Harmonized Groundnut Production
Manual for Malawi
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### ACRONYMS

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<th>Description</th>
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<tr>
<td>ADD</td>
<td>Agricultural Development Division</td>
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<tr>
<td>AICC</td>
<td>African Institute of Corporate Citizenship</td>
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<tr>
<td>ASWAp</td>
<td>Agricultural Sector Wide Approach</td>
</tr>
<tr>
<td>DARs</td>
<td>Department of Agricultural Research Services</td>
</tr>
<tr>
<td>FISP</td>
<td>Farm Input Subsidy Programme</td>
</tr>
<tr>
<td>GAPs</td>
<td>Good Agricultural Practices</td>
</tr>
<tr>
<td>ICRISAT</td>
<td>International Crop Research Institute for the Semi-Arid Tropics</td>
</tr>
<tr>
<td>ITC</td>
<td>International Trade Centre</td>
</tr>
<tr>
<td>MGDS</td>
<td>Malawi Growth and Development Strategy</td>
</tr>
<tr>
<td>NASFAM</td>
<td>National Association for Smallholder Farmers in Malawi</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non Governmental Organizations</td>
</tr>
<tr>
<td>RLEEP</td>
<td>Rural Livelihoods and Economic Enhancement Programme</td>
</tr>
<tr>
<td>RUFT</td>
<td>Ready to use Therapeutic Food</td>
</tr>
<tr>
<td>SSA</td>
<td>Sub Saharan Africa</td>
</tr>
<tr>
<td>STAM</td>
<td>Seed Trade Association of Malawi</td>
</tr>
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</table>
Foreword

The Malawi National Export Strategy (NES) advocates for serious refocus on legumes as a viable commodity for export. While trade policy regimes have an equal impact on the practicality of this goal, it is an open secret that groundnuts productivity levels are significantly lower than the feasible potential levels due to a number of factors. In isolated cases where productivity has been evidently better off, the quality of groundnuts in terms of aflatoxin levels has been an issue at international market. Unfortunately, for a long period of time, there was no comprehensive resource material to enable farmers, frontline extension workers and other value chain stakeholders to address these problems. This Harmonized Groundnut Production Manual has therefore been developed to consolidate information from various publications on groundnuts with the aim of providing various players in the groundnut value chain in Malawi with a more harmonized and diverse source of information.

The manual is a result of a synthesis of various publications and it has been carefully compiled in a comprehensible language for different users. I have no doubt that that this manual will become a vital source of information for any farmer, extension staff, researchers and all players along the groundnut value chain in Malawi.

This manual is a product of selfless and tireless effort of several stakeholders especially those that operate under the umbrella of the Legumes Development Trust (LTD). I would therefore like to register my profound gratitude to the members of the LTD. In a special way, I would also like to express our deep gratitude to development partners for their contributions towards the production of this manual as well as the authors who have worked tirelessly to ensure that this manual meets its intended purpose.

Mr. Duncan Warren
Chairperson, Legumes Development Trust
Acknowledgements

Foremost, we would like to thank the Government of Malawi through the Rural Livelihood and Economic Enhancement Programme (RLEEP), Irish Aid, and Norad for funding the production of this manual through the African Institute of Corporate Citizenship (AICC).

We would like also to express our gratitude to the following team of contributors and reviewers for their valuable comments and time spent in improving the manuscript: Mr. Albert Chamango, Dr. Geoffrey Kananji, Mrs. Bupe Mulaga Mwakasungula, Mr. Phillip Kamwendo, Ms. Mercy Butao, Mrs. Linda Magombo-Munthali, Mr. Aone Kumwenda, Mr. Frank Masankha, Ms. Norias Kayira, and Dr. Justus Chintu.
1.0 Importance of Groundnut in Malawi

Groundnut (Arachis hypogaea L.) remains an important component of the agriculture sector in Malawi. With the current unstable market performance for tobacco, the development of the agricultural sector and its contribution to the national economy is increasingly becoming more centered on legumes. Groundnut is among the major valuable and versatile grain legume crops with incredible contributions to improving household food security, nutrition, soil health and soil fertility. Additionally, groundnut thrives under low rainfall, in marginal lands, and can be grown with minimal capital investment.

The average annual cultivated area for groundnut from 2003 to 2012 was 260,000 hectares and this accounted for 34% of the average total cultivated area under legumes. During this period, groundnut production per year accounted for 41% of Malawi’s total legume production. In the same period, the area planted with groundnut was about 14% of the area planted with maize. One key component of the Second Malawi Growth and Development Strategy (MGDS II) is that it recognizes the role of crop diversification as a key factor of cropping systems for sustainability, and emphasizes grain legumes, including groundnut, as an important element that could potentially contribute to enhanced productivity and wealth creation. In addition, both the Farm Input Subsidy Programme (FISP) and the Agricultural Sector Wide Approach (ASWAp) incorporate selected legume crops, including groundnut, as a smart means for ensuring sustainability of farming systems and the environment in this country.

Empirical research evidence has shown that legumes are important in Malawi’s maize-based farming systems for a number of reasons, which include:

1.1 Food security

Grain legumes are important for Malawi as they constitute a vital supplement to the largely maize-based diets. Legumes, such as groundnut, are usually grown under
rain-fed conditions in many areas including drought prone areas to promote household food security. Groundnut performs well in a wide range of environments thereby promoting food security in many areas of the country.

1.2 Nutrition

Groundnut is one of the readily available sources of vegetable protein, vitamins and vegetable oil. It is an important component of both rural and urban diets, especially for many poor families who cannot afford dairy and meat-based diets. The crop is regarded as a nutritionally rich food supplement because it contains approximately 18 to 25% protein. Groundnut based products are used to treat malnutrition among under-five children and people living with HIV and AIDS. For example, Rab Processors Limited (RABS) and Valid Nutrition produce Ready to Use Therapeutic Food (RUTF) supplements processed from groundnut in order to address malnutrition locally and regionally.

1.3 Soil fertility replenishment

It has been observed that smallholder farmers in Malawi often cultivate on poor soils. The inclusion of groundnut in cropping systems would help to improve soil fertility because the crop fixes atmospheric nitrogen in soils. This is an essential attribute in the context of agricultural production in Malawi, which is dominated by resource-constrained smallholder farmers who are precluded from the use of chemical fertilizers due to high prices.

1.4 Source of income and foreign exchange

The contribution of grain legumes to the agro-industry is quite remarkable. Groundnut provides cash that smallholder farmers depend on especially in the rural areas of Malawi. The crop contributes over 25% of rural income thereby significantly contributing to rural livelihoods. Therefore, if produced in large quantities, the country can export the surplus and it would significantly result in generation of forex.
1.5 Fodder for livestock

In livestock-farming communities, grain legumes are among the major sources of plant protein that is used as livestock feed. In particular, groundnut haulms and straws are used as fodder for livestock in all groundnut growing areas.

2.0 Groundnut production trend (2003-2012)

The national groundnut production trend (Figure 1 below) reveals that over the past decade groundnut production has generally been increasing. However, the increase in area under production has been higher than the gains in productivity. In addition, a noticeable change in the trend can be observed from 2009-2012 where production has increased from 985kg/ha to 1083 kg/ha. However, the yield increase still remains below the realizable potential yield of 2500 kg/ha recorded at research stations. This clearly demonstrates the need to promote good production technologies.

Figure 1. Groundnut production trend for period 2003-2012
3.0 Constraints to Groundnut Production

Despite its importance, the groundnut industry in Malawi is faced with numerous challenges evidenced by low productivity and production. These challenges include both biotic and abiotic factors, and other socio-economic factors that constrain different stages of the groundnut value chain. Major challenges include:

- Low adoption of improved technologies (such as improved varieties),
- Poor insect pest and disease control,
- Low soil fertility,
- Lack of organized markets for groundnut and its products,
- Frequent droughts,
- Limited availability of improved varieties suitable for specific agro-ecological zones,
- Inadequate availability of good quality seed, particularly foundation seed,
- Poor weed control,
- Lack of labour saving technologies.

This entails that research and development efforts to improve efficiency of the groundnut value chain should focus on reducing the impact of these constraints.

4.0 Groundnut varieties, their descriptions and agro-ecological zones of adaptation

Malawi currently promotes two botanical or market types of groundnut, namely: Virginia types in the mid altitude agro-ecology and Spanish types in the lowland agro-ecology. However, overlaps of varieties occur across agro-ecologies as farmers become more knowledgeable about varietal characteristics, market preferred traits, management recommendations and market demand. Twelve groundnut varieties have been released since 1968. Six varieties (Chalimbana, Chitembana, RG1, Mawanga, Manipintar and Malimba) are relatively old and less relevant in the context of current climate, length of growing period and resilience to various stresses.

Currently, six varieties are being promoted, and these are: CG 7, Chalimbana 2005, Nsinjiro, Chitala, Kakoma and Baka. It is advisable that farmers should use these improved varieties and good quality seed. Although legume seed can be recycled to a maximum of three seasons, it is recommended that farmers replace their seed
stocks from reputable sources such as registered seed outlets and research institutions. The recommended varieties are described in Table 1 which follows.

**Table 1: Recommended groundnut varieties in Malawi**

<table>
<thead>
<tr>
<th>Variety name</th>
<th>Market group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG 7 (ICGV-SM 83708)</td>
<td>Virginia bunch</td>
<td>CG 7 is a confectionery nut with medium seed size. It is recommended for production in all groundnut growing areas of the country. It has a bunch growth habit and tolerates drought. It matures in 130 to 150 days. The seeds are red, uniform and contain 48% oil. It has a yield potential of 2500 kg per hectare.</td>
</tr>
<tr>
<td>Nsinjiro (ICGV-SM 90704)</td>
<td>Virginia bunch</td>
<td>Nsinjiro is a confectionery nut recommended for production in all plateau areas of Malawi, within the altitude range of 1000-1500m above sea level. It matures between 120 to 140 days after sowing. The yield potential is close to CG 7 but has the advantage of being tolerant to groundnut rosette disease. The seeds are tan in colour, 45% oil. Nsinjiro has a potential yield of 2000 kg per hectare. The variety has spreading bunch growth habit.</td>
</tr>
<tr>
<td>Chalimbana 2005 (CML851/7)</td>
<td>Virginia bunch</td>
<td>Chalimbana 2005 is a confectionery nut recommended for all plateau areas of the country within the altitude range of 1000 to 1500m above sea level. The variety was bred by the national programme and</td>
</tr>
<tr>
<td>Variety</td>
<td>Type</td>
<td>Details</td>
</tr>
<tr>
<td>-----------------</td>
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<td>---------</td>
</tr>
<tr>
<td>Chalimbana 2005</td>
<td>Virginia bunch</td>
<td>Released for cultivation in 2005. Chalimbana 2005 is a Virginia bunch variety with a tan seed coat and matures in 130 to 140 days. It contains 45% oil and has yield potential of 2000-2500 kg per hectare. Additional attributes include moderate resistance to both rosette and early leaf spot diseases.</td>
</tr>
<tr>
<td>Kakoma (JL24)</td>
<td>Spanish bunch</td>
<td>Kakoma is a confectionery nut recommended for production in all the low-lying areas within an attitude range of 200-500m above sea level such as Shire Valley, Lakeshore Areas and also for off-season (dimba) cultivation. It matures in 90 to 120 days after sowing, has no seed dormancy and it should therefore be harvested as soon as it matures. The seeds are small, pale tan in colour and contain 48% oil. Kakoma has a potential yield of 1500 kg per hectare. It has erect bunch growth habit.</td>
</tr>
<tr>
<td>Baka (ICG 12991)</td>
<td>Spanish bunch</td>
<td>Baka is a confectionery nut recommended for production in all the low-lying areas within an attitude range of 200-500m above sea level such as the Shire Valley, Lakeshore Areas and also for off-season (dimba) cultivation under residual moisture. Like Kakoma, it matures in 90 to 120 days after sowing and it has no seed dormancy. The seeds are pale tan in colour and contain 48% oil but are slightly smaller than Chalimbana 2005.</td>
</tr>
</tbody>
</table>

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6
<table>
<thead>
<tr>
<th>Variety</th>
<th>Bunch Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chitala</td>
<td>Spanish bunch</td>
<td>Chitala is a Spanish bunch confectionery nut recommended for production in all the low-lying areas such as the Shire Valley and other Lakeshore Areas within an attitude range of 200-500m above sea level. The variety can also be grown during the off-season under dimba cultivation using residual moisture or irrigation. Chitala has a seed yield potential of 1500kg/ha, matures in 90 to 100 days after sowing, and has no seed dormancy. The seeds are tan in colour, medium sized (41g/100 seeds) and contain 48% oil. An additional attribute of Chitala is resistance to rosette.</td>
</tr>
</tbody>
</table>

**5.0 Recommended Cultural Practices**

The most important production system for groundnut is pure stand. However, in areas where land is scarce, groundnuts are usually intercropped with maize and other crops. Winter cropping of some groundnut varieties particularly, of Spanish types such as Chitala, Baka and Kakoma under residue moisture is also practiced especially in areas of Karonga Agricultural Development Division (ADD) and Mzuzu ADD. However, considering the current low productivity levels, there is a need to follow recommended practices if groundnut yields were to be sustainably increased.
5.1 Site selection and ideal conditions for production

Temperature, soil, rainfall and altitude play a major role in determining whether a crop can be successfully grown in a particular area or not. Groundnut does best on well drained loamy-sand, sandy-loam, or sandy-clay-loam soil with sufficient calcium and moderate organic matter. Fallow and virgin lands are not suitable for groundnut production as these may have the appropriate natural *rhizobium* for effective nodulation. The crop grows well in most of the soils in Malawi provided that the soil remains friable until harvest. The soil should have a pH of 5.0-6.2. Crop growth is drastically affected under either acidic or alkaline conditions. A soil test done at a reputable soils laboratory is an ideal tool to determine whether the soil is acidic or alkaline.

The optimum soil temperature for good seed germination is 30°C. Low temperature at sowing delay germination and increase the risk of seed and seedling diseases. However, extreme temperatures and low relative humidity interfere with flowering and pegging. Ideally, a 4-5 month growing season with a steady, rather high to moderate temperature and uniformly distributed rainfall and soil moisture is ideal. A dry period is required at harvesting time.

5.2 Seed Sourcing

Farmers should always use certified seed for higher yields. Seed can be purchased from ICRISAT-Lilongwe, Department of Agricultural Research Services (DARs), and other reputable seed sources including Seed Traders Association of Malawi (STAM).

5.3 Land Preparation

Select deep, well-drained sandy loam soils that are well supplied with calcium and moderate amounts of organic matter. Land should be prepared early enough before the onset of rains in order to sow with the effective early rains. All debris and other stubble from the previous crop should be ploughed under thoroughly. To achieve loose and friable soil into which the peg (gynophore) can easily penetrate and to
avoid excessive loss during harvesting, land should be thoroughly ploughed to a depth of 25-30 cm. Higher groundnut yields have been realized in the field where rows are made at 45 cm or 60 cm apart. To further improve yields and maximize land usage, farmers can also make raised flat topped ridges (beds) spaced at 75 cm apart, sowing at two rows spaced at 20-30 cm apart on each bed.

5.4 Time of Sowing

In Malawi, planting is done with the first effective rains. Groundnuts should not be planted beyond 15th January, after which there is high aphid build-up. Early sowing of groundnut is of utmost importance. Plant with the first effective rains (approximately 25-30 mm). At the time of sowing, make a groove of 5-6 cm deep on the middle of the ridge, drop a single seed every 10 cm for Spanish varieties and 15 cm for Virginia varieties. Cover the groove firmly to ensure rapid and uniform emergence. It is also important that supplying should be done within the first week after seedling emergence.

There is need to treat groundnuts kernels with appropriate fungicides such as Thiram or Fernasan D. These fungicides prevent initial losses from seedling diseases and ensure a full stand. The chemicals can be sourced from agricultural chemical companies and other registered agro-dealers.

5.5 Spacing and Seed Rate

To ensure optimum plant population, planting at correct ridge or row and plant spacing are essential. Recommended seed rates and spacing have been stipulated following decades of agronomic research. For maximum yields, it is important to use the recommended ridge and plant spacing for different varieties as below:
Table 2: Recommended Ridge and Plant Spacing

<table>
<thead>
<tr>
<th>Botanical /market group</th>
<th>Varieties</th>
<th>Row and hill spacing (cm)</th>
<th>Seed rate (Kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia Bunch</td>
<td>CG 7 (ICGV-SM 83708) Chalimbana 2005 (C851/7), Nsinjiro (ICGV-SM 90704)</td>
<td>75cm x 15cm x 1seed</td>
<td>80-100</td>
</tr>
<tr>
<td>Spanish Bunch</td>
<td>Kakoma (JL 24) Chitala (ICGV-SM 99568) Baka (ICG 12991)</td>
<td>75cm x 10cm x 1seed</td>
<td>50-60</td>
</tr>
</tbody>
</table>

Source: *Guide To Agricultural Production in Malawi (2009)* Ministry of Agriculture

However, note that higher yields can be obtained on ridges spaced at 60 cm for Spanish and 75 cm for Virginia varieties. Flat sowing in rows or on raised beds has also been shown as being possible, particularly under dimba (off-season) cultivation or other low lying areas to conserve moisture. Supplying should be done if necessary within one week of seedling emergence.

5.6 Weed control

Weeds cause severe damage to the groundnut crop during the first 45 days of its growth. This is the most critical period of weed competition. Therefore, weeding at least twice during this critical period is necessary, thus within 20 and 45 days after sowing. Thorough weed control prior to pegging is also extremely important. During
pegging, only hand weeding should be done to avoid damage to developing pods. Chemical weed control can also be done using herbicides such as Dual Magnum, Roundup and Harness. However, whenever herbicides are used, farmers should as much as possible use appropriate types and follow instructions on time of application, application rates and safety precautions provided on the label.

5.7 Fertilizer Application

Groundnuts do not usually respond to direct application of mineral fertilizers. Generally, groundnuts perform well following a well fertilized maize crop, so long as phosphorus, calcium and sulphur-containing fertilizers such as 23:21:0+4S were applied. Calcium is the most limiting nutrient in sandy soils and where medium-large-seeded varieties particularly of Virginia type are grown.

Groundnut can be basal dressed with 100 kg ha⁻¹ of single superphosphate (SSP) fertilizer to provide 7% phosphorus, 19.5% calcium, and 12.5% sulphur. The fertilizer should be applied in a band on the ridge, or broadcasted onto the soil and ploughed under before sowing or soon after emergence. Top dressing with Gypsum at the rate of 200-400 kg/ha directly at the base of the plant when 30% of the plants have flowered will help to correct Calcium deficiency and reduce groundnut pops.

5.8 Pest and Disease control

Groundnuts are attacked by a number of pests and diseases. The most important and widespread diseases are: Rosette, Early and Late Leaf Spots and rust. The diseases can be controlled by early planting at correct spacing, practicing crop
rotation, burying previous season infected crop residues and use of chemicals if deemed economical. The most important insect pest for groundnuts is aphid which also transmits the Rosette virus. Aphids can be controlled by early planting and planting at correct spacing.

*Pictures 4, 5 and 6: Early Leaf spot disease*

*Pictures 7, 8, and 9: Late leaf spot disease*

*Picture 10: Groundnut rust disease*
5.9 Harvesting and Post-harvest Management

Groundnut behaves as an indeterminate crop. This means that after initiating flowering at about 25 days from planting, flowering and vegetative growth continue until the end of the growing season, posing difficulties in determining optimum harvest maturity. It is common to find pods of different ages on the same plant at any time the groundnut crop is scouted. Losses of greater than 300-400kg/ha may occur as a result of delayed harvesting while quality gains of 2-3% may be realized within 10 days of optimum maturity date (Okello et al. 2013). Groundnut should be harvested at the right time depending on physiological maturity of the variety. Timely harvesting of groundnuts is essential to avoid; bleaching and discoloration of nuts, sprouting and pods remaining in the ground, and aflatoxin contamination.

5.9.1 Indicators of maturity in groundnut

Several methods exist for determining maturity and optimum harvest time for groundnut. These include: the shell interior, hull scrape, days after planting (DAP) and the constant seed weight methods. However, a combination of several of the methods is the most accurate way to determine optimum harvesting time. It is therefore important for farmers to keep a record of date of planting and have good knowledge of the variety grown to accurately determine when to harvest. Prior to harvesting, farmers should frequently check the crop in the field by lifting a few pods and examining the inside of the shell. Groundnut is generally considered mature when the highest percentage of sound mature kernels (SMK) has been reached on each individual plant. The nuts are mature when the inside of the shell is spotted pale brown. If 75% of sampled plants show dark colour markings inside the shell, with plump kernels that have reverted to the characteristic colour of the variety, then the groundnuts are mature and ready for harvesting. The falling of leaves is not necessarily a sign of maturity. Timely harvesting of groundnuts is essential to avoid bleaching and discoloration of nuts, sprouting and pods remaining in the ground, and aflatoxin contamination.
5.9.2 Harvesting techniques and post harvest handling of groundnut

Various harvesting techniques are available for use in groundnut production, and these involve different processes. This begins with harvesting and ends when the product reaches the consumer. It involves digging, windrowing, stripping, curing, storage and shelling.

5.9.3 Lifting/digging and windrowing

Most farmers dig groundnuts and leave them in windrows in the field for a long time. This is bad practice. In this process, nuts dry quickly and have direct contact with the sun. Leaving the nuts in windrows indefinitely is discouraged since it does not only expose the crop to harsh field conditions, but may also predispose produce to insect attack and showers increasing the risk of fungal infection. This eventually increases the risk of aflatoxin contamination. Windrows should only be used to prepare the freshly lifted straws for construction of Mandela corks. Windrowing for 1-5 days will reduce moisture from 40-50% on lifting to 18-24%, after which drying should continue under shade or in Mandela corks to reduce moisture content further to the recommended storage level of 7-9%.

5.9.4 Drying and curing

After lifting, the groundnut should be quickly and thoroughly dried before storage. The entire process of moisture removal allows for flavour and texture to be maintained while the produce is brought to a storable condition. The process brings moisture content slowly to about 7-9%. Ventilated stacking or Mandela Cock is a modern way of curing the nuts. Small stacks are encouraged since the nuts take a few days to cure depending on environmental conditions in an area. Dry pods produce rattling sound when shaken.
Procedures to follow in construction of Mandela Cork;

1. Construct a circular platform of 1m in diameter,

2. Form a base with a few plants held together at the centre of the platform with the leaves facing down and pods face up; the plants are compressed together up until the whole platform if filled,

3. Add more bunches on the periphery of the circle leaving a chimney at the center. In each successive layer, the diameter of the chimney is reduced and the pods are arranged towards the center of the stack. The chimney narrows as more nuts are added and one or two plants are used to close the chimney at a height of about 1.5m. This will take about 2-4 weeks for the nuts to reach about 7-9% moisture content depending on humidity, temperature and wind movement.

![Pic. 11 Base of Mandela Cork](image1)

![Pic. 12 Finished Mandela Cork](image2)

5.9.5 Stripping

This involves removal of groundnuts from the straws. Majority of farmers use hands. The process is time consuming and labour intensive. There are groundnut strippers that can ease the stripping process; however, care should be taken to avoid mechanical damage to the pods which might create microscopic pores thereby
increasing the risk of aflatoxin contamination. Interested growers should consult their extension staff or nearest agricultural offices for advice on where to access them.

5.9.6. Transportation to homestead

Transporting groundnuts from the field to the homestead should ensure that there is no moisture contamination in the process. All carriers must be dry to avoid raising moisture content in the nuts which might encourage mould growth and aflatoxin contamination.

5.9.7 Storing

It is recommended that farmers should store their groundnuts in pods (unshelled) and in well ventilated containers and structures. Shelled groundnuts are exposed to various agents that cause physical, chemical and biological damage even when stored under natural conditions. Groundnuts storage should always be under dry conditions. Wet conditions in storage enhance the growth of moulds /fungi, *Aspergillus flavus*, which leads to aflatoxin contamination. If stored in bags, stack them on wooden planks or poles to avoid damage from dampness from the wall and the floor. Ensure that the bags allow good circulation of air so as to maintain seed vigour and viability. If storing for seed, farmers can apply Actellic Super Dust to prevent storage pests from attacking the seed.

5.9.8 Shelling

Groundnuts are usually shelled prior to sowing or selling and the majority of farmers use hands. However, this can also be done by hand shellers and other big machines. Care should be taken when using machines to avoid mixing up of varieties and mechanical damage to the kernels. It is bad practice to wet pods to make shelling easier since wet nuts are not accepted at the markets and are prone to mould growth/ fungal infection. If using a mechanical shellers, sort your pods according to sieve sizes. If kernels are too dry before shelling, they end up being
split, but if groundnut is dried to recommended moisture content i.e. 7-9%, less than 10% of splits are likely to occur.

5.9.9 Grading

After shelling, the nuts should be graded properly, taking out shriveled, rotten, mouldy and split nuts. All mouldy nuts should be discarded and not fed to livestock. Groundnuts can also be graded according to other criteria such as variety, seed size and colour. The process of grading improves quality of the kernels and is an important determinant of prices.

6.0 Groundnut Marketing

6.1 Local groundnut markets

The most prevalent groundnut marketing system involves individual farmers selling groundnuts to intermediate buyers. Other common marketing systems involve:

(i) individual farmers selling groundnut to local markets;
(ii) farmer groups pooling together their groundnuts and selling to large scale traders/companies; and
(iii) Affiliated farmers selling groundnut seed to seed companies, NGOs, etc.

There are several categories of buyers which include, intermediate buyers, processing and packaging companies, and other consumers of groundnuts.

Intermediate buyers

Intermediate buyers are categorized into small-scale and large-scale. The small-scale intermediate buyers are often village based and buy as little as a kilogram or less. They buy from open spaces and shops in local trading centers are used as warehouses. They either hang their scales in the open while some have or rent small shops in the village and buy the products from the shop. Usually they will resale to larger intermediate buyers.
The large-scale intermediate buyers tend to cover a wider area which could be a whole district or an entire region. Most of them deal in both seed and commercial grains and some participate in export markets. Some of these have constructed warehouses in trading centers of major groundnut growing areas. It should also be noted that the groundnut market has foreign buyers from within the region and internationally. These large scale intermediate buyers usually package groundnuts in 50 kg packs and sell to companies and processors.

**Companies and processors**

At the apex of the groundnut market are companies who process, package and distribute locally or export to other countries. Currently, the majority of these companies depend on intermediate buyers for the supplies of their raw materials. However, other companies and processors send middlemen to buy groundnuts on their behalf and a few buy directly from farmers. These market players are also involved in quality assurance (cleaning, grading, weighing and labeling) while others process.

**Development partners (NGOs and other institutions)**

NGOs especially those working in the agricultural sector usually purchase groundnut seed for redistribution to farmers. They buy directly from farmer associations, or commercial seed producers. However, they play a very limited role in groundnut grain marketing in general.

6.1.2 Constraints in local groundnut marketing

(a) Disorganized market structure

The groundnut market in Malawi has a diverse set of players, most of which are quite disorganized. Smallholder farmers are not organized in groups to collectively market their produce and this increases their vulnerability to exploitation by intermediate buyers. Where organized groups exist, there are issues of mistrust and side selling.
to earn immediate cash due to delays in sales/payment in collective marketing. There is also use of un-calibrated measuring devices and tampered scales among intermediate buyers purely for exploitation. In reciprocating, farmers have tended to add foreign matter or water to increase weight. This eventually affects quality of groundnuts and lowers the market value. Other players such as intermediate buyers have contributed to the disorganization of markets since most of them operate without registration. This gives opportunity to underhanded business tactics so that they earn more through exploitation. This does not leave out large scale traders and processors as contributors to the situation since despite the need for quality produce; there is too much competition to acquire produce to the detriment of enforcing standards.

(b) Poor enforcement of grades and quality standards

Evidence from Malawi Bureau of Standards indicates that Malawi has three grades of groundnuts, A, B, and X. There has been efforts to revise the grades by some institutions to A, B, C, D and E. However, these grades are not mandatory resulting in poor application among farmers and intermediate traders. The fact that the market does not differentiate pricing in relation to grades means there is no incentive for farmers to grade. This in the end affects prices offered to the farmers because the buyer will have added costs of grading hence offers low prices to farmers. There is need for a deliberate policy to enforce grades and standards in groundnut marketing in Malawi.

6.2 International markets

Groundnut export markets

The contribution of Malawi to international groundnut trade is very lean in part because about 70 percent of the total groundnut production is consumed locally. In the Sub-Saharan Africa (SSA) Malawi ranks as the ninth exporter of groundnut, but it
ranks third in Southern Africa. The top exporters in the SSA are South Africa, Gambia, Senegal, and South Sudan.

Malawi export market share declined from an average of about 20,000 tons (1.9%) between 1961 and 1989 to 1700 tons (0.1%) between 1990 and 2005 (ICRISAT 2009). Between 2008 and 2012 despite a steady increase in quantities exported (14,322 tons in 2008 to 42,000 tons in 2012) Malawi’s groundnuts export market share has remained low, with an average of 26,000 tons (ITC Trade Map, 2012) which is only 8% of total production and 1.7% of the global export market share. The stagnant export market share is mostly due to aflatoxin contamination.

Apart from shelled groundnut exports, Malawi also exported some groundnut oil. However, its participation in the groundnut oil export market is negligible. Between 2003 and 2012, Malawi was only able to export 4 ton groundnut oil in 2006 and 2007 only (ITC Trade Map, 2012).

6.2.1 Constraints to international marketing

(a) Stringent quality standards in international markets

The international groundnut market has put in place various minimum allowable levels of aflatoxin contamination at which they can buy groundnuts. However, Malawi has not been able to meet these minimum allowable levels, hence the sharp drop in Malawi groundnut exports. This is also amplified by lack of locally accredited testing facilities for aflatoxin. There have been efforts by institutions such as NASFAM and ICRISAT to test groundnuts for aflatoxin using the ELISA technology, but in most cases groundnut samples are still sent to accredited laboratories in the Republic of South Africa. Recently Chitedze Research Station has installed a High Performance Liquid Chromatography technology but it is still undergoing processes of accreditation. This technology will help in reducing cost of testing outside Malawi.
(b) Inadequate supply of seed for market-preferred varieties

The groundnut seed system is still developing due to the low participation by the private sector in groundnut seed production. Consequently, there is inadequate supply of improved seed of market-preferred varieties to the producers. It was observed in 2007 that, in Malawi, only 40% of the groundnut land was allocated to improved seed varieties which led to a negative impact on the productivity as well as the competitiveness of groundnuts (ICRISAT, 2009).

(c) High cost of export markets

Low groundnut production quantities do not allow Malawian traders to enjoy economies of scale. Usually they do not meet the quantity requirements of the international buyers, hence do not benefit from the economies of scale that would result from the fixed costs associated with the marketing of larger quantities of the products. In addition, being a land-locked country, transportation costs to the regional markets are comparatively higher than our competitors with access to the sea.

6.3 Groundnut price trends

Locally, groundnut prices are mostly determined by buyers. In the few cases where farmers determine prices, the basis is either past season prices or neighbouring markets prices. A very small proportion of farmers use cost of production as a basis due to absence of record keeping among many smallholder farmers. To try and protect smallholder farmers from exploitation, the government sets minimum prices for all agriculture produce.

Data from the Ministry of Agriculture and Food Security shows that nominal prices of shelled and unshelled groundnuts are highly unstable within months in a season but shows a steady increase between seasons. Prices of shelled nuts rose from an average of K100/kg in 2011 to K175/kg in 2012 and to K250/kg in 2013. However within the 2013 marketing season, prices of shelled nuts have fluctuated between K200/kg and K300/kg. Price has even fluctuated downward from K250/kg to K220/kg for CG 7 in Mchinji.
Fig. 2. An ideal groundnut marketing structure in Malawi

Source: ICRISAT, 2009
7.0 Aflatoxin management in groundnuts

Agriculture commodities are susceptible to attack by moulds which leads to aflatoxin contamination. Therefore, it is important that farmers and consumers are aware of aflatoxin and its implications on health and markets.

The term aflatoxin is an acronym derived from three words: Aspergillus (A), Flavus (fla) and Toxin (poison). Aflatoxins are the most important due to their acute and chronic toxicity and prevalence. They pose a higher chronic dietary risk to humans and animals and that is why many countries regulate the maximum levels that can be tolerated in foods and feeds.

7.1 Healthy implications

Human consumption of foods prepared from aflatoxin contaminated crops or livestock result in numerous health problems. Aflatoxins are known to cause cancers, produce tumours and other unpredictable disorders in humans and animals. Once consumed, aflatoxins are subsequently expressed into other more toxic forms. These forms may be passed on from mothers to babies through milk. Toxic effects may vary depending on a number of factors such as intake levels, duration of exposure, mechanisms of action, toxin species, metabolism, as well as each animal or person’s immune system. Exposure to aflatoxins may either be acute (short-term) or chronic (long-term). Any fungal growth should therefore be viewed as a potential source of aflatoxin and consumption of fungal infested nuts should be avoided.

7.2 Recommended Groundnuts management practices to reduce aflatoxin contamination

Aflatoxin contamination may occur at any stage in the value chain, including during growing, harvesting and post-harvest handling of the crop. Pre-harvest contamination is severe during periods of drought. Contamination occurs during harvesting due to poor harvesting procedures. Post-harvest contamination results mostly from poor drying procedures, re-moistening of pods at shelling, and sometimes poor handling and damage occurring during transportation.

To minimize aflatoxin contamination farmers should observe the following:
• Seed selection and treatment; seed should be obtained from credible sources and be treated with recommended fungicides to protect the seed from soil borne diseases.

• Crop rotation; groundnuts should be grown on a 3-4 year rotation plan in order to reduce fungal inoculums in the soil.

• Early planting; plant with the first effective planting rains to enhance plant vigour and increase the chances of the crop escaping late season drought.

• Correct plant population; farmers should strive to achieve 300,000 plants per hectare by adhering to the recommended plant and ridge spacing. This also helps the crop to develop a good canopy that provides good soil cover, which eventually conserves moisture and enhances resilience against aphid attack which causes rosette.

• Fertilizer application; farmers should apply recommended basal and top dressing fertilizers in order to improve plant vigour and ensure that the crop can withstand effects of various stresses.

• Pest and disease control; farmers should apply recommended chemicals to control pest and disease in groundnuts to ensure healthy plants.

• Moisture conservation; farmers should conserve moisture through construction of box ridges and mulching.

• Timely harvesting; farmers should harvest their groundnuts once they are mature. Delayed harvesting will expose the groundnut to the risk of fungal infection and aflatoxin contamination. It is recommended that, at harvest, farmers should avoid mechanical damage to nuts by using appropriate implements.

• Curing; after harvest leave groundnuts in the field for 1-5 days depending on climatic conditions after which, it should be dried in Mandela corks or under the shade.

• Stripping and storage; once dried, groundnuts should be stripped from haulms and stored under dry conditions and well ventilated facilities.

• Shelling; farmers should avoid sprinkling water to groundnuts when shelling as this practice predisposes groundnuts to mould growth and aflatoxin contamination
• Grading; shriveled, mouldy, split and rotten nuts should be separated from whole nuts. Shriveled and mouldy nuts should not be consumed or fed to livestock as they are highly contaminated with aflatoxin. Alternatively these should be sold to oil pressing companies – this may not be true/good as evidence has it that oils extracted from nuts can be contaminated by aflatoxin.

• Traders should offer premium prices for graded groundnuts to encourage grading and enhance aflatoxin contamination control.
Reference


### Annex 1: A list of old groundnut varieties released in Malawi

<table>
<thead>
<tr>
<th>Variety name</th>
<th>Market group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chalimbana</td>
<td>Virginia runner</td>
<td>Confectionery nut recommended for all plateau areas of the country within the altitude range of 1000 to 1500 meters above sea level. Chalimbana has large seeds, with wedge-shaped ends, tan seed coat and matures in 140 to 150 days. It contains 45% oil and has yield potential of 1500 kg per hectare. It is a runner in growth habit.</td>
</tr>
<tr>
<td>Chitembana</td>
<td>Virginia runner</td>
<td>Confectionery nut with round-shaped ends and tan coloured seed and relatively larger in seed size than Chalimbana. Like Chalimbana it is also recommended for plateau areas of the country within the altitude range 1,000 to 1,500 meters above sea level. It also matures in 140 to 150 days after sowing. It contains 45% oil and has yield potential of 1500 kg per hectare. It is a runner in growth habit.</td>
</tr>
<tr>
<td>RG1</td>
<td>Virginia runner</td>
<td>Confectionery nut recommended for production in all rosette prone areas such as Phalombe plains. It matures in 130 to140 days after sowing. The seeds are tan in colour and contain 48% oil. This variety is rosette resistant. It has a spreading bunch in growth habit.</td>
</tr>
<tr>
<td>Variety</td>
<td>Type</td>
<td>Description</td>
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<tr>
<td>Manipintar</td>
<td>Virginia runner</td>
<td>Oil nut recommended for Lakeshore plains, Nkhotakota, Salima, Mangochi, Upper Shire Valley, Bwanje Valley and Balaka areas within the altitude range of 500 to 750 meters above sea level. It matures in 130 to 140 days after sowing. It is a spreading bunch variety. The seeds are variegated red and white in colour and the yield potential is 1500 kg per hectare. It contains 48 to 50 % oil.</td>
</tr>
<tr>
<td>Mawanga</td>
<td>Virginia runner</td>
<td>Oil nut recommended for production in the same areas as Manipintar. It matures in 130 to 140 days. Mawanga can also grow in plateau areas. It has 48 to 53% oil content. The seeds are variegated red and tan in colour with a higher yield potential than Manipinter. It has a spreading bunch growth habit.</td>
</tr>
<tr>
<td>Malimba</td>
<td>Spanish bunch</td>
<td>Confectionery nut recommended for low lying areas and Lakeshore plains within the altitude range of 200 to 300 meters above sea level. It matures in 100 to 120 days. The seeds are small with no seed dormancy and pale tan in colour. It contains 48% oil and has a potential yield of 1000 kg per hectare. This variety is also known as Gambia and has bunch growth habit.</td>
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</tbody>
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