dry zone region, including the Mandalay, Sagaing, and Magway regions. An estimated 82% of production occurs in these areas, where sesame and groundnut are the dominant crops. The third most planted oilseed crop is sunflower.

Oilseeds exports are reliant upon a few key markets including Japan, China and Chinese Taipei. Over 91% of total oilseeds exports are destined for these three markets of which sesame seeds account for roughly 94%. With rising concern of consumer health, implementation of food safety throughout the food chain becomes critical. And for export markets, compliance to international requirements on sanitary and phytosanitary (SPS) measures becomes mandatory. SPS measures are aimed at the protection of human, animal and plant life.

In Myanmar, the major food safety concerns related to oilseeds include aflatoxins, rancidity of oil and pesticide residues. All of which, can be developed anywhere along the value chain of the oilseeds and can be controlled by implementing hygienic practices along the oilseeds value chain. This would include Good Agricultural Practices (GAP) at farms; Good Warehouse Practices (GWP) in storage facilities and Codex hygienic principles at processors' facilities.

In Myanmar, the value chain of oilseeds from farmer to processor/miller/exporter involves a variety of key players or collectors, the first being the primary village collectors, who obtain oilseeds directly from the farmers. The primary collector will sell to millers/processors directly or else to other agents/town wholesalers. The town wholesalers obtain oilseeds from primary collectors and also hire their own agents and/or brokers for supplying oilseeds to the exporters. All along this, the oilseeds are stored in warehouses of the agents, collectors and exporters. If good warehousing practices are not followed at these warehouses there may be deterioration to the oilseeds' quality, making them unsuitable for direct consumption and/or processing/milling/export.

This manual was conceptualized and designed keeping in view this need for Good Warehousing Practices (GWP) for oilseeds and is based on Codex General Principles of Food Hygiene[2]. The manual will guide the collectors/agents/brokers/distributors to GWP needed for storage of oilseeds to ensure the quality of oilseeds is retained and no food safety issues arise. The manual additionally guides processors/exporters to maintain their warehouses following the same principles.

GWP in the manual deals with the warehouse requirements related to the following:

- Specification and the problems related to quality and food safety oilseeds in Myanmar;
- Hygienic warehouse infrastructure – includes the location, layout, construction and facility requirements;
- Hygienic warehouse environment – includes cleaning program, maintenance and calibration, pest control and fumigation, waste management, personal hygiene and training requirements;
- Hygienic warehouse activities – includes all activities and records needed from purchase to dispatch of oilseeds;
- Sampling and testing – including recommended sampling (methods and tools), test plan (tests to be conducted and frequency of testing) and testing methods for oilseeds;
- List of service providers – includes list of suppliers that provide tools and equipment recommended for warehouses (Annex I).

The manual was developed in full participation and contribution of various stakeholders of the oilseeds value chain. Two roundtables and two expert group meetings were organized to deliberate and discuss the structure and contents of the manual with a purpose to ensure customization of the manual to suit Myanmar oilseeds collector warehouse conditions. The complete list of roundtables and expert group meetings' participants is included as Annex IX
Afterwards, four workshops were organized for collecting of comments on draft manual at the Commodity Exchange Centres of Yangon, Mandalay, Sagaing and Magway regions.

All material from contributors was finally reviewed and compiled by the International Consultant and ITC.

[2] Codex Alimentarius/RCP 1-1969, Rev 4-2003 Recommended International Code of Practice General Principles of Food Hygiene

Roundtable Meetings

12-13 June 2017, Ministry of Commerce, Yangon

13 August 2018, Ministry of Commerce, Yangon

Collectors manual development workshop

27 April 2018, Commodity Exchange Centre, Yangon

30 April 2018, Commodity Exchange Centre, Mandalay

1 May 2018, Commodity Exchange Centre, Monywa

2 May 2018, Commodity Exchange Centre, Magway

CHAPTER 2 OILSEEDS AND THEIR USES

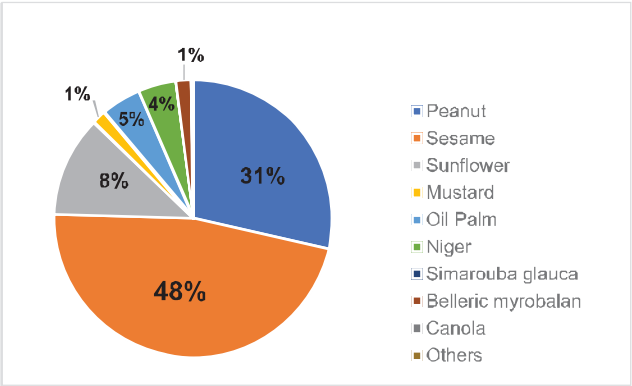
What are oilseeds

Oilseeds are seeds of various plant species, which have higher oil content (above 20%) and are used for commercial production of edible oil. In Myanmar, oilseeds namely peanut, sesame, sunflower, mustard, oil palm are grown on about 20 million acres, making oilseeds the third highest cultivated crop group after cereals and pulses. Among them, the most planted species and the most important oilseeds for export and edible oil extraction are sesame, peanut and sunflower. In Myanmar, soybean and maize are classified as pulses and cereals respectively.

According to the 2017 statistics of the United Nations Food and Agriculture Organization, Myanmar ranked second and sixth in global sesame and peanut production[3] and the major regions where oilseeds are grown include Magway, Sagaing and Mandalay.

Percentage area under cultivation of various oilseeds is given in figure 1.

Figure 1 Cultivated area share of different oilseeds crops in 2017-2018



Source: Myanmar Ministry of Agriculture, Livestock and Irrigation

Comparison of oilseeds grown in Myanmar

Year wise total cultivated area and total production/baskets of sesame, peanut and sunflower, the three major oilseeds crops in Myanmar grown over the last decade are given below:

[3] www.fao.org/faostat/

Figure 2 Production of sesame, peanut, sunflower (2008-2018)

Source: Ministry of Agriculture, Livestock and Irrigation

Table 1 Comparative data on the major oilseeds in Myanmar (2017-2018)

English name	**Sesame**	**Peanut**	**Sunflower**
Myanmar name	Hnan	Myay-pe	Nay-kyar
Scientific Name	*Sesamum indicum*	*Arachis hypogaea*	*Helianthus annuus*
Area under cultivation	3.9 million acres	2.5 million acres	0.7 million acres
Annual production	34 million baskets (8 million metric tons)	142 million baskets (1.6 million metric tons)	18 million baskets (0.3 million metric tons)
Weight per basket	54 pounds (24.52 Kg)	25 pounds (11.35 Kg)	32 pounds (14.53 Kg)
Categories/type	"early" and "late" "rainy", "winter", and "summer/irrigated"	"erect" & "spread" "rainy", "winter" & "mixed"	"rainy" and "winter" "open pollinated" and "hybrid"
Oil content	45 %	40 %	30 %

Uses of Oilseeds

Major quantity of oilseeds in Myanmar is exported as raw oilseeds for various intended purposes, for oil extraction and snack making. Within Myanmar, oilseeds are used to produce edible oil, to make snacks, as ingredients and/or seasons in salads. Oil Cakes, a by-product of edible oil extraction, is used both for human consumption as well as concentrate in animals feed. There are many traditional preparations made from oilseeds and oilcakes. Oil cake may also be used as a natural fertilizer in crop husbandry.













CHAPTER 3 SPECIFICATION OF OILSEEDS

Specifications describe something precisely or state precise requirements and description of material essential to be satisfied as per need of the customer. As per ISO 9000:2015 definition, specification is a document that states requirements. These requirements can be related to activities or products. Requirement is defined as needs or expectations that is stated, generally implied or obligatory.

As trading sphere is expanding and trade is becoming complex, specifications are playing a vital role to smoothen the trading process. Documented clear set of requirements and description, which are internationally accepted help ensuring customer needs and expectations are understood and supplied/met.

Codex documents are taken as internationally accepted references.

Sesame seeds

Sesame seeds specifications are given by the Ministry of Commerce[4] for trade purposes within the country and include only the physical and chemical parameters. The category wise specification for sesame is given below:

Specifications for Myanmar Red/Brown/Black Sesame Seeds (Fair Average Quality)

Characteristics/Parameter	Limits
Moisture Content	8.00% Max
Oil content	48.00% Min
FFA (Free Fatty Acid)	2.00% Max
Other colour seeds	1.00% Max
Damaged Seeds	2.00% Max
Foreign matters	2.00% Max

Specifications for Myanmar White Sesame Seeds (Fair Average Quality)

Grade I		Grade II	
Characteristics/Parameter	Limits	Characteristics/Parameter	Limits
Moisture Content	8.00% Max	Moisture Content	8.00% Max
Oil content	48.00% Min	Oil content	48.00% Min
FFA (Free Fatty Acid)	2.00% Max	FFA (Free Fatty Acid)	2.00% Max
Other colour seeds	5.00% Max	Other colour seeds	10.00% Max
Damaged Seeds	2.00% Max	Damaged Seeds	2.00% Max
Foreign matters	2.00% Max	Foreign matters	2.00 Max

Specifications for Myanmar Mixed Colour Sesame Seeds (Fair Average Quality)

Characteristics/Parameter	Limits
Moisture Content	8.00% Max
Oil content	48.00% Min
FFA (Free Fatty Acid)	2.00% Max
Damaged Seeds	2.00% Max

[4]MoC, Technical Regulation on (9-1-2014)

Foreign matters	2.00% Max

Where:

- Foreign Matter: includes dust, sand and other admixtures
- Damaged by insects: includes grains bitten/bored and infested
- Damaged otherwise: includes immature shriveled, heated, fungi infected and discolored grains
- In determining damaged (hand picking) the entire surface of every kernel is inspected exposing doubtful areas
- Analysis percentage results are to be obtained by weight as per following specifications of different qualities

Microbiological specifications for sesame seeds are not specified in Myanmar and are generally needed by the importer depending on the intended use of oilseeds that they buy and the country regulations. Therefore, if needed, the importer gives microbiological specifications criteria to the processor/exporter. The processor does not forward these specifications to collector and analyses samples of sesame after cleaning/processing for microbiological parameters.

Similarly, **pesticide residue MRLs** for sesame seeds is not specified within Myanmar, but maybe is an importing country requirement given to the exporter by the buyer. Again, the MRL level needed by buyer is not forwarded to collectors, therefore not included as a parameter for sesame seeds specifications.

Peanuts

The Myanmar government specifications for peanuts is not available, therefore the specifications referred below are from Codex[5]. Peanuts, either in the pod or in the form of kernels, are obtained from varieties of the species *Arachis hypogaea* **L.**

Specifications for peanuts

Composition and Quality factors

- Moisture content Maximum level
  - Peanuts in-pod.....10% max
  - Peanut kernels.....9.0% max
- Mouldy, rancid or decayed kernels.....0.2% max
  - Mouldy kernels are defined as kernels with mould filaments visible to the naked eye.
  - Rancid kernels are defined as those, which have undergone oxidation of lipids or the production of free fatty acids resulting in the production of disagreeable flavors/taste.
  - Decayed kernels are defined as those showing visibly significant decomposition.
- Other organic and inorganic extraneous matter
  - Filth: Impurities of animal origin (including dead insects).....0.1% max
  - Other organic and inorganic extraneous matter:
    - Peanuts in-pod.....0.5% max
    - Peanut kernels.....0.5% max
- In-pod defects
  - Empty pods (pods containing no kernels).....3% max
  - Damaged pods.....10% max
    - Damaged pods include shriveled (imperfectly developed or shrunken) pods and pods having cracks or broken areas which cause conspicuous openings or which seriously weaken a large portion of the pod, especially if the kernel inside the pod is easily visible without any pressure forced upon the edges of the crack.
  - Discolored pods.....2% max
    - Pods having dark discoloration caused by mildew, staining, or other means affecting 50% or more of the pod surface.

[5] Codex Standard 200-1995 – Standard for Peanuts

- Kernel defects
  Damaged kernel
    kernels affected by freezing injury causing hard, translucent or discolored flesh.....1% max
    shriveled kernels, which are imperfectly developed and shrunken; and/or.....5% max
    kernels damaged by insects, worm cuts;.....2% max
    kernels mechanical damage;.....2% max
    germinated kernels.....2% max

  Discolored kernels.....3% max
    Not damaged but affected by a) flesh (cotyledon) discoloration which is darker than a light yellow colour or consists of more than a slight yellow pitting of the flesh; and/or b) skin discoloration which is dark brown, dark grey, dark blue, or black, and covers more than 25% of the kernel.

  Broken and split kernels.....3% max
    Broken kernels are those from which more than a quarter has been broken off. Split kernels have been split into halves.

- Peanuts other than the designated type.....5% max

Contaminants

- Heavy Metals: free from heavy metals in amounts which may present a hazard to human health
  Arsenic[6] 0.1 mg/kg (ppm)
  Lead[7] 0.1 mg/kg (ppm)

- Total aflatoxins[8] 15 ug/kg (ppb)

- Pesticide residues: Codex Alimentarius Commission has established MRLs for a number of pesticides in peanuts. The same may be obtained from the official website of Codex Alimentarius Commission. In Myanmar, at collector level, pesticide residue is not a specification parameter. The pesticide residue MRLs like in case of sesame seeds is either a buyer or importing country specification, which the processor/exporter does not share with collectors.

Sunflower seeds

Although sunflower seeds specification and standards are not yet identified within Myanmar or Codex, other countries producing sunflower have identified their standards. These standards, like for sesame and peanuts are based on the following parameters:

- Moisture % (preferably below 10%)
- Admixtures %
- Damaged/other seeds/hulled seed %

Since country specifications are not available at present, it is recommended collectors ensure the max level of moisture % for sunflower specifications. The other parameters, can be as per buyer-seller agreements.

[6] CODEX STAN 193-1995
[7] CODEX STAN 193-1995
[8] CODEX STAN 193-1995

CHAPTER 4 QUALITY AND FOOD SAFETY ASSOCIATED PROBLEMS WITH OILSEEDS IN MYANMAR

As mentioned earlier, oilseeds are a major sector in Myanmar. With time, the quality of oilseeds including its food safety parameter deteriorate. The rate of quality deterioration in stored oilseeds depends on the quality of grain placed in storage and management of temperature, moisture content and insects. The quality of oilseeds is generally measured by testing the moisture %, free fatty acids (FFA), oil color, oil content, residues of unregistered chemicals or residues of chemicals above MRLs, insects or evidence of insect damage, mold and mycotoxin. With the exception of oil content, storage management affects all of these qualities.

In Myanmar, concerns related to oilseeds that have also been highlighted by several reports, include non-compliance with quality and food safety standards. Limited knowledge and inadequate equipment along the sector value chain (e.g. machinery, silos, trucks) for harvesting, handling, threshing, transport, processing and storage, lead to high post-harvest losses and contamination. This also consequently reduces the export capacity.

Inadequate warehousing or storage adds to the following quality and food safety concerns in Myanmar.

Growth of mycotoxin producing fungus

Source: Mold and Aflatoxin (video), Collaborative Crop Research Program (CCRP)

Currently in Myanmar, high levels of mycotoxin are of great concern in oilseeds, especially aflatoxins in peanuts. Growth of mycotoxin-producing fungi (in particular aflatoxins B1, B2, G1, G2) occurs due to inadequate practices at the storage facilities and high moisture content of the oilseeds. Once the fungus grows, it produces mycotoxin, which persist through the supply chain of oilseeds. No treatment of oilseeds can eliminate the mycotoxin. Sorting of visibly damaged seeds can reduce the mycotoxin level to a limited extent. Therefore, preventing growth of mycotoxin producing fungus is the best control for mycotoxin in oilseeds.

At the warehouse the growth of mycotoxin producing fungus can be controlled by adopting following measures:

Controlling the moisture levels of oilseeds

If the moisture level of the oilseeds is as per specifications, growth of mycotoxin producing fungus is minimized to a great extent. This would greatly reduce the deterioration of oilseeds quality. For controlling the moisture % during warehousing, the following good warehousing practices should be ensured:

- When buying oilseeds from farmers and/or agents, ensure the moisture specifications are clear.
- If buying oilseeds of higher moisture, ensure the same are dried to specification at the warehouse as soon as possible.
- When mixing oilseeds, moisture content of all lots should be as per specification.
- During transport especially in rainy season, ensure that oilseeds do not get wet. For this, tarpaulins in good conditions should be used while transporting, one on bottom and another one on top. The tarpaulins should be properly folded and tied to ensure the bags are completely covered and rainwater cannot find access to the oilseeds' bags.

- Warehouse is built to ensure no leakages occur, especially during rainy season, which may wet the oilseeds.
- Warehouse has proper ventilation and bags are stacked appropriately in brick-laying method on proper pallets, without using corrugated sheets or tarpaulin on them, to facilitate ventilation.
- Drinking water is not kept in the warehouse, where its spillage could lead to wetting of the oilseeds' bags.
- Ensure traceability and first-in-first-out (FIFO) is being followed in the warehouse.
- Warehouse should test the incoming, outgoing and in-process (especially after drying) moisture of oilseeds.

Since Myanmar aims to expand oilseeds production and exports, mycotoxin control becomes more critical. Export requirements for oilseeds for both human and animal consumption include compliance with maximum mycotoxin levels, specific and total.

(For details on how to control aflatoxin in peanuts refer to Codex Code of Practice for Prevention and Reduction of Aflatoxin Contamination in Peanuts CAC/RCP/55-2004)

Pesticide Residue in the oilseeds

Pesticide residues represent another concern with oilseeds in Myanmar, especially with sesame seeds. These pesticide residues come from improper farm practices, where farmers may not use the proper concentration or frequency for pesticide spraying, leading to residues in the oilseeds or using pesticides that are banned by law. The pesticide manufacturer generally prescribes the concentration of the pesticide to be sprayed on crop, the method of spraying and the minimum number of days for harvesting after spraying. These are all scientifically established, such that the residues of the pesticide are either nil or within safety range for consumption. If farmer does not follow these manufacturer recommendations, it may lead to higher residue levels of the pesticides. Once the oilseeds have pesticide residue levels higher than the maximum residue level (MRLs) permitted for human health safety, it persists through the supply chain to the end consumer and cannot be removed during processing.

At the warehouse level, the control is mainly limited to ensure that oilseeds are not accepted in pesticide bags or any other chemical bags, and oilseeds bought are within MRL limits. This would need warehouses being specific on pesticide residue to farmers or from whom they buy oilseeds, educating them on need to control residue levels and also giving feedback when problems arise. To ensure feedback is effective, proper traceability through the supply chain is essential. Each player in the supply chain needs to ensure traceability within his or her operations, i.e. oilseeds bought from a particular farmer/agent went to which exporter/warehouse.

Another aspect of control that may be adopted by the warehouse is monitoring/testing the pesticide MRLs of oilseeds bought/handled by them. This may be followed when required by exporter/processor who buys oilseeds from the warehouse. However, also this control can be of concern, namely, the MRLs of a particular pesticide may vary from country to country and also the laboratories in Myanmar may not be equipped to test the particular pesticide MRL or its required sensitivity.

Rancidity of oilseeds

Rancidity is the complete or incomplete oxidation or hydrolysis of fats and oils when they are exposed to air, light or moisture or by bacterial action leading to development of objectionable taste and odor. Free fatty acids (FFA) are produced by hydrolysis of fats and oils and the level depends on time, temperature and moisture content. FFAs are less stable and are prone to oxidation. Therefore, rancidity in oil can be measured directly as % in oil (FFA%) oil, or indirectly as weight of potassium hydroxide (KOH) needed to neutralize the FFA present in 1 gram of oil (AV), both of which are important parameters in specification of oilseeds.

Acid value (AV) is an important indicator of oxidation of oil and simple quick tests are available in Myanmar to roughly determine the AV of oilseeds. It is recommended AV to be checked at collectors' warehouses.

Since the level of FFA depends on time, temperature and moisture content, the following good warehousing practices may help control it:

- Moisture of oilseeds may be controlled, as mentioned above, in growth of mycotoxin producing fungus.

- Ensuring warehouse has proper ventilation and bags are stacked appropriately in brick-laying method on proper pallets without using corrugated sheets or tarpaulin on them. This will facilitate ventilation and can control temperature.
- Following first-in-first-out will ensure control on time.

Insect pest infestation during storage

During storage in warehouses, oilseeds are very prone to insect pests' infestation, especially sesame seeds. Different oilseeds have specific insect pests that infest them. Some insect pests can eat the entire oilseed in no time and lead to great losses. Insect pest reproduction increases with temperature and moisture, and limited chemical control options for pests in stored oilseeds increases the importance of good warehouse management and planning.

Chapter on good warehousing practices gives in detail the management of pest infestation in the warehouse. To summarize, the important aspects of good warehousing practices that would help control pest infestation during storage include:

- At the time of purchase, warehouse can specify "non-infested oilseeds" as a requirement.
- Ensure there is no infestation before unloading the oilseeds. If infested, do not unload till decision on disposition is taken.
- If infested oilseeds are unloaded, they should be stacked away from non-infested oilseeds bags and should be fumigated immediately.
- Ensure oilseeds bags are stored on clean pallets away from the walls.
- Ensure cleaning of warehouse is proper, especially under the pallets and between stack and walls. Also ensure that the spilled oilseeds are not brushed under the pallets.
- Proper cleaning and storage of used bags is also critical as, they may become source of pest harborage.
- Ensure oilseeds waste is disposed such that it does not harbor pests, which can become the source for infestation of oilseeds bags in warehouse.
- Ensure trained personnel following proper method in doing fumigation and verify the effectiveness of fumigation after it is over.
- Monitor insect pests' infestation of oilseeds as mentioned in GWP.

Conclusion

To conclude, all quality and food safety associated problems with oilseeds in Myanmar can be controlled to great extent by following good warehousing practices. Warehouse owners storing oilseeds need to be aware of good warehousing practices to be able to implement them. They would need to ensure their staff and workers are also aware of the good warehousing practices to implement them. Details of these practices to be followed are given in further chapters.

In addition to this, to facilitate understanding and implementation of the good warehousing practices the following is recommended:

- Posters given in this manual can be put up at appropriate locations as guidelines for staff and workers to follow (Annex XI to Annex XVII).
- Posters can also be used for in-house training of staff and workers, especially temporary workers.
- The Trainers cum Counsellors (TcCs) trained under this project can be hired to conduct short workshops on GWP for warehouse staff and workers (Annex X).
- TcCs can also be hired to facilitate implementation of GWP at warehouses

CHAPTER 5 GOOD WAREHOUSING PRACTICES FOR OILSEEDS

Oilseeds are seasonal crops and therefore need to be stored for round the year availability. Warehousing of oilseeds needs to be such that the quality including food safety of the oilseeds is retained. To ensure that oilseeds do not deteriorate during storage, Codex hygiene principles need to be followed.

The Codex hygiene principles can broadly be categorized into the following three basic requirements:

- **Hygienic warehouse infrastructure**
- **Hygienic warehouse environment**
- **Hygienic warehouse activities**

The term "Pre-requisite Program" (PRP) is used in the food safety management system standard ISO 22000:2018. Prerequisite program is defined as the basic conditions and activities that are necessary to maintain a hygienic environment throughout the food chain suitable for the production, handling and provision of safe end products and safe food for human consumption. The standard is based on the Codex principles for food hygiene. Therefore, PRPs can also be broadly categorized into the same three basic requirements. Examples of equivalent terms include Good Agricultural Practice (GAP), Good Veterinarian Practice (GVP), Good Manufacturing Practice (GMP), Good Hygienic Practice (GHP), Good Production Practice (GPP), Good Distribution Practice (GDP) and Good Trading Practice (GTP). Good warehousing practices (GWP) would also be an equivalent term for PRPs to be implemented in a warehouse used for storing food.

PRPs or the Codex principles requirements to be implemented in a specific sector within the food chain depend on the segment of the food chain, intended use and the type or category of food product. For oilseeds warehousing in Myanmar, activities involved in addition to storage mostly include drying, cleaning, sorting, mixing and/or re-bagging before the bags are dispatched to the processor. The good warehousing practice requirements for such warehousing oilseeds intended for either direct consumption or further processing are as follows:

Hygienic warehouse infrastructure

The building and facility of the warehouse should be such that it prevents deterioration of oilseeds during storage and/or introduction of hazards, which may be carried through the food chain to the end product leading to food safety issues.

Location of warehouse

The location of the warehouse should be such that the location is not a potential source of contamination. The following should be considered when selecting a location for building warehouse for oilseeds:

- Location of warehouses should ideally be away from residential buildings, adjoin sun-drying fields, elevated level and safe from natural disasters like flooding.
- In case the warehouse is located in the residential area and/or attached to residence, utmost care needs to be taken to segregate the house activities from the warehouse's activities and waste.
- The warehouse should have access to proper roads, water and electricity supply.

Layout of warehouse

The layout of the warehouse should ensure cross-contamination due to layout is prevented. The following needs to be considered:

- A forward flow of product from receiving and unloading of oilseeds, through drying, cleaning, sorting, mixing, re-bagging and storage to loading and dispatch of oilseeds.
- Designated place to be allocated for incoming and outgoing bags of oilseeds. Only incoming bags for direct dispatch should be stored in outgoing bags area.
- Drying, cleaning, sorting, mixing, re-bagging area should be segregated with easy access to storing of

bags (incoming and outgoing).

- Storage of packing material and used bags should be at designated place with easy access to where they are needed.

- Other material including chemicals and detergents should be stored in lock and key to avoid unintended misuse.

- If housing of workers is provided, it should be preferable a separate building within the premises. At minimum, a physical separation is needed between the housing and warehousing activities.
- Toilets and restrooms should not directly open into the warehouse or where warehousing activities are performed.
- Change-rooms/area and washing stations should be at and/or adjacent to the entry to warehouse.

For warehouse layout poster see Annex XI.

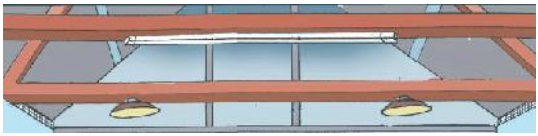
Construction of warehouse

The warehouse building needs to ensure that:

- It is built according to the relevant laws and regulations of the relevant municipal body and the relevant ministries.
- The floors, walls and ceilings are smooth (with no crakes or crevices or holes to harbor pests) and built with materials that are easy to clean and resistant to seepage of water. Floors are constructed to allow proper drainage and cleaning.
- Windows are also easy to clean preferable fitted with cleanable insect proof screens. It would help if the screens are removable to facilitate cleaning.
- Doors and shutters to the warehouse have strip curtains and/or screens to ensure bird proofing. Any form of screen that ensures bird proofing is acceptable. It is recommended that the doors and shutters of the warehouse are kept closed except when loading and unloading.

- Area where mixing, sorting and re-bagging is done is also in sound/good condition, durable and easy to clean and maintain. It is recommended any activity where oilseed is exposed be done on clean tarpaulins.
- Warehouse is provided with proper ventilation. If exhaust fans are provided, these should be adequate in number, properly working and screened to ensure bird proofing.

- Adequate natural or artificial lighting is provided to enable sorting, mixing and/or re-bagging of oilseeds. Lights of the warehouse should be non-glass e.g. could be LED or covered with non-glass or toughened glass.



Facilities at warehouse

Facilities needed in the warehouse include and may not be limited to:

- An adequate supply of potable water with appropriate facility for its storage and distribution. If source of water is other than municipal supply, it is essential to ensure that the water available is potable.
- Adequate drainage and waste disposal system and facility should be available.

- Adequate cleaning facilities suitably designed should be available for cleaning facility (including drains), equipment and tools. For example, brooms (both for floor and ceiling cleaning), mops, brush. These should not come in direct contact with oilseeds. If any of these are needed for oilseeds as well, e.g. brooms, then separate ones should be used for oilseeds in contact and these be maintained separately. It is recommended to visibly identify equipment used for cleaning and for direct contact with oilseeds in color-coding.

- Personal hygiene facilities should be available at the warehouse for the staff working here. These include appropriate number of hand washing and drying facility (including availability of running potable water, non-hand operating taps, liquid soaps and clean hand towels); sufficient number of lavatories/toilets of appropriate design; changing area/room where workers can put on their aprons and caps and then wash their hands before starting to work.
- Adequate number and design of all tools and equipment required should be available weighing balance, sampler, shovel etc. These should be made of easy to clean, durable material.
- Adequate (number and design) transport facility (owned or hired) for receiving and dispatch of oilseeds should be available.

NOTE: Where collector is using temporary or hired space for any activity (storage, drying, mixing, sorting and re-bagging) especially during peak season, such facilities need to comply with all requirements mentioned in this section. These requirements should not be compromised at the risk of deterioration of quality including food safety of oilseeds.

Hygienic warehouse environment

The building and facility of the warehouse should be maintained and cleaned to ensure continuing hygienic environment for proper oilseeds storage. This includes cleaning of warehouse premises and facility, pest control, waste management and monitoring effective implementation of these.

Warehouse-cleaning program

The warehouse cleaning program should include:

- All parts/areas of the warehouse premises inside and outside including floors, ceilings, ventilators, drains, toilets, hand washing area/stations etc.
- All machines/equipment and tools used in the warehouse including pallets, sieves, baskets, tarpaulins, sampling tools and balances used in each area of the warehouse.
- Cleaning method, frequency and person responsible. For example, for the warehouse floors, cleaning with broom is recommended on a regular basis with wet mopping done periodically. Ceiling need to be cleaned for dust and cobwebs at predefined frequency e.g. once in fortnight. Similarly, the method and frequency for cleaning ventilators too needs to be predefined.

  Cleaning, both inside and outside the warehouse, should ensure that there is no accumulation of unused drums, bags, parts of machines, construction or any other material that could harbor pest, collect dust and become a source of contamination.

  A sample of the cleaning program for oilseeds warehouse is included in Annex V. The warehouse should develop a cleaning program in the same manner including the areas, tools and equipment in the warehouse and the practices they need to follow. The cleaning program may vary from warehouse to warehouse as long as cleaning is effective as seen in the continuous monitoring and verification.
- Continuous monitoring and verification for effectiveness and suitability of the cleaning program. Warehouse can use a weekly maintenance and cleaning verification checklist to verify the suitability and effectiveness of cleaning program.

  Example of such checklist is given in Annex VI. Warehouse should modify the checklist as per the areas, tools and equipment present in their warehouse.

Maintenance of machines/equipment and calibration program

The maintenance of machines/equipment and calibration program should include:

- Warehouse may have various machines and equipment for drying, cleaning, sorting, mixing and re-bagging and stitching. It is recommended a list of all machines and equipment is made.
- All machines should be properly maintained and repaired before start of season.
- Greasing should be such that excess grease is not sticking out or smeared on in-contact surfaces to contaminate the product.
- Machine should be designed to ensure oilseeds do not come in contact with the greasing parts of the machine. However, if they do, food grade grease or if appropriate edible oil may be used.
- After season is over, machine should be properly cleaned and packed up for the next season. This would include closing all inlets and entries.
- In case of breakdown, after repair machine should be properly cleaned to ensure no machine screws or parts may enter in the product.
- Equipment like weighing balance needs to be calibrated to national standard at least once a year by department of weighs and measure. Warehouse should maintain certificate of calibration. Even the moisture meters, AV strips and any other test kit used should either be calibrated or verified as recommended by manufacturer.

Warehouse pest control program

The warehouse pest control program should include:

- Preventing entry of pests by keeping warehouse building in good repair and condition. Pest includes birds, rodents, dogs, cats and insects. This can be achieved by ensuring:
  - Holes and drains from where pest can enter are sealed.
  - Windows have an effective wire mesh screen.
  - Doors are self-closing and/or have effective wire mesh screen or strip curtains.
  - Shutters have net/mesh/or any form of screen to prevent pest especially birds to enter.
  - There should be no or minimum gap under the doors and shutters when closed.

- Do not provide place for harborage and infestation within and surrounding the warehouse premises. This can be achieved by ensuring:
  - Maintain a clean environment around the warehouse to prevent harboring of insects, birds or rats as these can easily find entry to warehouse.
  - Unused material including bags and stacked pallets should also be maintained clean such that they do not provide harborage of insects.
  - Keep drains clean.
  - Oilseeds spillage should be cleaned and not pushed under the pallets. All pallets to be cleaned of oilseeds from underneath.
  - Discarded seeds should be stored properly till they are adequately disposed. Do not keep these for too long time as they can become a breeding ground for pests.
  - Bags should be stacked on pallets and away from walls.
  - Storage should be preferably at cooler temperatures, which may be achieved by air-cooling crops or through other suitable procedures.

- Pest infestation should be dealt with immediately, therefore facility and its surrounding areas should be regularly examined for evidence of infestation preferably every 7 to 10 days. Records of the examination needs to be maintained and can be included in the weekly maintenance and cleaning verification checklist mentioned earlier (Annex VI). It is recommended additionally, the staff and workers of warehouse to be trained to detect signs of infestation.

  To check infestation the following methods are recommended:
  - Shaking of bags and passing the oilseeds through sieving. Check the pests coming out after shaking the bags hardly. It is recommended to shake the bags under shadow, as pests are shy of light. Checking by passing oilseeds through sieve is a faster and more accurate method to check infestation.
  - By trapping in corrugated cardboard, sticky/glue traps and/or light traps.

Using corrugated cardboards: Leave strips of 20cmx3cm of wavy corrugated box (2 ply or more) paper in between bags of oilseeds in the stack twice a month and examine after 24 to 48 hours to determine the existence of insect eggs, larvae, or matured insects, after which the cardboards can be removed till next use.

Using sticky traps: Hanging sticky traps/boards above oilseeds stacks or piles can catch flying mature insects while placing commercially available glue traps behind the stacks can catch crawling insects and rats/mice. Sticky traps can also be made by soaking woven palm leaves, coconut leaves in molasses, beer and coconut oil.

Using light traps: There are various kinds of light traps to capture insects available commercially. A simple way to do this is to use one electric bulb (or) fluorescent tube and a bottle filled with liquid soap.

- Pest infestation should be eradicated immediately as soon as identified, without adversely affecting food safety or suitability. For eradication treatment with chemical, physical or biological agents can be done.

The list of registered pest control providers, recommended by the Plant Protection Division (PPD) of the Ministry of Agriculture, Livestock and Irrigation (MoALI) is included as Annex II.

Fumigation of Infested bags

Fumigation is typically defined as the method where poisonous gas/smoke/fumes is used to remove harmful pests, bacteria and disease. In oilseeds it is used to remove pest's infestation from oilseeds, which compromise on suitability and also are a source of cross contamination. Fumigation is a form of chemical treatment for pest eradication and needs to be done properly by trained personnel. Many food products including oilseeds are prone to get infested by specific pests during storage, therefore it is important to fumigate to remove these pests which can not only destroy the oilseed but can also cause contamination. Moisture, sanitation, and environmental conditions can all affect how long a treatment may last. Most pests typically require 2-3 treatments, and last approximately 2-3 weeks.

There are many chemicals that may be used for fumigation depending on the type of product and kind of infestation. Use of some fumigants is banned in countries. It is therefore good to know if the oilseeds are intended for export such that they do not use the banned fumigants.

For fumigating peanuts, sesame and sunflower Phosphine fumigants (aluminum and magnesium phosphide) (Celphos, Quikphos, Gastoxin, Shenphos, Phostoxin and Aisatic) are recommended.

Only registered fumigation agencies with proper training can conduct fumigation. List of registered fumigation agencies can be obtained from Department of Agriculture and it is included as Annex II, or visiting Plant Protection Division website (http://ppdmyanmar.org/pesticide-registration-board/).

Each fumigant has an effective dosage at which the infestation can be eradicated. This dosage is scientifically proven by the manufacturer and is mentioned on the commercial packaging of the fumigant or the material data sheet accompanying the fumigant. It is essential this dosage is accurately and as prescribed used. It may be noted that fumigants are harmful for human health too. If workers are exposed to fumigant and/or they show symptoms of exposure like are headache, vomiting and/or dizziness, they should consult the doctor. It is also recommended, people working around fumigation should not consume alcohol 24 hours before and after fumigation.

Before conducting fumigation things to remember include, but are not limited to:

- Since fumigant is harmful for human beings as well, are needs to be taken to conduct fumigation far away from residential buildings. In case the warehouse is not far from residential area or is in residential area, care needs to be taken to restrict the fumigant so that human beings are not exposed to the fumigant.
- Stacking bags away from walls and on pallets also facilitate effective fumigation. The space between stack

of bags and wall helps to ensure tarpaulin or plastic sheet can be properly placed around the stack.

- It is encouraging if the building is airtight which acts as an additional barrier for fumigant to escape.
- Ensure all preventive tools and emergency facilities are available for fumigation. Sufficient number of fire extinguishers and a medicine toolbox should be available, and the emergency number for hospital and fire brigade must be hanged somewhere visible. To conduct fumigation, the use of protective clothing, pants, long shirt, boots and rubber gloves is recommended.
- Make sure to have the contact numbers of the nearest hospitals, clinics and fire stations.

Since it is important to confine the gas released during fumigation, it is essential that the tarpaulin or plastic sheet used is intact with no tears. Available tarpaulins generally do not have high permeability therefore it does not permit the fumigant gases to pass through and is recommended to be used. However, there are many types of plastic sheets available in the market. Diffusion through the sheet will reduce the concentration of fumigant to which insects are exposed in the stack. If using a plastic sheet, it is essential that it be fit for purpose. Following are points to consider when selecting plastic sheet for fumigation:

- The plastic sheet must withstand UV radiation preferably 3% UV stabile.
- The plastic strength needs to be appropriate such that it is resistant to tearing.
- It should be heat stable, to withstand at least 80 degree centigrade.
- The rate at which diffusion through the fabric takes place depends upon the type of material, its thickness and the ambient temperature.
- To confine phosphine gas for effective fumigation, the gas loss must be less than 1 milligram per cubic feet per day.
- The weight or material mass of the plastic should be on an average 200-250 g/m^2

Fumigation Procedure

Fumigation needs to be planned in advance, min. a day in advance. It is important to ensure the number of bags and/or tonnage and cubic meter to be fumigated is known. Inform the pest control company and they will follow the below procedure unless described differently by manufacturer. If any other procedure is followed, it is recommended to verify the manufacturer's recommendations. The general procedure of fumigation is as follows:

• Ensure the stack to be fumigated is stacked neatly on pallets and sufficiently away from the walls.

• Confirm the tarpaulin or plastic cover is intact with no tears. Small tares can be repaired, however too many repairs are not recommended since i would significantly affect the permeability of the cover to retain the gas for sufficient exposure time.

- Confirm the area and bags/quantity to be fumigated.
- Since permeability of cover is affected by temperature, it is recommended to start the fumigation process near to closing time. Also, warehouse workers and staff would close for the day making it safer to fumigate.
- Warehouse should depute their staff to supervise/monitor the pest control agency hired to do fumigation.
- Supervising/monitoring staff to ensure the following before the agency starts fumigation:
  - The fumigant tablets/pellets should be in the original packaging. Transferring the tablets/pellets into other packing is not recommended.
  - Confirm the fumigant used, its dosage and method of fumigation recommended by the manufacturer. Dosage of fumigants per volume of the stack treated should be followed as prescribed on the label of the fumigant packing/bottle. According to the FAO guidelines[9], the recommended dosage for groundnuts (shelled or in shell) is, under atmospheric pressure, a sufficient aluminum or magnesium phosphide formulation to generate 1.5 grams of phosphine per m^3. However, according to Myanmar

[9] Bond, E. J. (2007). Manual of fumigation for insect control. FAO plant production and protection paper, 54.

exporters' experience, some middle-east importing countries of oilseeds may require a higher dosage up to 4 grams of phosphine per m^3.

- Confirm the batch number and expiry date of the fumigant.
- Confirm with the pest control agency the quantity of fumigant that they would use for the quantity/number of bags that need to be fumigated
- Record these essentials in simple format. A recommended record for fumigation is as below:

Sample record 1 Fumigation

Date of Fumigation	Lot/Batch No.	Total Number of Bags	Fumigant Used	Batch No. & expiry date of Fumigant	Date for Opening stack	Verification of effectiveness

- The fumigation agency will prepare small portions of the tablets preferably in small muslin/permeable bags. These are placed in-between the bags for fumigation and is essential to remove the fumigant residues after fumigation. For underneath the pallets, fumigant may be placed in small trays such that after fumigation, the residue may be collected for proper disposal.
- Ensure there are minimum two people to do fumigation. If two staff are not available from pest control agency, the collector may depute his workers or staff who can be trained to work with the pest control agency staff.

- The fumigant tablet/pellet bags will be placed all over the stack in a way to ensure fumigant reaches the entire stack. To ensure penetration of the fumigant till the core, the stack height should be not more than 6 meters for polyethylene bags and not more than 3 meters for gunny bags.
- Immediately start covering the stack with tarpaulin/plastic cover. In actual practice, one person will place the fumigant tablets/pellets and the other will follow covering the stack where tablets/pellets are placed.

- Ensure the sides of the cover are properly closed as well as the floors. Use dummy bags or additional bags for weight to better close the tarpaulin/plastic sheets on the floor. The most important remark of fumigation is to make sure it is done in air-tightness to get sufficient exposure time at the right concentration.
- After the stack is properly covered, label the stack clearly with the date only after which it may be opened. Each fumigant has a scientifically defined minimum exposure time for effective action. The exposure time additionally varies with environment temperature.

- After fumigation, the fumigant must be returned to storage at a secure place, under lock and key so as to avoid unintentional misuse. Empty fumigant containers should either be taken back by the pest control agency or disposed as per instructions, so as not to contaminate the environment or product.
- Once fumigation is over, if material is not needed to be dispatched, the cover may be left remaining on the stack, however, effectiveness of fumigation needs to be verified. The determination of live and fragments of insects' method, cited in Chapter 7, can be applied to verify the effectiveness of fumigation. Verification of effectiveness of fumigation also needs to be recorded (refer sample fumigation record).

It can also be assumed that the fumigation is done successfully, if the persons in charge follow the requirements to conduct an effective fumigation included in the FAO guidelines[10] (i.e. using approved fumigants, respecting the exposure time, ensuring the stack is properly sealed, having sufficient time available for post-exposure ventilation, etc..)

- The residues of phosphine powders must be mixed with water and buried in the ground located away from rivers or as recommended by manufacturer.
- Deliver the items to the market only after ventilating them for 24 hours after fumigation.

For fumigation procedure poster see Annex XII

CAUTION: Be aware that phosphine will bursts into flames in contact with water. It also has the ability to rust copper.

Warehouse waste management program

At the warehouse, the waste generated is only dry waste, which is mostly dust, stones and damage oilseeds, if cleaning and sorting is done. Also, there may be spillage oilseeds and damaged bags for discard. The following should be considered for waste management:

Solid waste

- During cleaning activities, discarded seeds, stones and other matter should be collected in clean waste bins.
- Sufficient number of wastes' collecting bins that are identified should be available.
- Once shift is over, the material from waste bins should be collected at a designated place within the facility. Waste can be collected and stored preferably in containers with lids such as not to cross contaminate the surroundings and product.
- The waste bins and designated place for waste storage should be maintained clean.
- At a predetermined frequency, preferably once or twice a week, waste should be disposed in an appropriate manner such that waste collection place does not become the ground for infestation.
- For used or torn/damaged bags too, proper stacking, bundling and storage at predetermined place till disposal should be available. Stored waste bag area should also be maintained clean.

Liquid waste at warehouse would be limited to the wastewater from hand-washing facility and toilets. Care should be taken there is proper drainage for the same especially for the toilet wastewater. Connecting the wastewater to the municipal sewage system would be recommended.

If warehouse holds dining or kitchen within the premises, waste from the same needs also to be disposed appropriately so as not to create contamination or infestation.

[10] Graver, J. V. S. (2004). Guide to fumigation under gas-proof sheets. Food and Agriculture Organization of the United Nations.

Personal hygiene

The staff and workers who come in direct or indirect contact with oilseeds can contaminate the oilseeds. It is therefore important that the warehouse staff and workers follow proper personal hygiene to minimize the chances of cross contaminating the oilseeds.

Personal cleanliness

Warehouse workers and staff need to maintain a high degree of personal cleanliness. This includes and may not be limited to:

- Workers should wear a shirt/T shirt and pants in the warehouse especially if performing activities like drying, cleaning, sorting, mixing and re-bagging. Longyi is not recommended to be used in the warehouse.
- Protective clothing to be provided by warehouse for the working staff and workers like apron, caps and closed footwear with shoe-covers. Protective clothes are recommended to be worn especially during drying, cleaning, sorting, mixing and re-bagging. These protective clothing should be used only during the activity and should not be worn when going to toilets or during lunchtime or anywhere other than where activity is being performed. Shoe-covers should be restricted to tarpaulins on which oilseeds are exposed/open. Protective clothes should be cleaned after use. It is recommended that warehouses use cloth protective gear (apron, caps and shoe-covers), which are re-usable after washing.

- Warehouse staff and workers should wash their hands at the start of operation/activities, after using toilets and whenever handling contaminated materials. Having visible hand washing posters in appropriate locations would help to remind warehouse staff and workers to wash their hands. For hand washing poster see Annex XIII.
- Report to work in good health, clean, and dressed in clean attire.
- Keep fingernails trimmed, filed, and maintained so that the edges are cleanable and not rough. No nail varnish or false nails must be worn.
- Pockets above waist are not recommended in aprons/uniforms. If street clothes are worn under the aprons, the breast pockets must be emptied before starting operation/activities like drying, cleaning, sorting, mixing and re-bagging.
- Long hair must be tied back and tucked-in within the cap.

For personal hygiene do's and don'ts poster see Annex XIV.

Personal behaviour

Personal behaviour is important for personal hygiene and may lead to cross contamination of oilseeds. Within the warehouse, staff and workers should:

- Refrain from smoking, spitting, chewing tobacco/beetle leaf/nut or eating/drinking, sneezing or coughing over unprotected (outside the bags) oilseeds, scratching, touching hair, ear, eyes or mouth and use of mobile phones.

- Not wear jewellery, watches, friendship bands and religious threads.

- Consume all meals and refreshments only in the dining area or lunch rooms.

For personal behavior poster, see Annex XV.

Health status

Warehouse workers and staff known, or suspected, to be suffering from, or to be a carrier of a disease or illness likely to be transmitted through food, should not be allowed to come in direct contact or handle oilseeds if there is a likelihood of their contaminating the oilseeds. Worker or staff would come in direct contact with oilseeds only when oilseeds are exposed during drying, cleaning, sorting, mixing and re-bagging. Any person so affected should immediately report illness or symptoms of illness to the management.

As per Codex hygiene requirements, medical examination of a food handler should be carried out if clinically or epidemiologically indicated.

Illness and injuries

Conditions that are important for food safety and need to be reported to management include:

- jaundice;
- diarrhoea;
- vomiting;
- fever;
- sore throat with fever;
- visibly infected skin lesions (boils, cuts, etc.);
- discharges from the ear, eye or nose.

In case worker is suffering from any of the above, he/she need to inform the supervisor/warehouse in-charge such that worker responsibility may be changed to ensure he/she do not directly touch the oilseeds.

Changing room/area

Prior to entering the plant facility, the warehouse staff and workers need to wear protective clothes for which the changing room or designated area adjacent to the warehouse should be available. Here warehouse staffs and workers will wear their caps, aprons and change their footwear too.
If warehouse provides uniform in addition to protective clothes, then facility or lockers to keep the worker street clothes in, should be available.

Visitors

Entry to the warehouse should be restricted. Visitors should be permitted only with permission and should at all times be accompanied by warehouse staffs and/or workers. Visitors should declare if suffering from any condition or illness that may lead to food safety issues before entry. In case they do, appropriate cautions are taken such that there is no contamination to the oilseeds. All visitors are expected to follow the same personal hygiene requirements as are bring followed by the warehouse staffs and workers.

Training

The staffs and workers working in the warehouses need to be trained on all aspects of good warehousing practices. This including not only the permanent staff and workers but also the temporary workers hired for specific tasks like loading, unloading, cleaning, sorting and/or re-bagging. For this purpose, the followings are recommended:

- Appropriate posters with graphics showing how to do and/or do's and don'ts can be used.
- Quick 10 to 15 minutes briefing (may include demonstration) before the activity on how to do and/or the do's and don'ts. Posters may be used for quick briefings.
- Monitoring of activity while in process by authorized person. As soon as non-conformity is seen the same can be rectified immediately and the responsible worker corrected/re-trained.

Hygienic warehouse activities

Oilseed warehouse activities at collectors' level include drying, cleaning, sieving and sorting, mixing and re-bagging. These activities need to be done hygienically such that oilseed quality including food safety does not deteriorate. Following standard operating procedure is recommended for warehouse activities.

Purchasing and transport of oilseeds

The warehouse owner or top management generally does purchase of oilseeds in an informal manner. Following is recommended:

- Oilseeds may be purchased directly from the farmer or other collectors in the commodity exchange market.
- It is recommended, if possible, to buy from regular/approved sellers who has been selling oilseeds as per specification.
- Oilseeds should be purchased according to authority specifications or as per buyer requirements. It is recommended that moisture and acid value of the sample is checked using moisture meter and AV strips, especially for purchase from a new seller.
- A sample of the agreed specification should be available in the warehouse.
- The quantity and cost of oilseeds of the agreed specification is negotiated with the seller.
- Warehouse management/owner should specify packaging requirements, i.e. is possible to re-use oilseeds bags but not fertilizer, chemical or any other non-food bag. Torn bags are not to be used.
- Warehouse management/owner should also specify the transport conditions, i.e. oilseeds bags to be transported in covered vehicle, covered with tarpaulin below and above especially during rainy season.
- Additional food safety issues like aflatoxins, pesticide residues, heavy metal contamination, even though will not be tested directly by collectors, should be communicated.
- On the agreed delivery date, oilseeds are dispatched from the seller and information is sent to the warehouse.
- Oilseeds must not be transported with other chemicals (fertilizers and pesticides) and detergents. If required, effective separation is essential between oilseeds and other non-food chemicals and detergents.

Receiving and unloading of oilseeds

A designated person with authority to reject non-conforming incoming oilseeds should be responsible for receiving and unloading of oilseeds in the warehouse. Following is recommended:

- Once the oilseeds' truck arrives at the warehouse, the designated responsible person should be intimated and preferably available.
- The delivery documents should be checked to confirm the purchase order and keep record of the incoming trucks. A sample of information needed is given:

Sample record 2 Incoming material register

Date	Truck No.	Supplier Name	No. of bags (total quantity)	Moisture	Acid Value	Truck Condition	Tarpaulin	Sample No.	Accepted/ Rejected

- Check the truck conditions before removing tarpaulin/cover and unloading. It should be examined for cleanliness, insect infestation, dampness or unusual odours. If the vehicle is not fully enclosed, it should have available a covering such as a tarpaulin to keep out the rain or other forms of water.
- If truck condition is ok, remove the tarpaulin and randomly pull bags from various locations, top and sides.
- Take samples from these bags using an appropriate sampler. Check oilseed quality as per specification agreed and purchased sample.
- If the oilseeds are wet to the touch, insect infested, insect damaged, or contain an unusual amount of dirt, debris or other foreign material, they should not be co-mingled with known good oilseeds in a bulk warehouse. The vehicle which contains oilseeds should be set aside until a decision is made for their disposal.

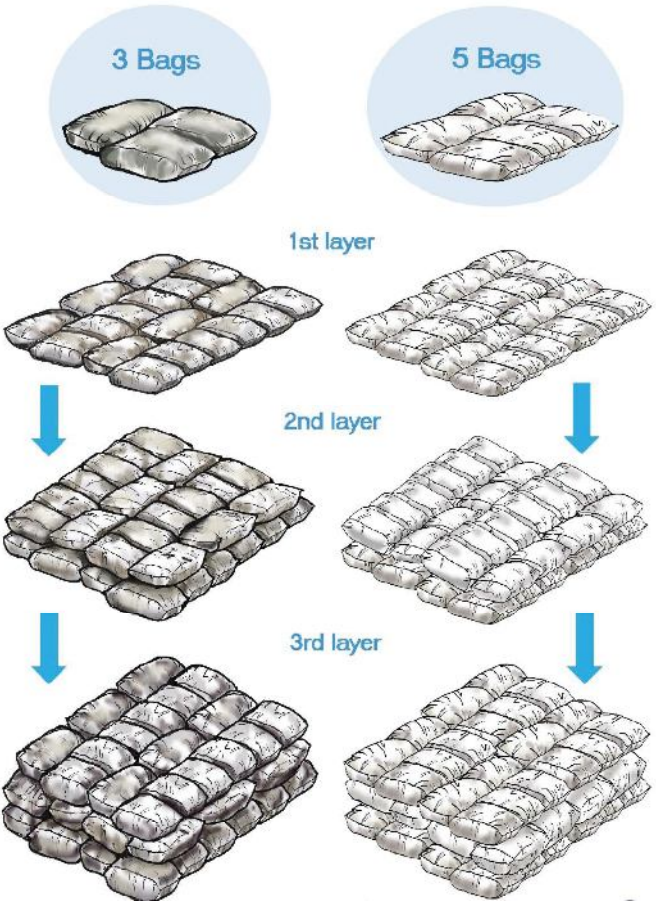
- If acceptable, begin unloading of bags. While unloading, take samples preferably from every bag and collect the sample in a container. This cumulative sample should be sampled as per sampling procedure mentioned in Chapter 6. If not possible to take sample from every bag unloaded, then set a frequency to take sample e.g. every 5th or 10th bag, take a sample.
- The sample collected from bags while unloading should be tested for moisture and acid value using test method given in Chapter 7.
- Record the moisture and acid value of the sample for each truck received, as per sample record given above.
- Oilseeds in fertilizer, pesticide or other chemical bags shall not be accepted.

- Oilseeds spillage should be collected in identifiable separate bags and stored separately. These should be cleaned before dispatch.

Stacking and issuing of oilseeds

A designated person with authority to accept incoming material should be responsible for stacking and issuing of oilseeds in the warehouse. Following is recommended:

- Clean an area in the incoming material storage area.
- Place clean pallets in this cleaned area. Pallets should be kept away from the walls to facilitate cleaning around the stack. No tarpaulin or corrugated sheet should be kept on pallet under the bags.
- Unloaded bags should be brick-layered in a stack. Bags may be brick layered in 3 bag or 5 bag brick laying method as per below illustration:



- Bags should not be stacked directly on the floor.
- All bags in a stack should become one batch/lot. More than one truck, one seller, one farmer oilseeds bags may be in one stack.
- Details of all the trucks, sellers and/or farmer with quantity received from them should be recorded in bin cards and attached to each stack. A sample bin card is given below, as well included in Annex VII:

Sample Record 3 Bin card

Lot/Batch No. _____

Date	Truck No.	Name of Supplier/ Customer	Incoming Bags	Issued for processing				Out Going bags	Total Stock
				No. of Bags	Purpose*	Date of Return	Moisture**		

* Purpose of issuing oilseeds bags i.e. for drying, sorting, cleaning, mixing, re-bagging etc.
** Moisture after drying

- Define a criterion for batch/lot size e.g. number of bags. In this case, once the designed number of bags is placed in the stack, close the batch/lot or do not place any more bags in this stack. If a truck is half loaded and batch/lot closes, the remaining bags should be placed in another stack.
- Batch/lot numbering can be the serial wise number of stack of oilseeds received. This number can be reset in defined time i.e. every year.
- When removing bags from a stack for drying, cleaning, sieving and sorting, mixing and re-bagging details of issuing should be recorded in the bin card.
- If bags are removed for dispatch, details of dispatch should be recorded in the bin card.
- Where more than one batch is stored with a particular specification, First-in-first-out (FIFO) should be followed, as possible, when issuing material i.e. material received of a particular specification first should be dispatched first unless a later batch is specifically requested by the customer.
- Check the stock regularly for pest infestation preferably every 7 to 10 days. If infestation seen, immediately get stack fumigated (refer to fumigation procedure is earlier section).

For receiving, unloading and stacking procedure poster see Annex XVI.

Purchase and issuing of other consumable material

A designated person with authority to accept other material should be responsible for receiving and issuing of these materials in the warehouse. These other materials include but may not be limited to packaging material, pallets, cleaning tools, stitching thread, stitching machine needles, chemicals and detergents etc. Following is recommended:

- Keep a stock register to record all incoming and consumption of all consumable material.
- Stock register can include simple specifications of the consumable material e.g. dimensions of packaging material along with weigh of defined number of bags; active ingredients strength of detergents; design, dimensions and material of pallets etc.
- On receiving any material other than oilseeds, entry should be made in specified section of the stock register. Sample of details to be recorded are given below:

Sample Record 4 Stock register

Item/material Name: _____

Date	Supplier Name	Item/material Quantity			Signature	Remarks (accepted/ rejected/returned of used)
		Received	Issued	Stock		

Note: Recommended to be maintained for all items/material purchased by the warehouse like the packaging material, threads, labels, needles, detergents, protective clothes etc.

- When issuing these materials, it should be recorded in the same specified section of the stock register.
- Incoming consumables, where possible, to be checked for appropriateness as per the specifications.
- Appropriate designated place identified for storage of all consumables.
- Non-food chemicals to be stored in lock and key.

Drying, cleaning, sorting, mixing and re-bagging of oilseeds

Warehouse management/owner to designate a person with authority to ensure implementation of hygiene during the drying, cleaning and sorting process of oilseeds in the warehouse. Activity should be planned at least a day in advance to ensure the hygienic environment activity is completed before and during the process of drying, cleaning, mixing, sorting and re-bagging. Hygienic environment activity namely includes following the cleaning program, applicable pest control, personal hygiene and waste management. Following is recommended:

For drying: if a moisture level of the incoming oilseeds is higher than specification, the bags should be immediately issued for drying, preferably within 24 hours. For drying the warehouse may use the sun drying method or the mechanical drying method. Most collectors in Myanmar use the sun-drying method for oilseeds. Following is recommended:

- Place clean tarpaulins on cleaned drying area.
- Ensure workers spreading oilseeds for drying on the tarpaulins wear shoe-covers. The shoe-covers should be worn as the worker gets on the tarpaulin and be confined to use on the tarpaulins only. Once it is worn off the tarpaulin it will get contaminated and therefore not serve purpose.
- Proper hygiene can be achieved if the team of workers bringing the bags to the drying area either handover bags to the drying team with shoe-covers on the tarpaulin or place bags on the tarpaulin edge without stepping on the tarpaulin. This procedure allows the drying team to pick the bags up without stepping off the tarpaulins.
- Spread the oilseeds evenly for proper drying.
- Collect and store the empty bags neatly in a cleaned place till re-bagging or needed. Do not leave these

outside for pest and workers to walk on.

- Ensure provisions for keeping birds, dogs and cats away is effectively implemented.
- Do not permit workers to walk on the oilseeds spread for drying.
- Turn over the oilseeds at regular intervals to ensure proper drying.
- While turning over, ensure the implement/tool used is clean and the worker wears shoe-covers. Spreading with feet, even with shoe-cover, is not recommended.
- Ensure the oilseeds are properly covered during night to ensure the night humidity/dew does not increase the moisture.
- Use the moisture meter to check the moisture before re-bagging the oilseeds. Record the moisture on bin card.

In case mechanical drying is done, care must be taken to ensure that the machine is cleaned before use and oilseeds are collected directly into bags/containers (not on the floor). Moisture at exit of the mechanical drying should be tested during the drying process before sealing the bags.

For cleaning and sorting: if the incoming oilseeds do not meet specifications on admixture, stones and/or damaged/other seeds specifications, cleaning and sorting would need to be done. Cleaning and sorting may be done manually or using simple machines. In both cases, the cleaning needs to be done hygienically. Following is recommended:

Manual cleaning and sorting:

- Place clean tarpaulins on cleaned area where cleaning and sorting is done. If cleaning and sorting is done immediately after drying then the tarpaulin should be placed near the drying area.
- Proper personal hygiene to be followed by the workers. This include hand washing, use of protective gear (caps, aprons and covered-footwear), personal cleanliness and personal behavior.
- Use of proper tools for cleaning and sorting. This includes sieves for cleaning and containers for sorting.

- Oilseeds should not be directly on tarpaulin on which workers sit. If cleaning and sorting needs to be done without containers, the use of cloth sheets to cover the sitting worker should be considered.
- The dust and damaged seeds should be collected in separate (preferably identifiable – colour coded or marked) containers or bags and disposed properly to ensure it does not cross contaminate or become a breeding area for pest.
- Authorized person to accept the cleaned and sorted oilseeds should supervise the process. If oilseeds are not accepted, then re-cleaning and re-sorting may be done.

Mechanical cleaning and sorting:

- Ensure the machine and all its parts are cleaned before use. Also ensure the intactness of the sieves.
- Open bags directly into the inlet hopper and collect cleaned sorted oilseeds directly into clean bags or container.
- Spilled oilseeds should be collected and put back into inlet hopper.
- Care is taken not to step on the oilseeds with shoes/slippers/bare feet. If needed, tarpaulin and shoe-covers may be used.
- The dust and damaged seeds should be collected in separate (preferably identifiable – colour coded or marked) containers or bags and disposed properly to ensure it does not cross contaminate or become a breeding area for pest.
- Authorized person should supervise the process and monitor the effectiveness of cleaning from time to time during the cleaning and sorting process.

- If oilseeds are not sufficiently cleaned, then the bag of collected oilseeds may be put back into the inlet hopper for re-cleaning and re-sorting.

For drying, cleaning and sorting of oilseeds, see Annex XVII.

Mixing of oilseeds

A designated person with authority to ensure that the oilseeds after mixing meets specification, should be responsible for mixing activity. Mixing is done to meet the buying specification on quality parameters other than food safety. Following is recommended:

- Batches selected for mixing should not vary in moisture%.
- Batches that should be permitted to match should be for parameters like size of oilseed, its color and admixture quantity.
- Warehouse needs to ensure no food safety parameter is compromised during mixing e.g. aflatoxin damaged seeds and AV (rancidity).
- Batch of mixed oilseeds should be traceable. For this, the newly mixed batch is stacked separately and a new batch number is given to it. This new batch number is referred to in bin card on issue for mixing of batch.
- The bin card on the mixed batch should have this new batch number with old batch numbers given in supplier name column. Example is given in Annex VII.
- Mixing should be done off the floor on clean tarpaulins.
- Workers to use shoe-cover as used for drying ensuring the shoe-cover is restricted to the tarpaulin on which mixing is done.
- Similar personal hygiene as for drying also needs to be followed.
- Tools used for mixing also need to be appropriate to ensure hygienic mixing.
- After mixing the oilseeds are ready for re-bagging.

Re-bagging, stitching and storing of oilseeds

A designated person with authority to accept the oilseeds after the processing activity should be responsible for re-bagging, stitching and storing of final product before dispatch. Following is recommended:

- Once the oilseeds are dried, cleaned and sorted, they need to be re-bagged.
- It is important to retain the batch number through all the processing activities. This batch number is the same that is given on stacking the batch on receiving the oilseeds.
- Re-bagging after manual drying, cleaning and sorting should be done off the floor on clean tarpaulin ensuring the oilseeds do not touch floor directly.
- After mechanical drying, cleaning and sorting as long as oilseeds are directly bagged from the machine outlet, it may be done on clean floor.
- After re-bagging, weighing of product to required quantity is done.
- Ensure to use the same batch to top up the weighted quantities.
- Weighing balances should be calibrated (with traceability to national standard) and warehouse management/owner should retain the traceability certificate.
- The bags are then stitched with the stitching machine. If the needle of the machine breaks while stitching, care is taken to ensure broken piece of needle does not go in the oilseeds.
- It is recommended to locate the broken needle piece and submit it when issuing a fresh needle. This may be recorded in the stock register of consumable materials (as per sample record 4)
- All re-bagged oilseeds bags should have the batch number on them. This can be done either using a marker or stitching a 2"x2" chart paper/piece of cloth with batch number on it at the time of stitching.
- Once re-bagged, the bags are stacked back in the storage of outgoing material.
- These bags are layered in stacks in the same manner as explained in stacking of incoming oilseeds.

- Each stack to have a bin card giving the stack details to be maintained.

Sale and dispatch of oilseeds

A designated person with authority to dispatch final material should be responsible for proper dispatching of oilseeds from the warehouse as per sales order. Sales are generally done by the warehouse owner/proprietor. Following is recommended:

- An agreement on quantity, price, specification and delivery date is made between the warehouse and buyer based on the sample sent to buyer for approval.
- A duplicate sample should also be retained in warehouse as control sample till start of new season.
- It is preferred that the warehouse management/owner is aware of the proposed destination and intended use of the product. This information can additionally help to choose the oilseeds batch for dispatch.
- Once a sale agreement is made, transport arrangements are made. Warehouse may use a hired or self-owned transport vehicle.
- It is recommended to transport oilseeds in dedicated covered vehicles or vehicles with tarpaulins above and below the oilseeds' bags.
- Trucks used for transporting non-food material should preferably not be used unless there is no threat of cross contamination or it is thoroughly cleaned.
- Part shipment transport of oilseeds is not recommended.
- Once transport arrives for loading, check it for cleanliness, insect infestation, dampness or unusual odours and availability of min two tarpaulins.
- If truck is not clean send it back for change. Washing the truck before loading is not recommended as it may remain wet at parts and therefore increase moisture of oilseeds. Alternatively, used dry brooms or blow dryers to clean the truck.
- If truck is clean, spread the tarpaulin on truck floor covering sides and start loading the truck.
- First-in-first-out needs to be followed for bags to be dispatched i.e. for a particular specification, oilseeds received first should be dispatched first.
- Once all the bags are loaded, cover the top of the bags with the second tarpaulin. It is important to ensure the bottom tarpaulin is first folded to cover the sides and then the top tarpaulin. This ensures that when it rains, water will not seep into the bags from tarpaulin sides/edges. Ropes may be used to secure the tarpaulins in place.
- Once the truck is loaded, complete the outgoing material register and dispatch documents. Sample of the outgoing material register is given below:

Sample Record 5 Outgoing material register

Date	Truck No.	Customer Name	No. of bags (total quantity)	Lot/Batch No.	Sample No.	Moisture*	Acid Value*	Truck Condition	Tarpaulin

* If incoming bags are loaded as such within 2 weeks and without any activity (drying/sorting/cleaning/mixing/re-bagging) not needed

- Dispatch the truck and inform the buyer.
- In the warehouse, the empty pallets are picked up and cleaned before stacking on side till they are next used. The place from where the pallet is picked is also cleaned once the pallet is picked up.

CHAPTER 6 RECOMMENDED SAMPLING TECHNIQUES AND CONTROL SAMPLE

In order for the warehouse to store and sell quality oilseeds it is essential that they ensure that oilseeds procured and received are of appropriate quality/specifications. Needless to say, that the quality of oilseeds also needs to be confirmed during processing activities like drying, cleaning, sorting, mixing and re-bagging as well as at dispatch, if needed. Performing various tests on the oilseeds ensures the quality/specification of oilseeds is as required. Warehouse cannot test every bag of oilseed that arrives at or is dispatched or is processed in the warehouse. Therefore, they use a statistical/scientific method to collect a sample as a representative of the entire lot/batch/truck. This process is called sampling. Accurate sampling is essential to ensure test results are meaningful and represent the entire lot/batch/truck from which sampling is done. It allows the warehouse to measure the quality of a batch with specific degree of statistical certainty, without having to test every bag of oilseeds.

Tests performed on sample of incoming material collected determine the further need of activities like drying, cleaning, sorting, mixing and re-bagging. In case test results show incoming material is as per buyer specification, the batch may be dispatched to buyer as such. However, during storage, oil seeds quality may deteriorate. Therefore, when oilseeds are stored for longer duration, sampling is done before dispatch to perform tests, which can confirm the batch of oilseeds continues to be as per buyer specifications.

Sampling techniques and precautions recommended for oilseeds at collector warehouse is given further.

Hygiene practice before sampling

It is essential to ensure that the sampling activity itself does not lead to contamination of oilseeds. For this the following is recommended:

- Before sampling, hands must be washed thoroughly and dried properly.
- For sampling from pile of oilseeds, sampler must wear clean trousers, closed foot ware with shoe-cover.
- Clean and proper sampling tools and utensils must be used.
- Sampling for microbiological testing should be taken using sterile tools and containers.
- Collected sample properly mixed and portioned.
- Samples stored in clean plastic bags, which are properly labeled.
- It is recommended not to take sample with naked hands, as per picture below. Use of scoop or other tools is recommended.

Sampling Tools

Proper sampling tools need to be used to ensure that the sample and/or oilseed bags are not damaged during the sampling process and that sample is easily collected. E.g. inappropriate sampling tools (spears) can destroy the seed coat for peanut kernel sampling therefore hand scoop is recommended.

The following tools are recommended for sampling oilseeds:

- Spear
- Scoop
- Cup
- Spade
- Fresh/new bags for collecting incremental sample
- Plastic sheet for coning and quartering

Sampling from Bags

At the collector warehouse, oilseeds are generally received, stored and dispatched in bags only. Bulk containers like dump trucks, or oilseeds directly in containers, is not practiced. Therefore, sampling technique for bags is critical. The following guidelines are recommended:

Bags in trucks before unloading (for acceptance) and bags in stacks in warehouse

- Sampling point shall be selected randomly from top, bottom and/or sides, as applicable from trucks or stack in warehouse.
- Approximately same quantity of sample should be collected from each bag of oilseed located at a sampling point i. e. random bags from top and top/bottom layer bags from sides, as applicable.
- Sample drawn from different bags of one lot/batch/truck to be collected separately and prepared as given below.
- Total bags sampled from in a truck or lot/batch in the warehouse depend on the total number of bags in the truck or lot/batch. Number of bags sampled are as follows:

Total number of bags in truck or stacks	Number of bags to be sampled
• Up to 10 • 10 to 100 • More than 100	• Each bag • 10, taken at randomly from different locations • Square root (approx.) of total number plus 1

Sampling during unloading of bags from truck

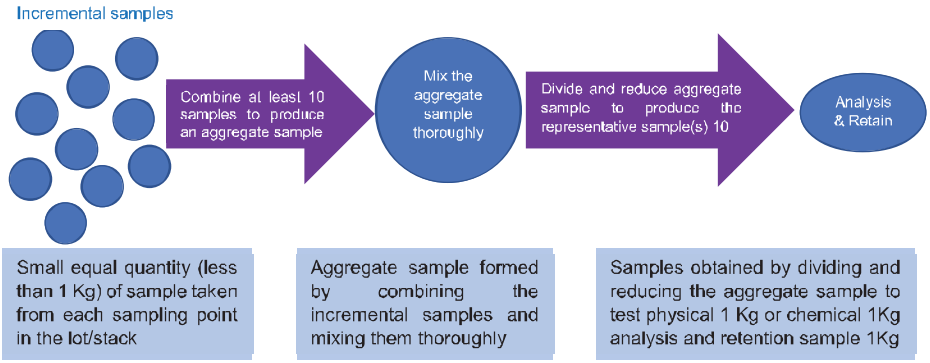
- While unloading, sample recommended to be taken from each bag.
- Approximate same quantity of sample taken from each bag and collected in a fresh bag.
- After all bags are unloaded, cumulative sample collected is prepared by coning and quartering method given below.

Random sampling from stacked pile

Sample handling and preparation for analysis and retaining

Sample preparation is a three-step process namely,1) collection of incremental samples from each bag, 2) mixing into aggregate sample and 3) reduce the aggregate sample to required quantities for analysis/retention.

Figure 3 Three-steps sampling process



Coning and quartering method is used to scientifically and without bias divide the aggregate sample to obtain the required amount and number of test samples.

Figure 4 Coning and Quartering sampling method

Sample size and number of samples

The number of representative samples that the warehouse should make depends on the analysis to be done. For oilseeds warehouse, generally two samples are recommended each of 1 Kg size namely, one for physical analysis and chemical analysis and one sample for retention as a control sample. The control sample should be properly sealed/tied and labeled (as mentioned below).

If microbiological testing needs to be done, additional sample (1 kg or as recommended by laboratory) is taken under sterile conditions and the sample is dispatched to laboratory as soon as possible.

Control sample storage

Once the aggregated sample is mixed and reduced to required quantity, one sample (about 1 kg) should be stored as control sample in moisture proof containers (for example, plastic bags stored in plastic boxes) in a cool, dry place safe from rodent and other pests' infestation.

These samples should be retained minimum until the lot is delivered to customer, accepted and payments are received from the customer.

Preferably the control sample should be retained for the entire season of the crop and discarded only before the arrival of the next crop.

Label of the retained/control samples

Since the control samples are to be retained and stored for a considerable time, its proper labeling is critical. The label needs to ensure that it possible to trace back the sample to the supplier/customer, receiving/dispatch date and truck number, analysis results obtained etc. additional information, as required by the warehouse may also be included in the control sample label.

Essential information on the control sample label should include:

- Warehouse name and address
- Farmer/supplier/customer name
- Date of receiving/dispatch
- Receiving/dispatch truck number
- Lot/batch size
- Sample number

Additional information may include but is not limited to:

- Crop name and variety
- Origin of crop
- Warehouse name

In order to ensure all the essential information is captured for every sample label, it is recommended either the sample label be pre-printed or a rubber stamp with important information needed is made. This stamp can be used on plain sheet of paper used to label each sample.

Warehouse name/address_____
Supplier name_____
Date _____
Truck No._____
Lot/batch_____
Sample n°_____

Labeled samples should be stored in a manner such that the same are retrievable when needed. For being able to retrieve a sample, a sample numbering system may be implemented, where each sample is given a serial number. This serial number can be included in the incoming/outgoing material register (refer to sample record 2 and 5). The boxes/plastic containers in which the control samples are stored could be labeled as "sample number xx to yy". Sample number can be reset to 01 every year for fresh crop.

CHAPTER 7 RECOMMENDED TESTING AND MONITORING

As understood, it is essential to ascertain the quality of the oilseeds at all stages, such that the oilseeds dispatched to the customer and finally the end user of as needed. Verification of quality of oilseeds at various stages at the collector level can be done by performing simple tests in-house and if and when required, samples sent to external laboratories for testing. The list of laboratories and parameters tested is included as Annex IV.

Generally, the tests performed on oilseeds can be categorized into physical, chemical and microbiological tests. Of these, the recommended to be done at collector level include physical and chemical tests. Microbiological requirements are only if oilseeds are exported for direct consumption. For microbiological tests, it is required and/or recommended to send sample to an external laboratory.

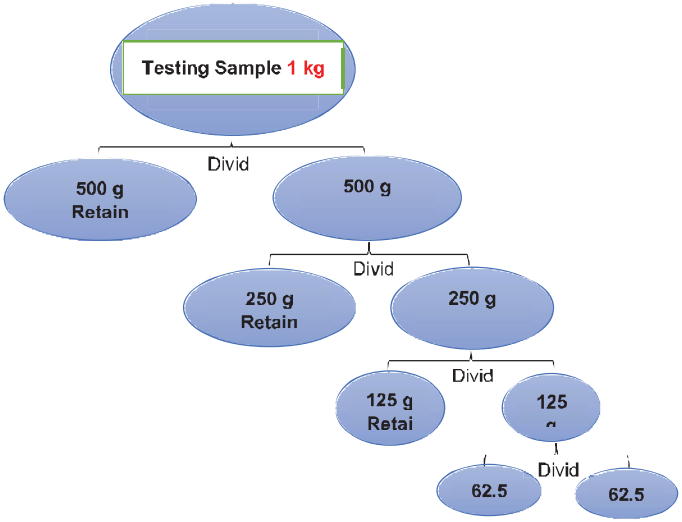
At the collector level warehouse, the following test plan is recommended:

Stage of testing	Category of test	Test Conducted	Frequency of test	Where conducted
Incoming material	Physical Tests	Moisture %	Every incoming truck	In-house
		Damaged/other seeds		
		Admixture		
	Chemical Tests	Acid Value		
		FFA	If required	External Laboratory
Stored material	Physical Tests	Moisture %	Every month of storage	In-house
		Damaged/other seeds		
	Chemical Tests	Acid Value		
Outgoing material	Physical Tests	Moisture %	Every batch/truck	In-house
		Damaged/other seeds		
	Chemical Tests	Acid Value		
		FFA	If required	External Laboratory
	Microbiological tests	E coli/coliform; salmonella or as recommended by buyer	If required	External Laboratory
	Any other test as recommended by buyer		If required	Internal/External Laboratory

Working Sample for Testing

From the sample collected from bags as per method mentioned in the chapter on sampling, working sample is taken for conducting tests. Quantity of working sample for peanut and sunflower is 100gms and for sesame seeds is 50gms. This working sample is made in the following method:

Figure 5 Working Sample



Physical Testing

Physical tests are a set of quick tests, which confirms the physical properties/specifications of the sample material. For oilseeds, the physical tests recommended to be done as per frequency of the test plan given above include:

- Moisture content
- Foreign Matter or admixture
- Damage and other seeds
- Insects (live or fragments)

Tools Required for Physical Testing

The tools needed for the physical testing of samples are moisture meter, tweezers, digital scale, magnifying glass, sieves, etc. Sieves size needed for sesame is no. 6, 6¼, 6½ and 6¾ , whereas for peanuts sieve no. 12, 13 and 14.

Tweezers

Digital scale

Magnifying Glass (Hand Lens)

Testing Moisture

Moisture is one of the more important parameters especially for food safety and ensures the keeping quality of the oilseed. Warehouses may obtain any kind of moisture meter available for testing moisture of oilseeds. Care must be taken to ensure that manufacturer recommends the equipment fit for testing oilseeds specifically sesame, peanuts and sunflower. Also ensure the equipment comes with method to use and calibrate the machine. The warehouse should follow the equipment recommended method to test moisture and calibrate/maintain the machine.

In general, the test method using a moisture meter includes the following steps:

- Set the machine settings as per manufacturer recommendation for the oilseed to be tested.
- Take a working sample quantity recommended by the equipment manufacturer using calibrated digital balance or container provided in the equipment.
- Initiate the testing button on the machine and wait for the reading.

In addition to calibrating the machine as per manufacturers recommendations, it is recommended to verify the test results obtained by the machine with results of the same sample conducted in an external laboratory (see Annex IV).

© Kett

Determination of percentage foreign matter/damaged/other seeds

The percentage foreign matter/damaged/other seeds in the oilseed sample may be determined as follows:

- Obtain a working sample of at least 20g. from the sample collected for testing. Working sample to be weighed on calibrated digital balance.
- Place weighed sample on white sheet or paper or white tile and remove all foreign matter by tweezers.
- Determine individually weight of foreign matter, damaged and other seeds.
- Express/calculate the weight thus determined as a percentage of the weight of the working sample as below:

$$\text{Percentage} = \frac{100 \text{ X } D}{T}$$

T = Total weight in gram

D = Defective weight in gram

Such a percentage represents the percentage foreign matter, damaged and other seeds in the consignment.

Foreign matter and Damaged and other seeds in Sesame Seeds

Foreign matter

Damaged seeds

Other color seeds

Damaged and Defective seeds in Peanuts

Sound peanut kernels

A) Discolored flesh and seed coat
...B) Insect/pest damaged
...C) Mechanical/physical damaged
...D) Germinated kernels

Shriveled peanut kernels

Immature peanut seeds

Broken kernels
(more than a quarter
broken off)

Split kernels
(split into halves)

...Other color

Damages and Defects in Sunflower Seeds

Sound sunflower seeds

Damaged sunflower seeds

Damaged Kernels include:

a) Discoloured flesh and seed coat;
b) Immature kernels, which are imperfectly developed and shrunken;
c) Those damaged by insects, worm cuts;
d) Mechanical damage;
e) Germinated kernels

Common foreign matter



Determination of live and fragments of insects

Live and dead insects are determined to verify infestation of oilseeds and effectiveness of its fumigation. Insect fragments are given as specification in some countries as permissible number in food products. The live and dead insects, as well as insect fragments in the oilseed sample, may be determined as follows:

- Obtain a working sample of at least 50gms sesame seeds and 100gms for peanuts and sunflower from the sample collected for testing. Working sample to be weighed on calibrated digital balance.
- Place weighed sample on white sheet or paper or white tile and check for presence of live and/or dead insects with a tweezers.
- For insect fragments, determine the number of insect fragments in the oilseeds sample.

Express the live and/or dead insects as "live" and "dead" insects identified. For fragments of insects, determine and express as number of fragments per unit of sample as per buyer requirement.

Chemical Testing

Chemical tests are done to check the appropriateness of chemical composition of the oilseeds. At present, in Myanmar the important chemical tests that need to be done for oilseeds include the oil acid value (AV) or free fatty acid (FFA) and aflatoxins. For export purposes, pesticide residue testing is also gaining importance. For easy and quick screening of oilseeds for AV, aflatoxins and pesticide residues, rapid test kits are available. These can however be used only for screening and need to be confirmed by proper test methods, where needed. At the collector warehouse level however, they can serve as a good screening method to be used. Confirmation may be done are processor or exporter level.

Acid Value screening (Rapid test)

Acid value is an important indicator of the oxidation of oil. Since oilseeds have more than 40% oil content it becomes an important parameter for oilseed quality and food safety. Most commonly used rapid test in Myanmar is a strip test as shown below:


Any other quick test may also be used provided the manufacturer recommends its use for oilseeds testing and the manufacturer recommended method be used.

Aflatoxin Value Screening (Rapid Test)

Storage can contribute most to aflatoxin problems in oilseeds. Quick screening test for aflatoxin is available in Myanmar. One of the ones available is given below:

© Vicam

Sample extraction:

1. Scan the test kit barcode for the type of sample and lot of strips that you are using
2. Weight 5g +/- 0.1 of ground sample and place in an extraction tube
3. Measure 25 ml of 70% MeOH with a graduated cylinder and pour it into the extraction tube
4. Cover the extraction tube and vortex the mixture for 2 minutes at max speed.
5. Filter the extract into a clean extraction tube

Procedure:

1. Transfer 100 µL of Afla-V diluent to the strip test vial
2. Add 100 µL of sample extract and mix well by vortexing
3. Transfer 100 µL to the Afla-V strip test by dropping (~ 1 drop/second) vertically into the circular opening
4. Allow strip test to develop for 5 minutes and a flat surface (such as a countertop)
5. Insert the Afla-V strip test into the Vertu reader (circular opening side in first). Be sure that the lot # displayed on the reader matches the lot # of the strips being used.
6. Read results
7. If the reader displays "> Range ", dilute sample extract 1 to 5 with 70% MeOH (100 µL extract + 400 µL 70% MeOH)
8. Repeat steps 1-6
9. Multiply the displayed result by 5 to obtain the true level of contamination

Any other quick test may also be used provided the manufacturer recommends its use for oilseeds testing and the manufacturer recommended method be used.

Rapid Screening Pesticide residue

Pesticide residue testing is a more complicated test even for quick screening. The recommendations for storage and use of the test kit are more stringent. The quick screening test kits are based on ELISA (Enzyme Linked Immuno Sorbent Assay) tests. The test kit requires to be refrigerated. Manufacturer recommended the method of sample preparation and conducting the tests. This is a test recommended to be done as per buyer requirement. Ensure that the test kit that is purchased is recommended for use in screening pesticide in oilseeds. Also confirm the pesticide residues that are screened by the test to ensure they collaborate with those needed to be tested by the buyer.

Microbiological Testing

Depending on the intended use of oilseeds, microbiological testing and its specification may be recommended by the buyer. If oilseeds are intended for direct use or for high-risk population microbiological specifications are given by the buyer. In Myanmar the intended use of the oilseed is generally not disclosed to or decided by the collector, therefore making microbial testing of less importance at collector level. However, contamination at this stage would make the oilseed unfit for export if microbiological specifications are given by importers. Microbiological testing in oilseeds is generally done for following:

- Salmonella
- E coli/coliforms
- Staphylococcus aureus, in some cases.

CHAPTER 8 LOCAL POLICY AND REGULATORY REQUIREMENTS

Among the twelve points of the Myanmar Government economic policy announced on 29 July 2016, number fifth refer to the support to the local agricultural business, for which it is planned to establish an economic model that balances agriculture and industry and supports the holistic development of the agriculture, livestock and industrial sectors, so as to enable rounded development, food security, and increased exports.

In regards to the collectors' businesses, even though at the departmental level, most departments are not directly involved in the warehouses and storage facilities monitoring, some are instead broadly related to the quality and food safety system implementation along oilseeds value chain:

- The Department of Agriculture is responsible for oilseeds quality production at farms' level.
- The Department of Trade is also not involved in the control of warehouses and storage facilities, since the passage to the market economy during the 1990s; however, the departments under the Ministry of Commerce sometimes share their experience for the exporters' warehouses.
- The Department of Health is accountable only for processed food safety.
- The Department of Consumer Affair is mostly responsible for dispute settlement from consumers' complaints.
- The Department of Research and Innovation is related to the development of the National Standards for Myanmar products. The Technical Committee on Agriculture Standards has drafted the draft peanut and sesame standards and submitted to DRI on 2017.
- The laboratories owned by respective departments such as DoA, DoCA, DoH and food processors and exporters associations can provide the testing services for some chemical parameters of oilseeds relating to food safety, on a voluntary basis.
- The inspection body from Plant Protection Department can provide services for issuing Phyto- certificates for exporters as per buyer country requirement.

The only department directly concerned in regulatory control for quality and food safety of oilseeds at the warehouses' level is the City Development Committee. Respective Municipal Departments in each city check regularly the requirements of the collectors' warehouses with their own regional rules and regulations. The Inspection record of the health safety aspects of the business used by municipal inspectors is included as Annex VIII.

Some of the provisions involved in the rules and regulations promulgated by the regional city development committees concern the control for the food safety practices in the warehouses and business. The requirements for quality and food safety in the regional Municipal regulations are similar in every states and regions. For instance, the provisions relating to food safety for the warehouses and business premises of the Nay Pyi Taw City Development Committee are as follow:

The Nay Pyi Taw City Development Committee issued the following rules in accordance with the Article 38 (b) of the Nay Pyi Taw Development Law[11] and Public Health Rules Article 6(b). (27.6.2016)

Rules for business people

Anyone who have set up a business in Nay Pyi Taw territory shall comply with the following:

- The building must have a good air ventilation system and enough light.
- A good fire prevention system and cleanliness on the inside and outside of the building must be maintained.
- Explosive and flammable materials shall not be stored. Food or other items prohibited by the committee must not be sold.

[11] Nay Pyi Taw Development Law (State Peace and Development Council Law No 4/2009) issued 29-12-2009

- Equipment and products shall be systematically kept, based on the business type.
- Garbage bags and dustbins with lids that can be easily cleaned shall be placed in the premise of the building. Waste shall be disposed at the designated place.
- A good sanitation system shall be installed to allow smooth waste water flow into the municipal sewers. The business owner is responsible for smooth drainage flow and clearing of waste blockages in the surrounding area.
- A pest elimination system shall be in place in the business or cooking area and the surrounding.
- Cleaning materials, pesticides and chemicals shall be stored separately.
- An adequate number of hygienic restrooms shall be built.
- A smoking area shall be arranged separately.
- Signages like "No Smoking, No Betel Spit, Flammable Material" shall be placed clearly.
- Inspection clearance from the Department of Health shall be secured annually for business license application or renewal.

9.1. Rules regarding the management of general businesses issued by Nay Pyi Taw City Development Committee

Special rules for businesses that store and trade rice, wheat, pulses and other crops:

- The goods are placed on the pallets at least 2ft high from the floor. The pallets must be at least 1 foot away from the wall and no materials shall be placed under the pallets.
- The goods must not be placed near wet vegetables (or) other wet surfaces.

General rules

- When applying for license, the recommendation letter from the Department of Health needs to be attached.
- The licensee must make sure their premise has a good air ventilation system and enough light inside.
- The licensee shall make sure the business premise and surrounding area have a well-managed sanitation system.
- The licensee shall make sure their waste materials do not reach public road, pavement, drainage, and creeks or rivers. The waste must be disposed at the designated place.
- The licensee shall make sure their business does not emit foul smells, generate dirt and slimy liquid substances nor disturb the public in the surroundings.
- The licensee shall make sure the floor and foundation part of the facility are reinforced with concrete and prevented against water seepage, install a good sanitation system and keep the work area clean.
- The ceiling of the facilities shall be painted with white paint or liquid lime.
- The licensee shall make sure sick or people with infectious diseases must not live or work in the permitted area.
- The licensee shall put bins, buckets or boxes with signs for betel spits. Places where betel or spits are not allowed shall be clearly communicated with signals. The facilities shall be cleaned daily.
- The licensee shall not sell non-hygienic food and make sure all the food processing steps are hygienic and in line with healthy practices.
- Raw materials, production area, stored and exhibited products shall be in line with the standards of the ministry and food safety rules and processed with food safety methods for the health of consumers.
- The licensee shall have proper plans for drinking water, cleanliness, waste disposal, protecting the environment, beautifying and safety for Nay Pyi Taw area and hygiene and safety for workers and customers. Plans to alleviate traffic and prevent fire shall also be developed and applied strictly.
- The Department of Health may conduct inspections at any time as necessary. If the business is found to be negatively impacting the public health, the license will be revoked.

The regulations for workshops, factories or warehouses building

- The walls must be built with bricks or others materials of good quality.
- The roof must be made of wood, steel, earth, brick tile, fire brick, fire proof materials. The edges of the roof must be built long enough to avoid water dropping onto the plinth.
- The top of the wall, pillar, the space between the tile and the roof must be sealed to prevent rats and

pests from entering.

- Use portable ladder to climb the building. The design of ladder must be as per the committee's instructions.
- The building must be 8 feet away from any shelter or tree where rats can nest. Any residential building must be 50 feet away.
- The wood clapboard building must be built as per the following rules.
    - The building must be 6 inches thick by using literate or similar material on the ground. There must be about 8ft wide outside of the building. There is the slope to have good flowing of water.
    - The floor must be 3 feet above the surface of the ground. Use timber plunks and never bamboo.
    - Block the way which is under the tile and the roof cover, the space where mice can run.

CHAPTER 9 INTERNATIONAL STANDARDS RELATED TO THE OILSEED VALUE CHAIN

List of general standards applicable to oilseeds sector

- RECOMMENDED INTERNATIONAL CODE OF PRACTICE GENERAL PRINCIPLES OF FOOD HYGIENE (CAC/RCP 1-1969, Rev. 4-20031)

  http://www.mhlw.go.jp/english/topics/importedfoods/guideline/dl/04.pdf

- Code of Hygienic Practice for Groundnuts (Peanuts) (CAC/RCP 22-1979)

  http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCAC%2BRCP%2B22-1979%252FCXP_022e.pdf

- Codex Standard for Named Vegetable Oils (CODEX-STAN 210 - 1999)

  http://www.fao.org/docrep/004/y2774e/y2774e04.htm

- Codex Standard for Peanuts (CODEX STAN 200-1995)

  http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCODEX%2BSTAN%2B200-1995%252FCXS_200e.pdf

Benzo(a)pyrene (only for edible oil products)

- COMMISSION REGULATION (EC) No 208/2005

  https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32005R0208

Heavy metals

- Codex General Standard For Contaminants And Toxins In Food And Feed (CODEX STAN 193-1995)

  http://www.fao.org/fileadmin/user_upload/livestockgov/documents/1_CXS_193e.pdf

Aflatoxin

- Codex Alimentarius Code of Practice for the Prevention and Reduction of Aflatoxin Contamination in Peanuts (CAC/RCP 55-2004)

  www.fao.org/input/download/standards/10084/CXP_055e.pdf

Storage and Transportation

- Recommended International Code of Practice for the Storage and Transport of Edible Fats and Oils in Bulk (CAC/RCP 36 - 1987, Rev. 1-1999)

  http://www.fao.org/docrep/004/y2774e/y2774e07.htm#TopOfPage

Packaging

- Codex General Standard for the Labelling Of Prepackaged Foods CODEX STAN 1-1985 (Rev. 1-1991)

  http://www.fao.org/docrep/005/Y2770E/y2770e02.htm

List of country-specific oilseeds standards

Taiwan

- Standards for Pesticide Residue Limits in Foods
  https://consumer.fda.gov.tw/Law/Detail.aspx?nodeID=518&lang=1&lawid=127
- Standard for the Tolerance of Heavy Metals in Plant Origin
  http://law.moj.gov.tw/Eng/LawClass/LawAll.aspx?PCode=L0040093
- Sanitation Standard for the Tolerance of Mycotoxins in Foods
  https://consumer.fda.gov.tw/Law/Detail.aspx?nodeID=518&lang=1&lawid=129

China

- GB1534-2003 Peanut Oil Standard G/TBT/N/CHN/24
  https://apps.fas.usda.gov/gainfiles/200408/146107054.doc
- GB/T 11761-2006 China National Standard for Sesame Seed
  https://www.chinesestandard.net/PDF.aspx/GBT11761-2006
- National Food Safety Standard for Edible Oil Products (GB 15196-2015)
  https://gain.fas.usda.gov/Recent%20GAIN%20Publications/National%20Food%20Safety%20Standard-Edible%20Oil%20Products_Beijing_China%20-%20Peoples%20Republic%20of_2-29-2016.pdf

Japan

- Specification and Standards for Food, Food Additives, etc., under the Food Sanitation Act
  https://www.jetro.go.jp/ext_images/en/reports/regulations/pdf/foodext2010e.pdf
- Guidebook for Export to Japan (Food Articles) 2011
  Sesame: https://www.jetro.go.jp/ext_images/en/reports/market/pdf/guidebook_food_spices_herbs.pdf
  Peanuts: https://www.jetro.go.jp/ext_images/en/reports/market/pdf/guidebook_food_nuts.pdf

For more information related to oilseeds standards and market requirements for export, it is possible to consult "Myanmar oilseeds to China, Japan and Europe: A Guide on Quality-related market requirements" at the following links: ITC Myanmar oilseeds project (www.facebook.com/itcoilseedsmyanmar) and Myantrade (www.myantrade.org)

Annex I List of service and equipment providers

N	Type of Equipment	Specifications	Brand	Local Supplier
1	**Moisture Meter**	1 ~ 40%		China Border Trade
			KETT	Pioneer Agrobiz Co., Ltd. *K-14, Yuzana Street, Bayint Naung Warehousing, Mayangon, Yangon*
			WILE 55	Trust & Development Co., Ltd *Bayint Naung Tower, Kamayut Yangon*
2	**Acid Value Test Kit**	AV 0~4	ADVANTEC, Japan	MAST Myanmar Technology 1293, *Pinlon Road, Wd-37, N-Dagon Myothit, Yangon*
3	**Aflatoxins Test Kit (100 pieces or 30 pieces)**	0~100ppb	VICAM (recommended by IC)	Nanova *33/B, Pyidaungsu Yeiktha Street, Dagon, Yangon*
			NEOGEN (25 kits)	Nanova *33/B, Pyidaungsu Yeiktha Street, Dagon, Yangon*
				China Border Trade (test strips)
4	**Micro Balance**	2-digit, 500 g	Shimadzu	Nanova *33/B, Pyidaungsu Yeiktha Street, Dagon, Yangon*
			Shinpo	PSH group of companies
			Shimazu	AMTT Co., Ltd. *5/Sah B, Aung Mingalar Street, Wd-4, Mayangone, Yangon*
			Metalella Toledo	Nanova *33/B, Pyidaungsu Yeiktha Street, Dagon, Yangon*
5	**Sieves**	6.25~6.75 size for sesame 12.25~13.5 size for peanut		U Win Hlaing – One One machinery *Hlaing Tharyar Zone (1)*
6	**Probes**	9 inches long with holes		U Win Hlaing – One One machinery *Hlaing Tharyar Zone (1)*
7	**Air blow grain cleaner (small winnower)**			Maung Maung, Machinery Store, *No. 27, Theimnie Road, Lasho, Shan State* Jiaozuo Zhiyou Machinery Co., Ltd. *jzzhiyou.en.alibaba.com* Kyin Lone Myanmar Machinery Store, *35-36 Thirimon Street, Corner of 8th and Bayint Naung, Mayangone, Yangon*
8	**Digital Thermometer**	Room temperature		Myanmar Electronic Store, *No. 10 Yamonar St, Zayyar thiri, Dawbon, Yangon*
9	**Sample divider**	10 inches long		Local supplier near Commodity exchange centre
10	**Hand lens**			Local commodity store
11	**Tweezers**			Local commodity store

(This is an illustrative, however not exhaustive list of service and equipment providers)

Annex II List of pest control and fumigation service providers

Sr	Name of the company	Business Address	License no	Effective Date	Expiry Date
1	Overseas Merchandise Inspection Corporation (OMIC)	No. 170/176 Bo Aung Kyaw Road, (MGW Center), Botahtaung Township, Yangon, Myanmar	PCL-10-1999-3-6th	21-4-2016	20-4-2019
2	SGS Myanmar Ltd	79/80, Bahosi Housing, Wahtan Road, Yangon	PCL-06-1999-4-6th	28-7-2016	27-7-2019
3	Myanmar Overseas Commodity Inspection Co.,Ltd	No. 6, Myaingmarlar Road, 15th Ward, Yankin Township, Yangon	PCL-02-2000-7-6th	18-2-2016	17-2-2019
4	General Inspection & Testing Enterprise Co.,Ltd	CNR of Sakawah Road and ShweTharaphi Road, near (Sport Club), FMI City, Hlaing Thaya	PCL-10-1998-12-7th	13-9-2018	30-8-2021
5	Myanmar Pest Control Service	No.46, First Floor, Bogalay Market Street, Botahtaung Township, Yangon	PCL-02-1998-14-7th	30-8-2018	9-9-2021
6	Diamond Win Co. Ltd	9/A Zabuyit Road, Kyauk Kone Ward, Yankin Township, Yangon	PCL-09-1998-16-7th	28-11-2018	27-11-2020
7	Mahar Inspection &Service Co.,ltd	No.380, Second floor, right, between (37/38th street), Pabetan Township, Yangon	PCL-09-1999-23-7th	10/1/2019	13-1-2022
8	Super Standard Fumigation Services	No.73, Ground floor, 31st street, Lower Block, Pabetan township, Yangon	PCL-10-2001-24-6th	30-8-2018	30-7-2021
9	Top Pest Control Services	No.72, First Floor, Nawaday Street, Thamaing Ward -1, Mayangone Township	PCL-11-2005-27-5th	11-9-2018	9-6-2021
10	(MITS)	No. (124-128) Bo Aung Kyaw Road, Botahtaung Township, Yangon	PCL-01-2007-30-4th	29-7-2016	28-7-2019
11	ASK Inspection and Fumigation Service	No. 118, Fourth floor, 38th Street, Lower Block, Kyauktada Township, Yangon	PCL-10-2008-34-4th	11-1-2018	30-12-2020
12	Mandala Pest Control	No. 119, Ground Floor, 41st Street, Botahtaung Township, Yangon	PCL-10-2008-35-4th	16-3-2018	15-3-2020
13	Green Pest Management	No. 531 C-2, No.814, Mahamyaing Yeiktha, Pyi Road, Kamayut township, Yangon	PCL- 06-2010-37-3rd	21-7-2016	20-7-2019
14	Min Naing Khant Co. Ltd	No. Na- 9/2, 42nd street, between 62 and 36th Street, Mandalay	PCL- 06-2012-39-3rd	21-9-2018	9/9/2021
15	Powerful Asia Galaxy Empire Co. Ltd	Building no.1/003, Myainghaywun Housing, 8th mile, Mayangone Township, Yangon	PCL-10-2013-43-2nd	25-3-2016	24-3-2019
16	InternationalGreat Future Fumigation and Inspection Co. Ltd	No. 81, 32nd Street, Pabedan Township, Yangon	PCL- 02-2013-44-2nd	5/7/2016	4-7-2019

17	Golden King Fumigation Services	No. 443, 8th floor, Merchant Street, cnr of 44th street and Theinbyu Street, Botahtaung Township, Yangon	PCL-06-2013-45-2nd	26-7-2016	25-7-2019
18	Aung Group Inspection and Fumigation Services	No.75, 5th floor, 44th Street, Upper Block, Botahtaung Township, Yangon	PCL- 03-2014-47-2nd	13-9-2017	6/3/2020
19	Natural Pest Control	No. 1611, 16th Street, no.2 Paung laung Steet, Pyinmana Township, Nay Pyi Taw	PCL-08-2016-48-1st	16-8-2016	15-8-2019
20	Myanmar Bureau Veritas C.,Ltd	No. 189-195, 11th floor, Pandsodan Street, Kyauktada Township, Yangon	PCL-07-2014-49-2nd	25-7-2017	24-7-2020
21	The King Pest Control Co. Ltd	No. Sa/62, Sipinthayayay Ward, Kyigone, Patheingyi Township, Mandalay	PCL-12-2018-50-2nd	2/1/2018	30-12-2020
22	Myanmar Koekant, Chinshwehaw Agricultural Company LTD	No.62, Nyeinchanyay street, Ward-1, Chinshwehaw Town	PCL-12-2014-51-2nd	23-5-2018	29-12-2020
23	August Pest Management Services	No.34, Myakanthar 4th Street, Myakantha Housing, 5th Ward, Hlaing Township, Yangon	PCL -07-2015-52-2nd	26-7-2018	25-7-2021
24	Competitive Pest Services Co.,Ltd	16 (F), Thalawaddy Road, 7th Mile, Mayangone Township, Yangon	PCL -11-2015-53-2nd	11/9/2018	11/11/2021
25	Swan Htet Pests Busters Enterprise	No.568(1) Block. East Dagon. Yangon.	PCL- 11-2015-54-2rd	6/11/2018	11/11/2021
26	Active Pest Control Service	No. 52-A, Myainghaywun Housing, Kyaikwaing Pagoda Road, Mayangone Township, Yangon	PCL -12-2015-55-2nd	24-12-2018	29-12-2021
27	Myanmar Agro pest Control Team.	No. 219-A, Minglar Road, 13th Ward, South Okkalapa, Yangon	PCL - 04-2016-56-1st	29-4-2016	28-4-2019
28	Javelin Services Limited	Levely, West Entrance ,99Condo. Dhamazedi Road. Kaymayut Tsp	PCL -04-2016-57-1st	29-4-2016	28-4-2019
29	Titan Pest Management Co.Ltd	No.603, 6th Floor, Hledan Center, Kamaryut Township, Yangon	PCL -12-2016-58-1st	31-12-2016	30-12-2019
30	CCIC Myanmar Inspection and Certication Co.Ltd.	No.5003, Pyay Garden Office Tower, Pyay Road, Sanchaung Township, Yangon.	PCL-01-2017-59-1st	10/1/2017	9/1/2020
31	Particular Service Co.Ltd	No.975, U Ponnya Road, 35th Ward, Northe Dagon Myothit	PCL-11-2017-60-1st	30-11-2017	29-11-2020
32	Geo-Chem Inspection & Fumigation S/	No. 64, 44th Street, 4th Floor, Botahtaung Township, Yangon	PCL-1-2018-61-1st	15-1-2018	14-1-2020

source: Plant Protection Department, Myanmar (http://ppdmyanmar.org/)

*This list was downloaded in January 2019

Annex III List of private sector inspection and testing services

Institution	Quality-related services	Institution	Quality Services
Myanmar Inspection and Testing Services Ltd	- Pre-shipment inspection for export commodities - Inspection of import commodities before the shipment at the destination - Sampling for lab testing - Fumigation Services	**Overseas Merchandise Inspection Co., Ltd**	- Agri-products inspection - Marine insurance and technical services - Laboratory testing - Fumigation and pest control services - Quality and quantity for oil, gas& chemicals
Myanmar Agro Inspection& Fumigation Co., Ltd	- Fumigation - Pre-shipment inspection - Agri-products inspection	**Mahar Inspection & Services Co., Ltd**	- Pre-shipment inspection - Agri-product inspection - Pest control services
Societe Generate de Surveillance (Myanmar) LTd	- Agri-inspection - Marine inspection - Mineral inspection - Timber inspection - Consumer testing - Fumigation - Oil, gas &chemical - System &services - Certification - Draft surveys - Collateral Management - Stock management	**Asia Pacific Inspection Agency Ltd**	- Pre-shipment inspection - Destination survey - Pre-production raw material - Loading/unloading supervision - Garment inspection audit - Sawn Timber & logs - Weight ascertainment - Fumigation services
United General Inspetion	- Fumigation - Pre-shipment inspection - Agri-products inspection	**Quality Services Ltd**	- Specializes in inspection of crude oil, gas and petroleum products
Global Greatness Co., Ltd	- For ISO, HACCP - Accredited certification laboratory standards	**General Inspection & Pest Testing Enterprise Ltd (GITE Pest Control)**	- Pre-shipment quality, quantity and weight inspection - Agri-products inspection - Fumigation
Myanmar Overseas Commodity Inspection Co., Ltd	- Pre-shipment quality and weight inspection -agri-product inspection and analysis - Fumigation	**MOCIC (Hong Kong GF Ltd)**	- Consulting and garment inspection centre
Myanmar Food Processors and Exporters Association	- Food testing laboratory (FIDSL)		

Source: http://www.trade.gov.mm/my/content/myanmar-nesquality-management

Annex IV Local laboratories for oilseeds and oilcake testing

Lab	Capacity	Parameter
Food Industry Development Supporting Laboratory (FIDSL) UMFCCI, Yangon	Microbial Test for oil and oilseeds	• TPC • Coliform • E. Coli • S. Aurenus • Salmonella • Yeast and mould
	Quality Test	• Moisture • Ash • Protein • Crude Fat • Fiber • Carbohydrate • Energy Value • Salt • Reducing sugar • Total sugar • Starch
Commodity Testing and Quality Management Laboratory (CTQM) Hlegu township, Yangon	Quality Test	• Crude Protein • Starch • Moisture • Sand and Silica • Ash • Other color seeds • Total oil content • Residual oil content • Free Fatty Acid (FFA)
	MRLs- Organo chlorine compound for sesame seeds	• BHC • DDT • Dieldrin • Endrin • Parathion – methyl • Malathion
	Micotoxin- Total aflatoxin content for oilseeds, cake, edible oil	(B1, B2, G1, G2)
MoALI, Plant Protection Laboratory Insein township, Yangon	Pesticide Residue	• Organochlorine • Organoposphate
	Quality Test	• Oil content • Moisture • Free Fatty Acid (FFA)
	Heavy Metal (Plant/Product)	(Cu, Cd, Ni, Pb)
	Micotoxin- Total aflatoxin content for oilseeds, cake, edible oil	(B1, B2, G1, G2)

Annex V Sample warehouse cleaning and sanitizing program

AREA/ITEM	PROCEDURE	FREQUENCY	RESPONSIBLE PERSON
EXTERNAL PREMISES			
Surroundings	The area within the storage facility is maintained and swiped with broom	Once a week	
Loading/ Unloading Area	Floor is properly dry cleaned with broom before each loading/unloading operation	Daily	
Drains	-Manually clean the drains removing and disposing debris accumulated; - Use brush to scrub inside the drains - Rinse several times with water	Once in a month	
Pest Control	-Clean and maintain the environment around the warehouse to prevent harbouring of insects, birds or rats and these can easily find entry to warehouse -Clean, maintain or replace mouse and insects' traps - Spraying, if needed for insect control	Once a week	
INTERNAL PREMISES			
SORTING, MIXING & RE-BAGGING, STORAGE AREA(S)			
Floor/ Walls	-Clean the whole floor with broom including behind and underneath pallets	Daily	
	-Clean the whole floor with wet mop	Fortnightly	
Ceilings	-Clean the ceilings to remove dust and cobwebs	Fortnightly	
Windows/ Birds proofing's/ Ventilators	-Clean windows and ventilators to remove dust and cobwebs and maintain bird proofing nets to prevent birds entrance	Fortnightly	
Light Covers	-Clean, maintain or replace lights covers to avoid possible broken pieces to fall on the product	Once in a month	
Drainage	-Manually clean the drains removing and disposing debris accumulated in the drains; - Use brush to scrub inside the drains - Rinse several times with water	Fortnightly	
Tarpaulin sheets	-Clean tarpaulin with broom -Maintain stored tarpaulins stacks tarpaulin clean	After use before storing	
Pallets	-Clean pallets with broom to remove dust and cobwebs	After use before storing	
	-Pest proofing of pallets, if required	As needed	
Jute bags/Other packaging materials	-Maintain stored jute bags and other packaging materials clean and off the floor in designated area	Fortnightly	
Sieves	-Wash the sieves with water to remove near-size particles lodged in the mesh	After each sieving before storing	

Other equipment/tools like sampling tools and balances	-Dry cleaning or as recommended by manufacturers	After use or as recommended by manufacturer	
Chemicals & Detergents	-Chemicals and detergents are stored and clearly identified -Clean side-spill after pouring -Expired chemicals are removed and appropriately disposed	After each use	
PERSONAL HYGIENE FACILITIES			
Hand washing stations	-Wet clean and dry -Soap dispensers cleaned and refilled	Daily at end of day	
Hand towels	-Wash and dry	Twice times a day	
Toilet/Lavatories	-Wet clean and sanitize	Twice a day	
Changing area	-Dry mopping with detergent and sanitizers	At end of shift/day	
TRANSPORTATION			
Vehicle/ Truck	- Truck is properly cleaned with dry brooms	After every unloading	
	-The inside part of the truck is dry cleaned from external matters before loading the oilseeds bags	before every loading	
	-Spray for pest control, if needed	When needed	
Tarpaulins on truck	-Beat with stick -Dry cleaning with broom	After use (incoming truck) before loading (outgoing truck)	
WASTE MANAGEMENT			
Waste collecting bins	-Material from waste bins is collected in containers at a designated place within the facility; - Empty waste bins are wet cleaned, scrubbed and dried	Daily (end of the shift)	
Waste collection area	-Waste is disposed outside the facility to be collected by the municipal sanitation operators -Waste collection area is wet cleaned and sanitized -Dry the waste collection area before storing waste material collected	Once a week end of shift/day	
PROTECTIVE CLOTHES			
Aprons, caps and shoe-covers (reusable)	-Wash with detergents -Sun dry (ensure not contaminated with bird droppings/pest)	Daily after use	
WATER STORAGE FACILITY			
Water storage tanks	-Remove the water -Scrub with soap/detergent -Wash thoroughly with fresh water	Once in two/three month	
PEST CONTROL			
Check for infestation	The facility and its surrounding areas are examined for evidence of infestation	Once a week	
Traps	Check and replace the corrugated cardboard, sticky/glue traps and/or light traps	Once a week	

Annex VI Sample Warehouse weekly sanitation checklist

Facility Name:

Checked by: Date:

	AREA/ITEM	✓ / X	CORRECTIVE ACTIONS	VERIFICATION Date:	✓ / X
1	**EXTERNAL PREMISES**				
	Surroundings (closed prohibiting pest entry)				
	Loading/Unloading Area (smooth no water logging)				
	Drains (clean/stagnating/overflow)				
	Pest harborage area and/or visible pests				
2	**INTERNAL STUCTURE**				
	DRYING, CLEANING, SORTING, MIXING & RE-BAGGING, STORAGE AREA(S)				
	Floor/ Walls (cleanable/smooth & clean)				
	Ceilings (closed, no gaps, cobwebs)				
	Windows/Ventilators (Birds proofing/screens)				
	Doors (self-closing, no gaps and kept closed)				
	Light Covers (non-glass and clean)				
	Drainage (clean and no pest harborage)				
	Tarpaulins (sufficient, clean, intact, properly stored)				
	Pallets (sufficient, clean and in proper use)				
	Packaging materials				
	Sieves (material, intact, clean, stored properly)				
	Other equipment/tools (proper, clean & properly stored)				
	Pests (visible pest in area, around bags)				
	Chemicals & Detergents (appropriate, stored separately, clean, properly capped, not expired)				
3	**PERSONAL HYGIENE FACILITIES**				
	Hand washing stations (water/soap/drying facility available, sign boards & clean)				
	Toilet/Lavatories (closed, clean & water available)				
	Changing area/room (location, clean & in use)				
4	**TRANSPORTATION**				
	Vehicle/ Truck (incoming/out going design)				
	Truck condition (clean, closed)				
	Signs of pest/non-food chemical transport				
	Use of tarpaulins (below and above the bags)				
5	**WASTE MANAGEMENT**				
	Collecting bins (location/contamination and clean)				
	Collection area (location/contamination and clean)				
	Waste collection/disposal (adequate)				
6	**PERSONNEL HYGIENE (CLEANLINESS AND BEHAVIOR)**				
	Protective clothes (worn clean)				
	Hair and nails trimmed				
	Ornaments / Watch/ threads (not worn)				
	Smoking/Chewing/spitting (signs not seen)				
	Open cuts, sores				
	Hand washing at entering being done				

Annex VII SAMPLE RECORD – Bin card

Lot/Batch No. ___32___

Date	Truck No.	Name of Supplier/ Customer	Incoming Bags	Issued for processing				Out Going bags	Total Stock
				No. of Bags	Purpose*	Date of Return	Moisture**		
23/05	KWF 161	Than Tun Aung	57 X 25kg						1425
	4K 9104	Zaw Tun	23 X 25kg						2000
	3C 4386	Zaw Lin	44 X 25kg						3100
25/05	4K 4386	Lin Lin Moe	11 X 25kg						3375
	7M 8465	Soe Paing	77 X 25kg						5300
	9G 2347	Shwe Zen	52 X 25kg						6600
		Zaw Tun		3 X 25kg	Drying	28/05	9%		-
		Zaw Lin		4 X 25kg	Re-bagging	25/05	-		-
	IG 9023	Phyoe Hein	73 X 25kg						8425
		Floor Spill		X 25kg	Cleaning	5/05			8450
28/05	F 413	Win Gyi	49 X 25kg						9675
	9G 9713	Myt Myt	48 X 25kg						10875
				0 X 25kg	Mixing	ot no 39			9625
	KWF 161	Than Tun Aung	37 X 25kg						10550
----------		Stack closed***	----------						
6/06	IP 4853	Golden Gate						00 X 25kg	5550
	5E 2130	Maung Myint						00 X 25kg	550
12/06		Mixed with Lot 42						2 X 25kg	0

* Purpose of issuing oilseeds bags i.e. for drying, sorting, cleaning, mixing, re-bagging etc.
** Moisture after drying
***Once stack is closed, no more new bags on this stack. And bags can go only once the stack is closed

Annex VIII Inspection record on the health safety aspects of the business

Township: _____ Inspection Date: _____

Name of Owner: _____ Name of Business: _____

Address: _____ Type of Business: _____

Business License No: _____ License Issued Date: _____

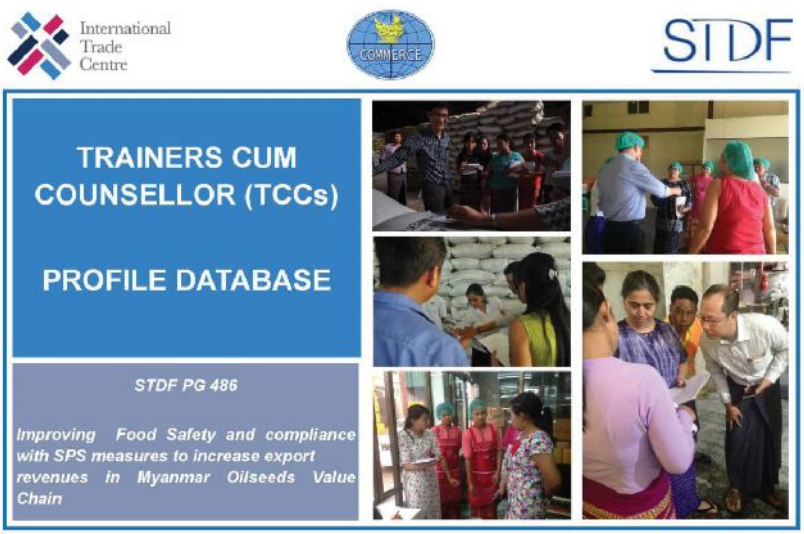
	Yes	No	Remarks
(A) Inspection on Business Open			
1. Health risk for the public			
2. Safety prevention plans			
3. Systematic storage			
4. Production of dyes			
(B) Inspection on Building and Facilities			
1. Located in a good environment			
2. Steadiness			
3. Managed to keep dusts away			
4. Managed to keep flies away			
5. Well ventilated			
6. Well lighted			
7. Resting or changing rooms for workers			
(C) Waste Disposal			
1. Hygienic restrooms			
2. Sanitation system			
3. Cleaning materials (Brooms, mops, gloves, shovels, etc)			
4. Garbage bins, garbage bags, waste disposal system			
(D) Miscellaneous			
1. Pest elimination (mosquitoes, flies, rats, stray dogs)			
2. Pesticides, acid and toxic materials are kept separately			
3. Warning signages (no smoking, no betel spits)			

Annex IX Roundtables and experts' group meetings attendance list

Name	Designation	RT 12-13.6.17	RT 13.8.18	EGM 7-8.9.17	EGM 12.8.18
U Aung Soe	*Director General, Myantrade*	✓			
Daw Thidar Win Htay	*Deputy Director, Myantrade*	✓	✓	✓	✓
U Myo Thu	*Director, Myantrade*	✓		✓	
U Than Myint Oo	*Director, Myantrade*		✓		
Daw Htay Htay Soe	*Assistant Director, Myantrade*	✓	✓		
Daw Thin Thin New	*Assistant Director, Myantrade*		✓		
Khet Khet New Phoo	*SDF, Myantrade*	✓			✓
Daw Myat Soe Moe	*Staff Officer, Myantrade*	✓			
U Myint Shwe	*Staff Officer, Myantrade*		✓		
Zin Mar New	*Junior clerk, Myantrade*	✓			
May Thuzar Khaing	*Junior clerk, Myantrade*	✓			
Kay Khine Htay	*Junior clerk, Myantrade*		✓		
Phyo Thida Aye	*Junior clerk, Myantrade*		✓		
U Aung Kyaw Oo	*Director, Plant Protection Dep., DoA*		✓	✓	
Dr. Wai Ye Lin	*Assistant Director, DoCA*	✓			
Daw Hla Hla Maw	*Assistant Director, DoCA*		✓		
Dr. Ko Ko	*Staff Officer, Plant Protection Dep., DoA*	✓	✓	✓	✓
U Tin Win	*Deputy Director, Pesticide Lab., PPD, DoA*			✓	
U Myint Oo	*Extension Officer, DoA*	✓			
Wah Wah Hlaing	*Staff Officer, DoA*	✓			
Daw Cho Cho Khaing	*Staff Officer, DoA*	✓			
Dr Aung Ko Oo	*Head of division, YCDC*		✓		
U Sein Aye Maung	*Vice Chairman, CEC*	✓			
U Myint Kyaw	*Magway CCI*	✓			
U Soe Win Maung	*Adviser, MPBSSMA*	✓	✓		
U Htay Aung	*Adviser, Mau Oak Shaung (MOS)*	✓			
U Myint Aung	*MD, Myint Myat Taw Win Group*	✓	✓		
Daw Ohmmar Khin	*Finance coordinator, Myint Myat Taw Win Group*	✓	✓		
U Nyan Lwin	*MD Lwin Phyo Collector*	✓	✓		
U Than Hlaing	*MD, La Thar Collector*	✓	✓		
U Thein Tan	*Member of Aunglan CEC*	✓			
U Kyaw Min Tun	*Export Manager, Shwe Tha Zin Company*	✓			
U Zaw Myint	*Factory In-charge, Shwe Tha Zin Company*	✓			
Shwe Phue San	*Sr Technical Expert, GIZ/TDP*	✓			
Dr Nay Myo Tun	*Food control Officer, FDA*	✓			
Dr. Han Mon Myo Hein	*Food control Officer, FDA*				✓
Dr. Khin Saw Hla	*Director, FDA*			✓	
Daw San San Win	*Assistant General Manager, MITS Laboratory*			✓	
U Than Tun Win	*Inspector, MITS Laboratory*		✓		
Daw Thin Thin Maw	*Lab Manager, SGS Myanmar*	✓	✓	✓	✓

Daw Soe Sandar Aung	*Managing Director, OMIC Myanmar Inspection & Surveying*			✓	
Maung Maung Myint	*Assistant General Manager, OMIC*		✓	✓	✓
U Myint Wai	*Director, Commodity Testing and Quality Management centre (CTQM), MoC*	✓			
U Zaw Win	*Retired DD, CTQM, MoC*	✓	✓	✓	✓
U Kyaw Wai	*DD, CTQM, MoC*			✓	
Dr. Lai Lai Moe	*Staff Officer, CTQM, MoC*		✓	✓	✓
U Kyaw Oo	*Deputy Director, Regional project committee chair (MDY), MoC*	✓			
U Khin Zaw	*Director, Regional project committee chair (MDY), MoC*	✓			
U Kyaw Swar Win	*Deputy Director, Regional project committee chair (MDY), MoC*	✓			
Tin Tin Hla	*Superintendent, MoC*	✓			
Daw Mon Mon Oo	*Junior clerk, MoC*		✓		
Ms Thit Thit Lwin	*National Project Manager, ITC*	✓	✓	✓	✓
Dr. Namrata Pandita Wakhaloo	*Food Safety Consultant, ITC*	✓	✓	✓	✓
Ms. Marta Drago	*Individual Contractor, ITC*			✓	
U Nay Zaw Tun	*Interpreter*	✓			
Daw Khine Khine Tun	*Interpreter*			✓	
Daw Moe Thidar Htwe	*Interpreter*		✓		✓

Annex X Trainers cum Counsellor (TcCs) Profile Database

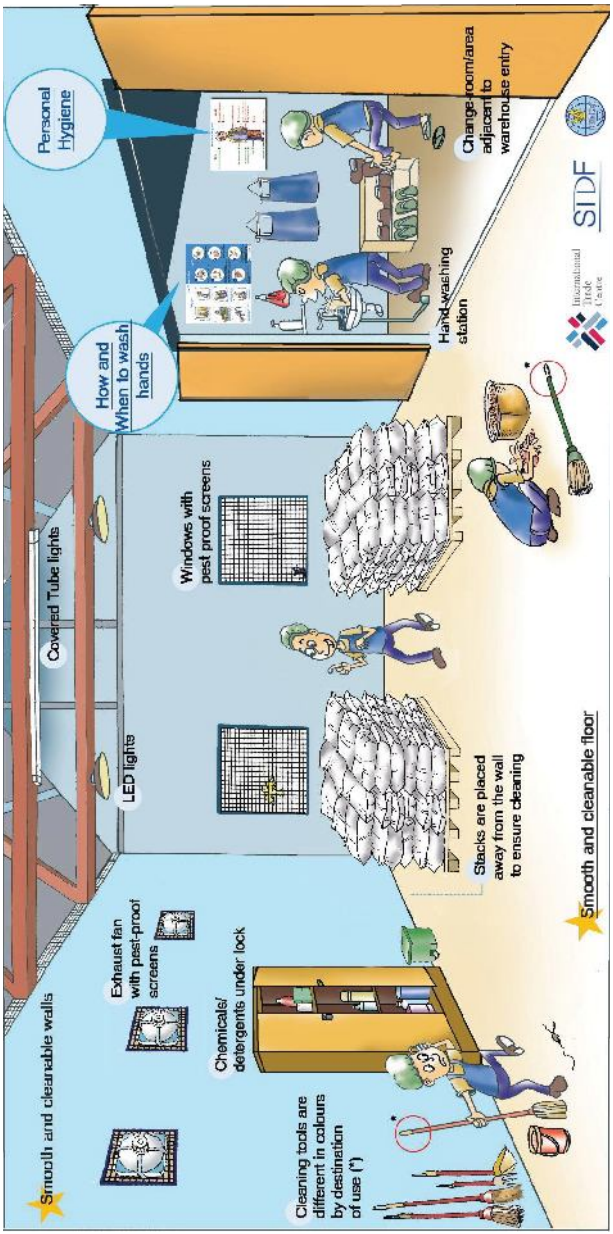


The complete database to be found at:

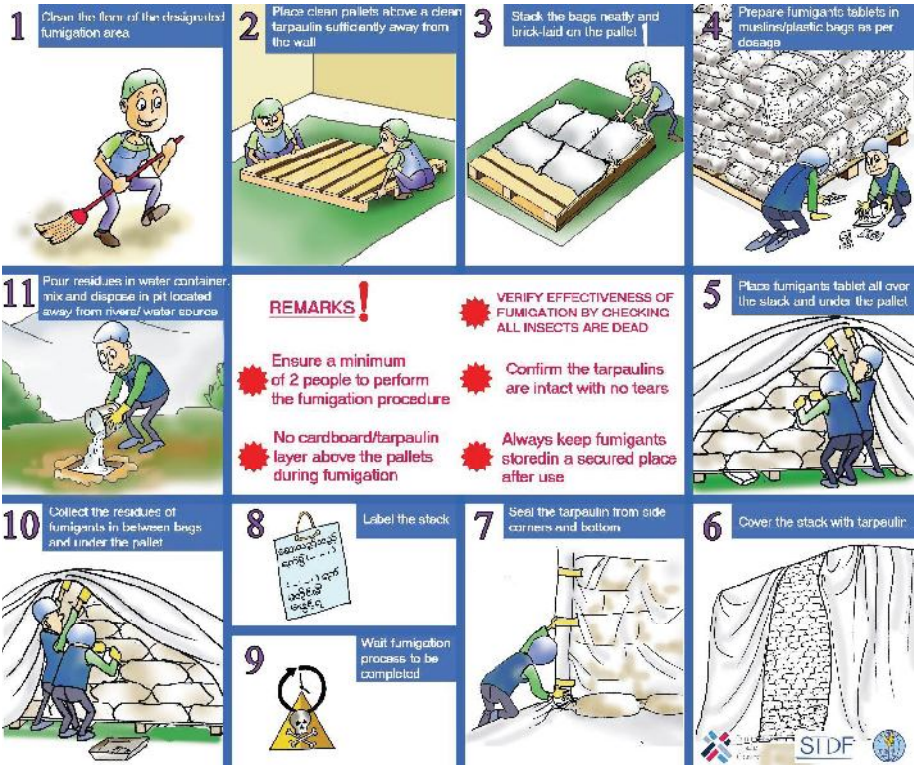
STDF-ITC Oilseeds Project Facebook Page (www.facebook.com/itcoilseedsmyanmar)

Myantrade website www.myantrade.org

Annex XI POSTER - Warehouse layout



Annex XII POSTER - Fumigation procedure



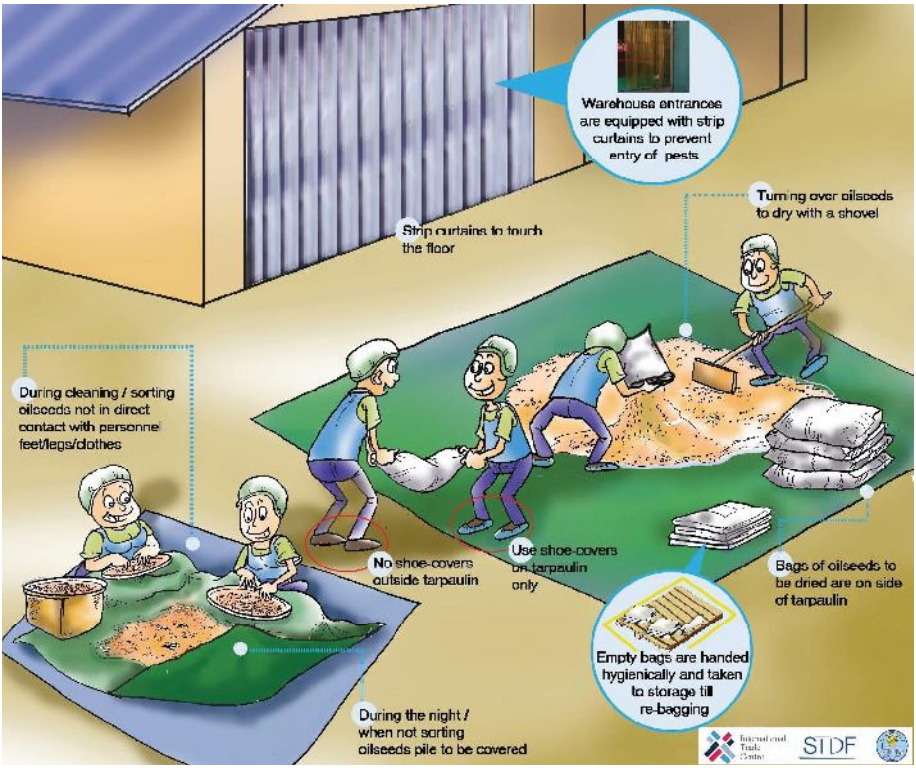
Annex XIII POSTER - Hand washing

Annex XIV POSTER - Dos' and Don'ts for personal hygiene

Annex XV POSTER - Personal Behavior

Annex XVI POSTER - Receiving, Unloading and Stacking of oilseeds

Annex XVII POSTER - Drying, Cleaning and Sorting of oilseeds



International
Trade
Centre

Street address: ITC,
54-56, rue de Montbrillant,
1202 Geneva, Switzerland

Postal address: ITC,
Palais des Nations,
1211 Geneva 10, Switzerland

Telephone: +41-22 730 0111
Fax: +41-22 733 4439
E-mail: itcreg@intracen.org
Internet: www.intracen.org

This project is funded by:

STDF

Project partners: