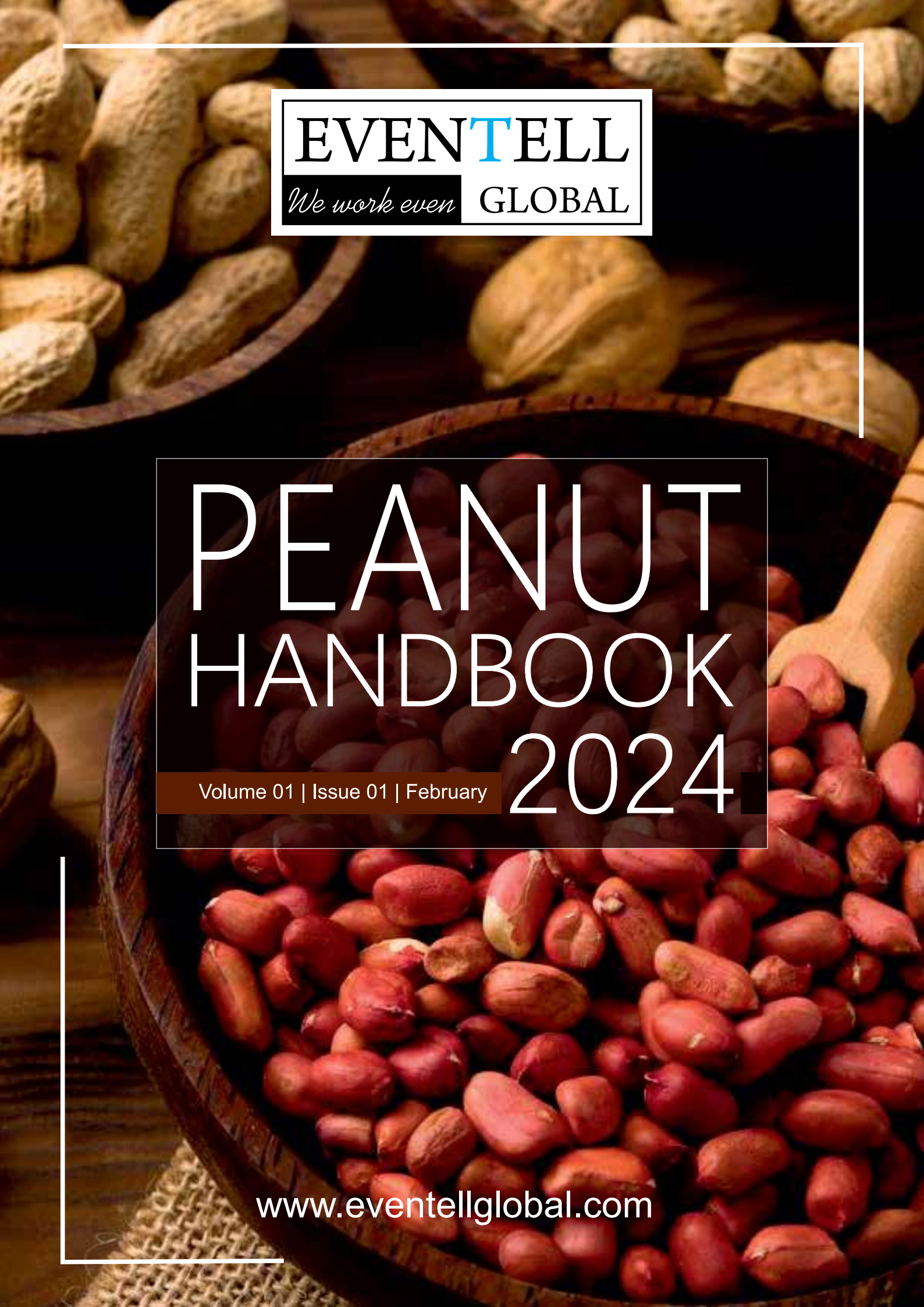

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PEANUT HANDBOOK 2024

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EDITORIAL

Dear Readers,

The global groundnut industry is significant, covering approximately 33 million hectares and producing 53.9 million tons annually, with an average productivity of 1648 kg per hectare. Asia dominates production with around 70 per cent of the world's groundnut production. Notably, China and India collectively account for over two-thirds of the global output, with other major producers including Nigeria, Senegal, Sudan, and Argentina. The commodity holds substantial value, with an average price realization of USD 650 per metric ton on an unshelled basis, valuing the industry at USD 35 billion at the farm level. Looking ahead, the global peanut market is projected to witness steady growth with a compound annual growth rate (CAGR) of close to 2.50%. This growth trajectory is attributed to rising demand, particularly in China, India, Europe, and Southeast Asia, driven by the increasing preference for protein-rich and versatile foods.

Internationally, groundnut trade primarily occurs in various forms, including in-shell (pods), shelled (kernels), and meal (cake). A significant portion of the harvested groundnuts is crushed for oil production, with hulls, representing about 25 per cent of the total mass, primarily utilized in animal feed, particularly for cattle and poultry. Low- and middle-income countries, especially countries in Africa, play a crucial role in groundnut production, accounting for nearly 95 per cent of the world's output. However, a substantial quantity of groundnuts from these regions is primarily traded within domestic markets. Conversely, developed countries such as the UK, Holland, Germany, France, Canada, and Japan account for 65 per cent of the global groundnut demand.

In terms of consumption patterns, groundnuts are extensively used for making peanut butter and consumed roasted or incorporated into confectionery products in developed nations. Meanwhile, in several developing countries, groundnuts are predominantly processed for their oil content.

From its humble beginnings to its current global significance, this handbook offers valuable insights for stakeholders. Covering topics such as historical trends, country-specific analysis, trade flows, and market drivers, it serves as a vital resource for understanding the peanut industry's evolution and navigating its complexities and opportunities

I express my sincere thanks to our experts, including Mr. V.K. Vidyarthi from APEDA, Dr. Janila Pasupuleti and Mr. Anurag Mathew from ICRISAT, Mr. Brendan O'Donnell from TOMRA, and other industry leaders, for their guidance and contributions to this handbook. I am deeply grateful to our sponsor ETG whose generous support has been instrumental in facilitating our journey in creating this handbook. Special thanks to Ms. Swapna for her marketing and client support, Mr Srinivas Moorthy and Mr Nikshep T A along with the other Eventell team members for their dedication and hard work.

As you explore the "Peanut Handbook 2024," we invite you to immerse yourself in the fascinating world of peanuts. Whether you are a seasoned industry professional, an academic, or simply a curious reader, this handbook promises to enrich your understanding and appreciation of this versatile crop. Happy reading, and may your journey through these pages inspire new perspectives on the humble yet mighty peanut.

Best wishes,
G Srivatsava
Editor

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Abbreviations Used

APEDA	Agricultural and processed food products export development authority
ASEAN	Association of southeast asian nations
BSI+	Biometric signature identification
Codex	Codex alimentarius
CT	Computer tomography
DA&FW	Department of agriculture and farmers welfare
DAP	Days after planting
DV	Daily value
ELISA	Enzyme linked immunosorbent assay
ELS	Early leaf spot
EU	European union
FAO	Food and agriculture organization
FAOSTAT	Food and agriculture organization statistical database
FP	Food products
GAP	Good agricultural practices
GDD	Growing degree days
GGHPS	Gujarat groundnut high protein soybean
GJG	Guj jun groundnut
GOI	Government of india
GSP	Generalized system of preferences
HOA	High oleic acid
HPS	High protein soybean
HTPP	High throughput phenotyping platform
ICAR	Indian council of agricultural research
ICRISAT	International crops research institute for the semi-arid tropics
IOPEPC	Indian oilseeds and produce export promotion council
K	Kharif
kg	Kilograms
LLS	Late leaf spot
m	Meters
MERCOSUR	Southern common market (mercado común del sur)
mg	Milligrams
MRL	Maximum residue level
MS 1	Market segment 1
MS 2	Market segment 2
NAFTA	North american free trade agreement
NIR	Near infrared
NIRS	Near infrared reflectance spectroscopy
ODA	Official development assistance

OECD	Dac: organization for economic cooperation and development assistance committee
PAC	Pre harvest aflatoxin contamination
PBND	Peanut bud necrosis disease
PBS	Peanut breeding scheme
Phyto	Phytosanitary
PS&D	Production, supply and distribution
PSND	Pod rot and seedling disease
R	Rabi/summer
RASFF	Rapid alert system for food and feed
RCEP	Regional comprehensive economic partnership agreement
RGA	Rapid generation advancement
RHRS	Regional horticultural research station
RTE	Ready to eat
RTNG	Research testing new groundnut
RUSFs	To use supplementary foods
RUTFs	To use therapeutic foods
RVMs	Reverse vending machines
TCGS	Tropical crops genetic resources institute
TG	Tonnage
TMV	Tobacco mosaic virus
TPP	Target product profile
USA	United states of america
USDA	United states department of agriculture
µg	Micrograms

APEDA: Action Plan to Promote Peanuts & Its Value-Added Products Globally

Mr V K Vidyarthi, General Manager, APEDA,
Ministry of Commerce & Industry, Govt of India

Introduction

Peanuts, a global agricultural commodity, face challenges related to aflatoxin contamination—a soil, seed, and environment-borne toxin. Many nations have dealt with this issue and developed strategies, including the creation of aflatoxin-resistant varieties and the adoption of Good Agricultural Practices (GAP) for comprehensive pre- and post-harvest management of groundnuts and their value-added products.

This persistent concern with aflatoxin contamination has propelled a comprehensive action plan to transform the peanut industry. The plan encompasses various strategies to enhance the export-oriented groundnut supply chain, focusing on addressing aflatoxins, technological advancements, enforcement mechanisms, market access improvements, capacity building, and collaboration.

Key objectives of action plan for peanuts & its value-added products

- Strengthen export-oriented groundnut supply chains
- Address the issue of aflatoxins through surveys, resistant varieties, and containment practices
- Collaborate with agricultural institutions to introduce certified groundnut seeds for improved quality
- Enhance technology for processing, waste utilisation, and packaging
- Strengthen enforcement mechanisms and traceability protocols
- Resolve certification issues for smoother export processes
- Conduct capacity-building and awareness programs for stakeholders
- Establish collaborative committees to address industry challenges
- Diversify markets and propose protection prices for groundnuts

Action plan overview

- Addressing Aflatoxin Concerns: Strategies include surveys, research for resistant varieties, and containment practices to ensure high-quality products.
- Technological Advancements: Ongoing efforts in technology enhancement across processing, waste utilization, and packaging for improved market competitiveness.
- Enforcement and Traceability: Strengthening surveillance mechanisms and traceability protocols to ensure product integrity throughout the supply chain.
- Market Access Improvement: Resolving certification issues, especially Phyto certification, for smoother and more efficient export processes.

- Capacity Building and Awareness: Programs aimed at educating stakeholders on food safety, technology adoption, and strategic market positioning.
- Collaborative Committees: Engaging farmers, researchers, exporters, and laboratories to collectively address pre- and post-harvest challenges.
- Market Diversification and Protection: Efforts to resolve export issues in specific markets, proposing protection prices for groundnuts to support farmers.

What to expect:

This comprehensive action plan is dedicated to aligning the Indian peanut industry with the highest quality standards. It emphasizes technological advancements, collaboration with laboratories, and compliance with stringent quality norms. It stands as a testament to the commitment to revolutionize the Indian peanut industry and position it as a global leader in the market.

As the peanut industry evolves, these strategic initiatives promise to transform it into a beacon of quality, safety, and market competitiveness. With concerted efforts and collaborative partnerships, the future of Indian peanuts appears brighter than ever on the global stage.

This comprehensive action plan is poised to transform the Indian peanut industry, positioning it as a global leader in quality and market competitiveness. By focusing on multifaceted strategies, collaboration, and technological advancements, it aims to revolutionise the industry landscape.

Supporting factors

- Innovation through Collaboration: The involvement of agricultural institutions and collaborative committees signifies a concerted effort toward innovation and collective problem-solving.
- Adherence to International Standards: Emphasizing compliance with stringent international quality norms ensures global acceptance and competitiveness.
- Empowering Stakeholders: Capacity building and awareness programs empower stakeholders to embrace best practices, ensuring sustained industry growth.
- Market Adaptation Strategies: Resolving certification issues and proposing protection prices demonstrate a proactive approach to market challenges.

Potential impact

The successful execution of this action plan is poised to:

- Elevate the quality and safety standards of Indian peanuts, enhancing their global reputation.
- Enable smoother export processes, expanding market reach and boosting industry profitability.
- Empower farmers through protection prices and technological advancements, ensuring sustainable growth.

Looking ahead

The transformation of the Indian peanut industry is on the horizon. With the diligent implementation of this action plan, it stands to achieve new heights in quality, safety, and market accessibility. By embracing innovation, collaboration, and a steadfast commitment to excellence, the industry's future is bright and promising.

As stakeholders unite to execute these initiatives, the Indian peanut industry is primed to emerge as a beacon of quality and excellence, capturing global attention and setting new benchmarks for success.

Chapter 1
General Overview of Peanuts

In the realm of agriculture and global cuisine, the peanut stands as a modest yet formidable player with a rich historical and nutritional narrative. Originating from South America, where it was cultivated as early as 3500 years ago, the peanut journeyed across continents, flourishing in varied climates and cultures. This leguminous plant, interestingly a member of the bean family rather than a true nut, thrives in the warm soils of subtropical and tropical regions, making it a staple crop in many countries.

Peanuts are celebrated not only for their culinary versatility but also for their substantial nutritional profile. They are a powerhouse of energy, packed with proteins, healthy fats (primarily unsaturated fats), vitamins like B-group vitamins and Vitamin E, and minerals including magnesium, phosphorus, and zinc. This nutritional richness renders peanuts a valuable asset in combating malnutrition, particularly in underprivileged areas.

The culinary applications of peanuts are remarkably diverse, transcending cultural and geographical boundaries. They are consumed raw, roasted, and boiled and are pivotal ingredients in a myriad of dishes, from African stews to Asian stir-fries. The production of peanut butter, a staple in American households, epitomises the peanut's integration into daily cuisine. In addition to culinary uses, peanuts also find application in the production of peanut oil, an essential cooking medium in many cultures.

The economic impact of peanuts is substantial, with the United States, China, and India being leading producers. The cultivation and processing of peanuts provide livelihoods for millions of farmers and workers globally. However, the journey of the peanut is not without challenges. Issues such as peanut allergies, which affect a significant portion of the population, and the susceptibility of peanut crops to aflatoxin contamination, a potential health hazard, require ongoing research and management.

Nutritional composition

Peanuts (Valencia) in their raw form contain 4% water, 48% fat, 25% protein, and 21% carbohydrates, including 9% dietary fibre, according to USDA nutrient data. Peanuts emerge as a nutrient-rich powerhouse, providing 2,385 kilojoules (570 kilocalories) of energy per 100-gram (3.5-ounce) serving. They stand out as an excellent source, exceeding 20% of the Daily Value (DV), for various B vitamins, vitamin E, and essential minerals like manganese (95% DV), magnesium (52% DV), and phosphorus (48% DV).

The fats in peanuts are predominantly polyunsaturated and monounsaturated, constituting 83% of the total fats when combined. Numerous studies suggest a positive association between regular peanut consumption and a reduced mortality risk from specific diseases, although causation cannot be definitively inferred from the study designs. According to the US Food and Drug Administration, scientific evidence indicates that incorporating 1.5 ounces per day of most nuts, including peanuts, into a diet low in saturated fat and cholesterol may potentially lower the risk of heart disease.

Table 1.1: Nutritional composition of raw peanuts

Raw Peanut (Valencia)	
Nutritional value per 100 g (3.5 oz)	
Energy	**2,385 kJ (570 kcal)**
Carbohydrates	21 g
Sugars	0.0 g
Dietary fiber	9 g
Fat	**48 g**
Saturated	7 g
Monounsaturated	24 g
Polyunsaturated	16 g
Protein	**25 g**
Tryptophan	0.2445 g
Threonine	0.859 g
Isoleucine	0.882 g
Leucine	1.627 g
Lysine	0.901 g
Methionine	0.308 g
Cystine	0.322 g
Phenylalanine	1.300 g
Tyrosine	1.020 g
Valine	1.052 g
Arginine	3.001 g
Histidine	0.634 g
Alanine	0.997 g
Aspartic acid	3.060 g
Glutamic acid	5.243 g
Glycine	1.512 g
Proline	1.107 g
Serine	1.236 g
Vitamins	**Quantity**
Thiamine (B1)	0.6 mg
Riboflavin (B2)	0.3 mg
Niacin (B3)	12.9 mg
Pantothenic acid (B5)	1.8 mg
Vitamin B6	0.3 mg
Folate (B9)	246 µg
Vitamin C	0.0 mg
Vitamin E	6.6 mg
Minerals	**Quantity**
Calcium	62 mg
Iron	2 mg
Magnesium	184 mg
Manganese	2.0 mg
Phosphorus	336 mg
Potassium	332 mg
Sodium	6 mg
Zinc	3.3 mg
Other constituents	**Quantity**
Water	4.26 g

µg = micrograms • mg = milligrams

Source: USDA Database

Peanuts v/s other oil seeds

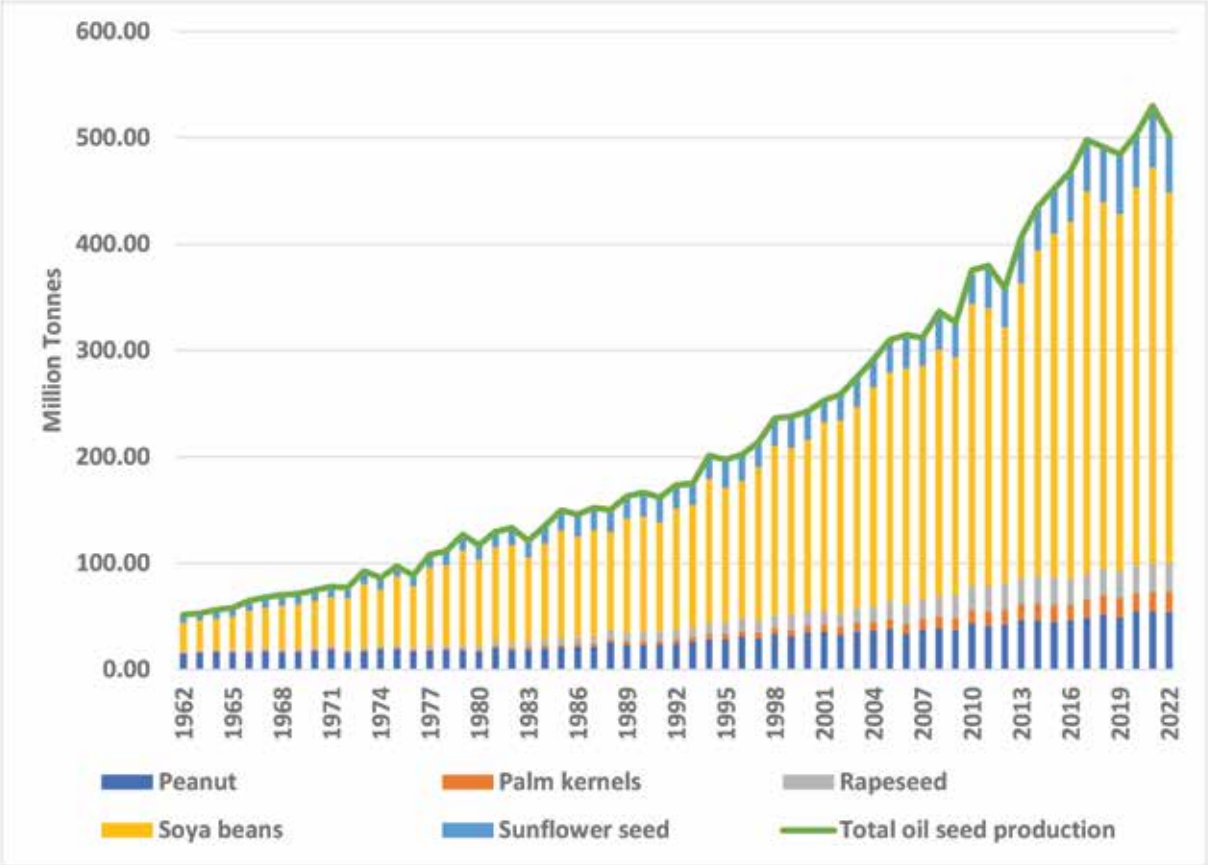
Soya beans have consistently been the dominant oilseed crop, starting from 27.12 million tonnes in 1962 and rising significantly to 348.86 million tonnes in 2022. This is mainly because of its versatile use in various food products, animal feed, and industrial applications like biodiesel. Rapeseed has shown a steady increase in production over the years, although its growth is not as pronounced as that of soya beans. Sunflower Seed and Palm Kernels Growth started with relatively lower production numbers in 1962 but has seen significant growth over the years, indicating increasing market demand and perhaps advancements in cultivation and processing technologies.

On the other hand, peanut production has shown a generally upward trend over the years. Starting at 15.10 million tonnes in 1962, it has increased to 54.24 million tonnes in 2022. This consistent growth suggests a

sustained demand for Peanuts globally. While the overall production has increased, the share of Peanuts in the total oilseed production has maintained a relatively stable proportion. This stability indicates that, despite the growth in other oilseeds, Peanuts have maintained their importance in the global market. Peanut production is influenced by regional factors such as climate and soil conditions.

Therefore, understanding regional variations can provide insights into the adaptability and resilience of Peanut crops.

Figure 1.1 Proportion of each oilseed in the overall oilseed production from the year 1962 to 2022



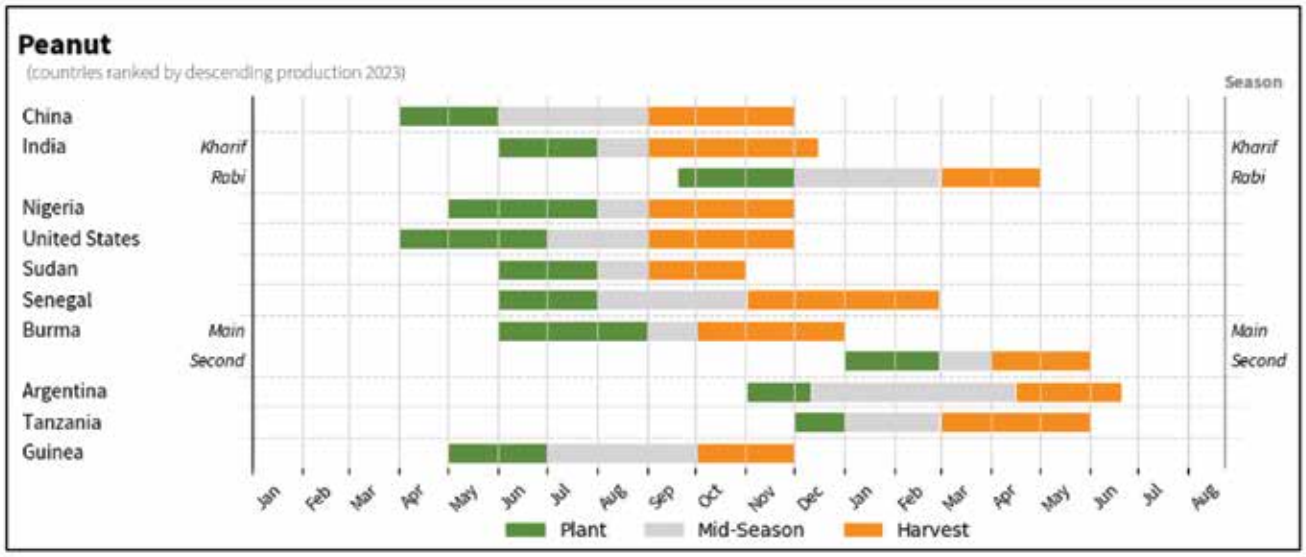
Source: FAO Statistics

Peanut producing regions and its agro-climatic profile

Peanuts thrive in warm climates and are well-suited to grow in tropical and subtropical regions. They require a frost-free growing season with temperatures ranging between 20 to 30 °C. Peanuts prefer well-distributed rainfall, with an ideal range of 500-1000 mm annually. The crop is sensitive to waterlogging, and excess moisture during flowering and pod development can lead to issues.

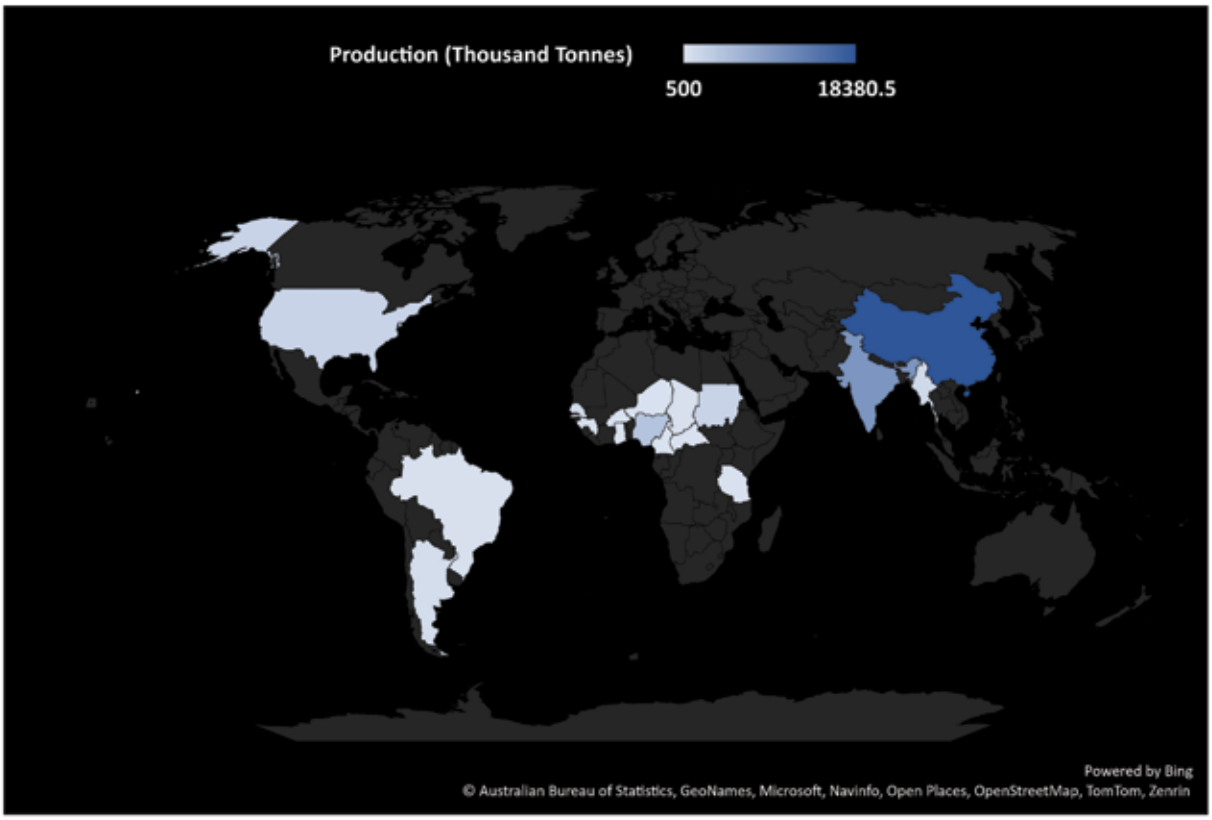
A well-defined dry period, lasting about four months, is beneficial for optimal peanut yields. Unlike many other crops, peanuts are not as tolerant of drought conditions. They are susceptible to frost, and exposure to cold temperatures can harm both seedlings and mature plants. Peanuts are not influenced by day length for flowering, and their cultivation extends between approximately 40° North and 40° South latitude. Cloudy weather during flowering may hinder pollination, affecting yields. Additionally, high temperatures during the fruit-setting stage can lead to fruit drop in peanut plants.

Figure 1.2 Global peanut crop calendar



Source: Peanut Explorer, USDA

Figure 1.3 World map showing the major peanut growing regions



Source: FAO Statistics, USDA, DA&FW India Data

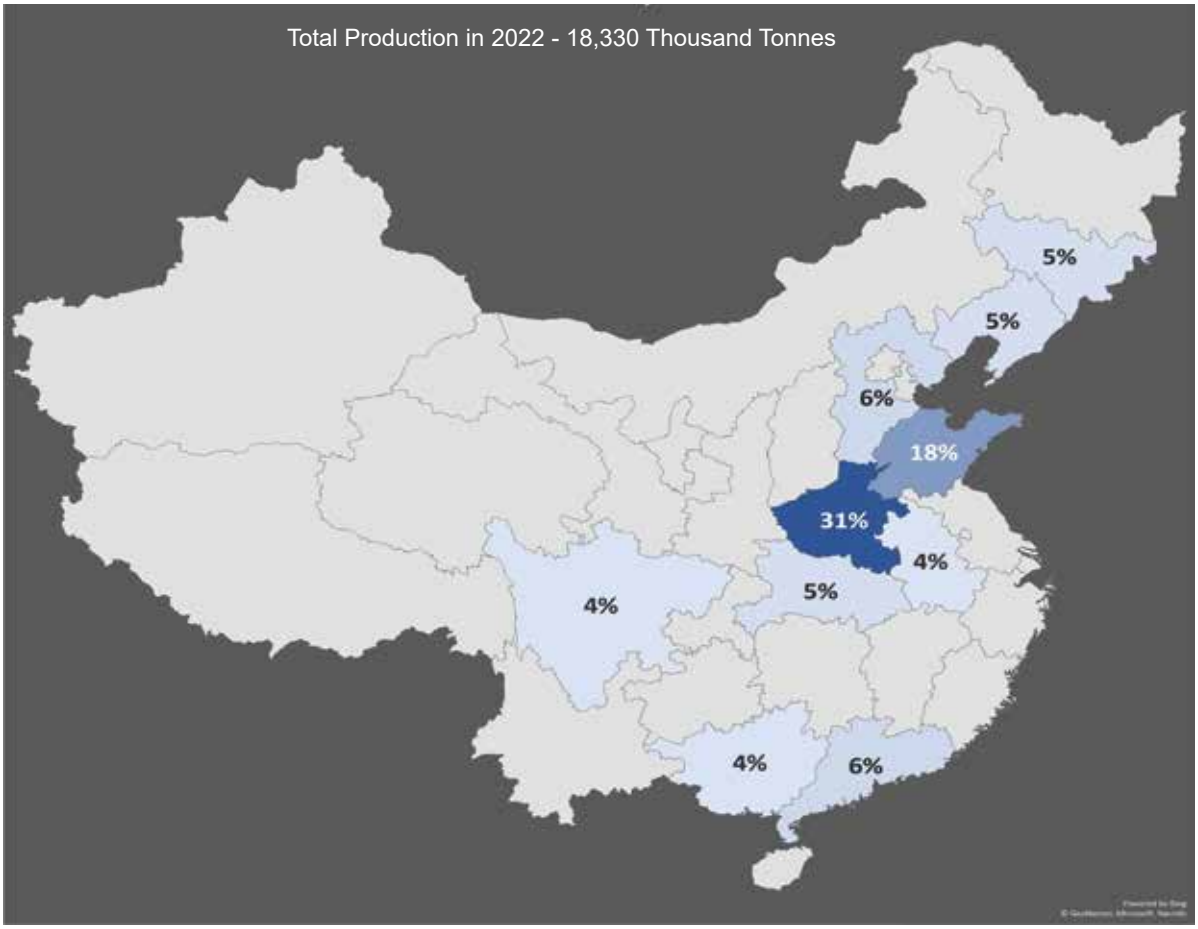
The above map shows 17 Major Peanut producing countries which covers 90% percent of the Global Peanut Production.

- China is the leading producer of peanuts, contributing 34% to the global production, with a total production of 18,381 thousand tonnes. This highlights China's significant role in the peanut agriculture sector.
- India follows as the second-largest producer, holding 19% of the world's peanut production share, which translates to 10,135 thousand tonnes. Together, China and India account for over half of the global peanut production.
- Nigeria ranks third, with 8% of the production share or 4,284 thousand tonnes, emphasizing its position as a major peanut producer, particularly in Africa.
- The United States of America and Sudan each contribute 5% to the global peanut production, with the USA producing 2,525.67 thousand tonnes and Sudan 2,500 thousand tonnes, showcasing their important contributions to the peanut market.
- Other notable contributors include Myanmar and Senegal, each with 3%, followed by Argentina, Guinea, Brazil, and Chad, each offering 2% to the global production. These countries highlight the diverse geographical spread of peanut cultivation.
- A number of countries have smaller shares, contributing 1% or less to the global production. This list includes nations from various continents, indicating that peanut farming is a widespread agricultural activity.

Country Profile

China

Figure 1.4 Major peanut growing region in China



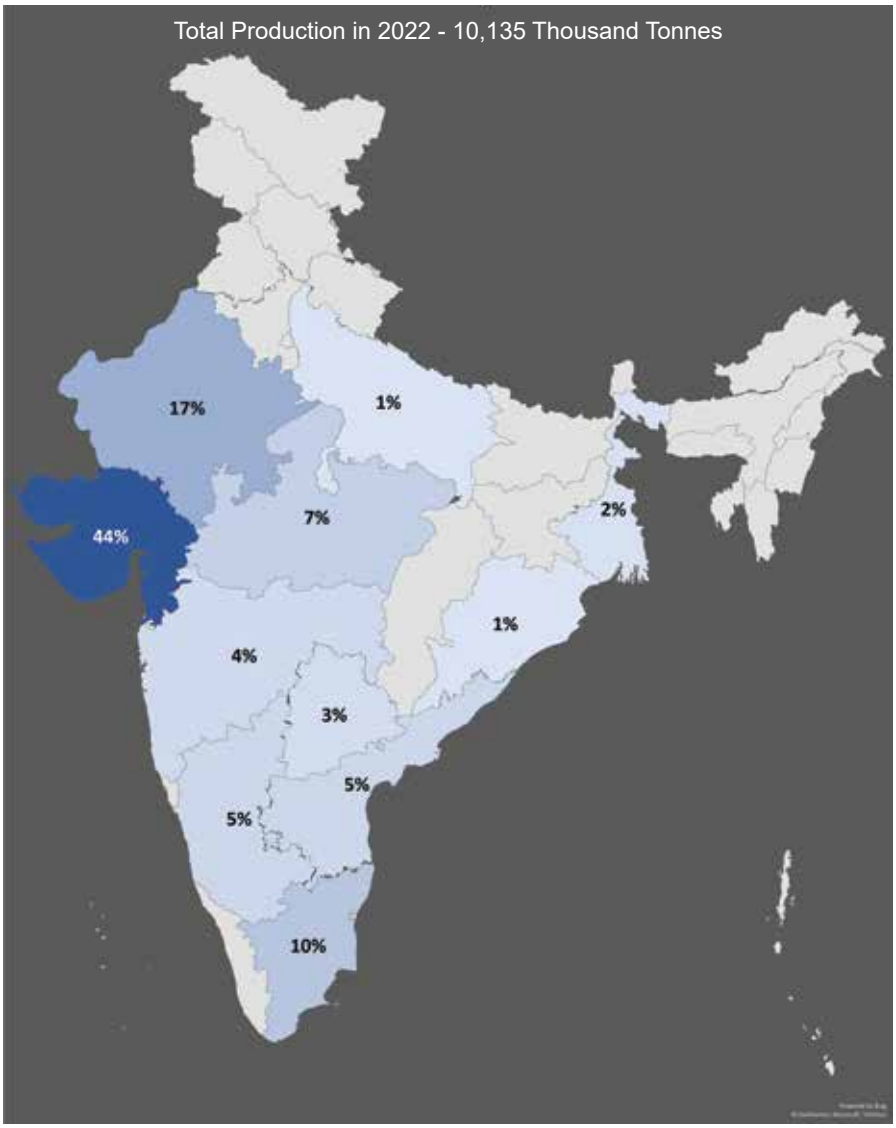
Source: USDA

Peanuts are grown in seven regions of China based on ecological zoning, from the frigid North China to the humid region of South China, and from the eastern to western region. Temperatures in the areas producing peanuts range from −5 to 25 °C (23 to 77 °F). These regions are: Region I is "Virginia type north large peanut" region; Region II is known as "South Spring and autumn peanut area; in Region III the "Yangtze spring and summer peanut region"; Region IV is the "Yungui plateau peanut region"; Region V is the "Northeast early peanut region"; Region VI is the "Loess peanut region"; and Region VII is the "Northwest inland peanut region". The five provinces where 70% of the crop is grown are Shandong, Henan, Hebei, Guangdong, and Jiangsu provinces.

Climate plays a crucial role in peanut cultivation in China. The crop thrives in warm temperatures with ample sunlight. Regions such as Shandong and Henan experience temperate climates, making them conducive to peanut farming. The warm summers and moderate rainfall create favourable conditions for the growth and development of peanut plants. The soil types suitable for peanut cultivation in China vary across regions. Well-drained sandy loam or loamy soils are preferred, as they allow for good aeration and drainage, preventing waterlogging that could harm peanut plants.

India

Figure 1.5 Major peanut growing region in India



Source: DA&FW India Data

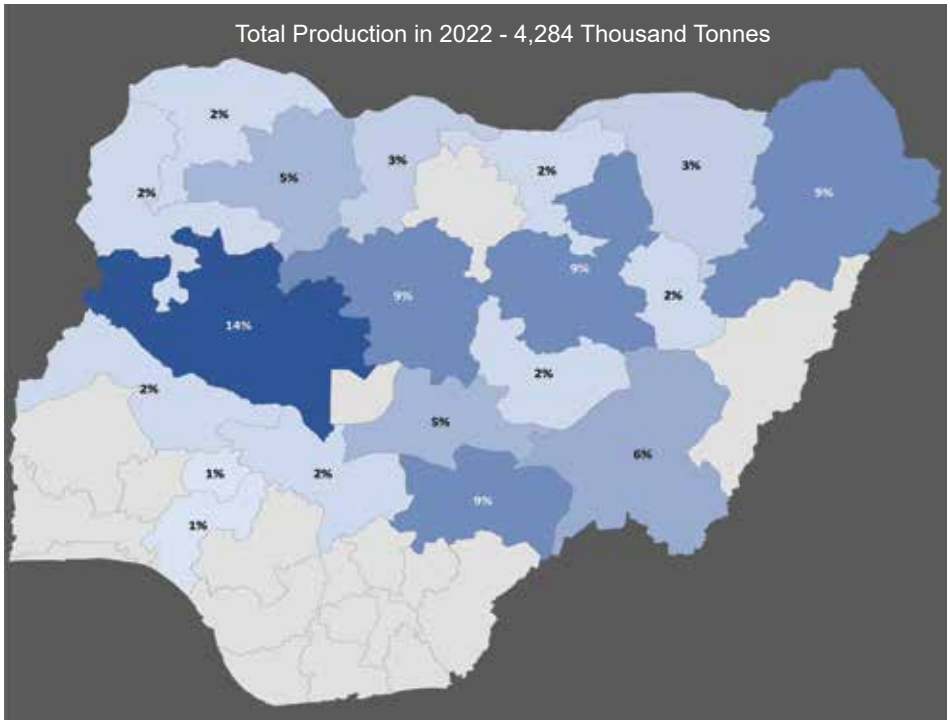
Peanut, a tropical plant that prefers warm climates, thrives in elevations up to 1160 m above sea level. It necessitates a lengthy growing season, abundant sunshine, and a minimum of 50 cm of well-distributed rainfall during its growth period. The optimal temperature range for its growth and development is between 21–26 °C, with a month of warm and dry weather required during the ripening stage.

Extreme temperatures below 20 °C hinder development, while those above 35 °C adversely affect flowering. Frost, at any stage, is detrimental, ultimately killing the plant. In India, around 85% of Peanut cultivation occurs during the kharif season under rain-fed conditions, varying in sowing time from June to November based on soil type and rainfall. An additional 10% of the crop is grown in the rabi season, usually in rice fallows from October to March. In areas with irrigation, Peanut cultivation is also feasible during the summer season, facilitated by good sunshine and high temperatures, particularly favouring pod formation.

Peanut is often grown as a mixed crop with pearl millet, maize, sorghum, castor, and cotton. Crop rotation is a common practice, and Peanut's nitrogen-fixing ability benefits the succeeding crop, resulting in a 25% increase in yield. Intercropping with cowpea is adopted in some regions to reduce pest damage. In irrigated areas, Peanuts are strategically intercropped with gingelly, Bengal gram, and cowpea. Following Peanut harvest, cotton is planted after 45 days, allowing for three harvests in a single season and minimizing cultivation costs. This agricultural strategy not only optimizes land use and resource efficiency but also offers farmers the advantage of multiple harvests in a single season, contributing to increased overall productivity.

Nigeria

Figure 1.6 Major peanut growing region in Nigeria



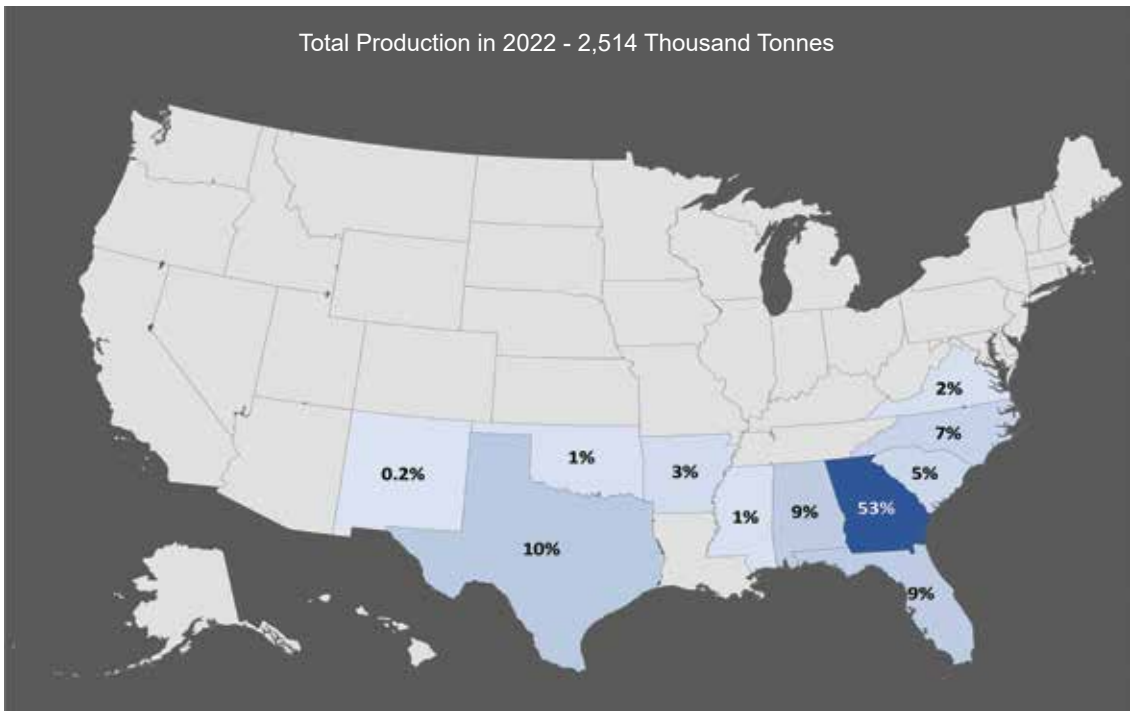
Nigeria has a rich historical legacy in peanut production, particularly in the northern regions where Peanut farming was pivotal in the nation's early economic development. The crop, locally known as Peanut, has been a major contributor to the country's economy, sustaining both federal and regional levels through exports to local and foreign markets. The northern states, such as Kano, Kogi, Kwara, Nassarawa, Niger, Plateau, and Benue, constitute the prominent peanut-producing belt. Peanut farming in Nigeria has faced challenges, notably a decline in production following the discovery and glut in oil and gas production, but recent initiatives aim to revitalise the sector as part of economic diversification plans. The climate conducive to peanut cultivation in Nigeria is

found in the savannah ecozone of the northern regions. Peanut thrives under natural conditions suitable for the diverse savannah types, including derived, South Guinea, Sudan, and Northern Guinea. The crop matures within 100 to 140 days, making it well-suited to the climatic conditions prevalent in the study area. The northern states experience a tropical savannah climate, characterised by warm temperatures and distinct wet and dry seasons, providing an optimal environment for successful Peanut cultivation.

The soil types in the northern regions of Nigeria, where Peanut is extensively cultivated, are diverse and well-suited for peanut farming. The savannah landscapes consist of soils with varying characteristics, including sandy soils, loamy soils, and others that offer good drainage and aeration. Well-drained soils are particularly important to prevent waterlogging, ensuring the health and productivity of peanut plants. The mix of soil types in the region contributes to the adaptability of Peanut cultivation, and farmers often employ modern techniques to enhance yields and sustain the sector.

United States of America

Figure 1.7 Major peanut growing region in USA



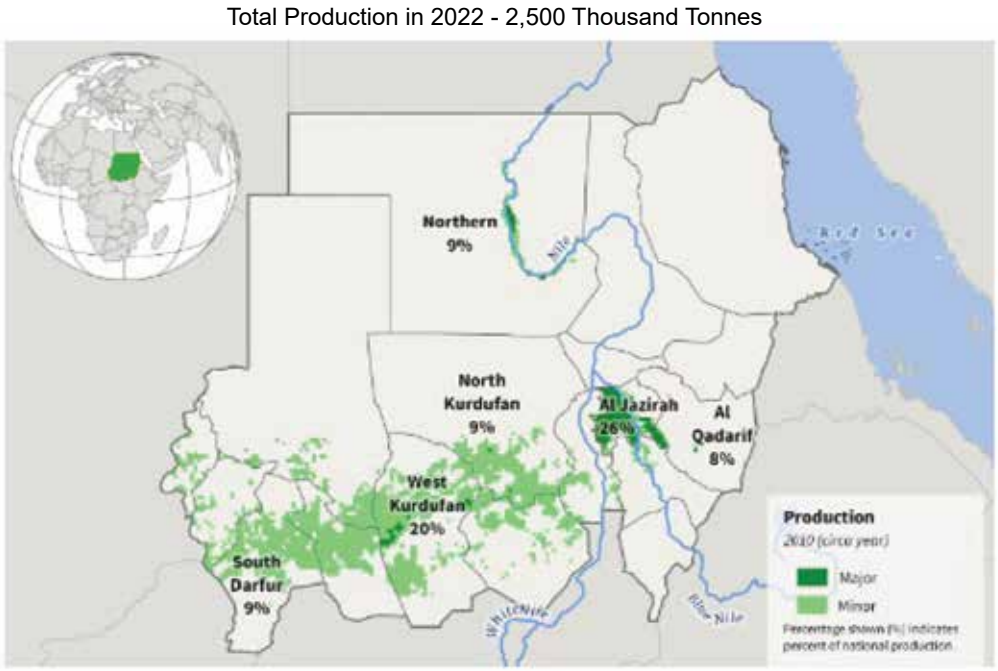
Source: USDA

Peanuts are primarily grown in the southeastern part of the United States, where the climate and soil conditions are conducive to their cultivation. The agro-climatic conditions for peanut cultivation in the United States are characterized by warm temperatures and moderate rainfall. Peanuts thrive in areas with a subtropical or tropical climate, making the southeastern states particularly suitable for cultivation. States like Georgia, Texas, Alabama, Florida, and South Carolina are major contributors to the U.S. peanut production. The growing season for peanuts typically spans from late spring to early fall, with warm temperatures promoting optimal growth and development. Peanuts require well-drained sandy loam soils, and the southeastern states provide the ideal soil conditions for successful cultivation. Adequate rainfall during the growing season is crucial for peanut plants, as they have a relatively high-water requirement.

Farmers in the southeastern United States often grow different varieties of peanuts, selecting those that are well-adapted to the specific climatic and soil conditions of their region. Additionally, crop rotation practices are employed to maintain soil health and reduce the risk of diseases. Peanuts are often rotated with other crops like cotton and corn to break pest cycles and improve overall soil fertility. The combination of favorable climatic conditions, suitable soil characteristics, and effective farming practices has positioned the southeastern United States as a key player in peanut production, contributing significantly to both domestic and international markets.

Sudan

Figure 1.8 Major peanut growing region in Sudan



Source: USDA

Sudan's agro-climatic profile for peanut cultivation is diverse, reflecting a range of climates across the country. The northern regions, characterized by arid and semi-arid conditions, experience limited rainfall. In contrast, the central and southern areas, have more humid environments and access to water bodies like the Nile rivers. Warm to hot temperatures prevail in Sudan, providing favorable conditions for growing warm-season crops like peanuts. Well-drained sandy loam soils, often found in these regions, offer an ideal substrate for peanut cultivation. The agricultural landscape is shaped by the need for irrigation, especially in areas facing water scarcity.

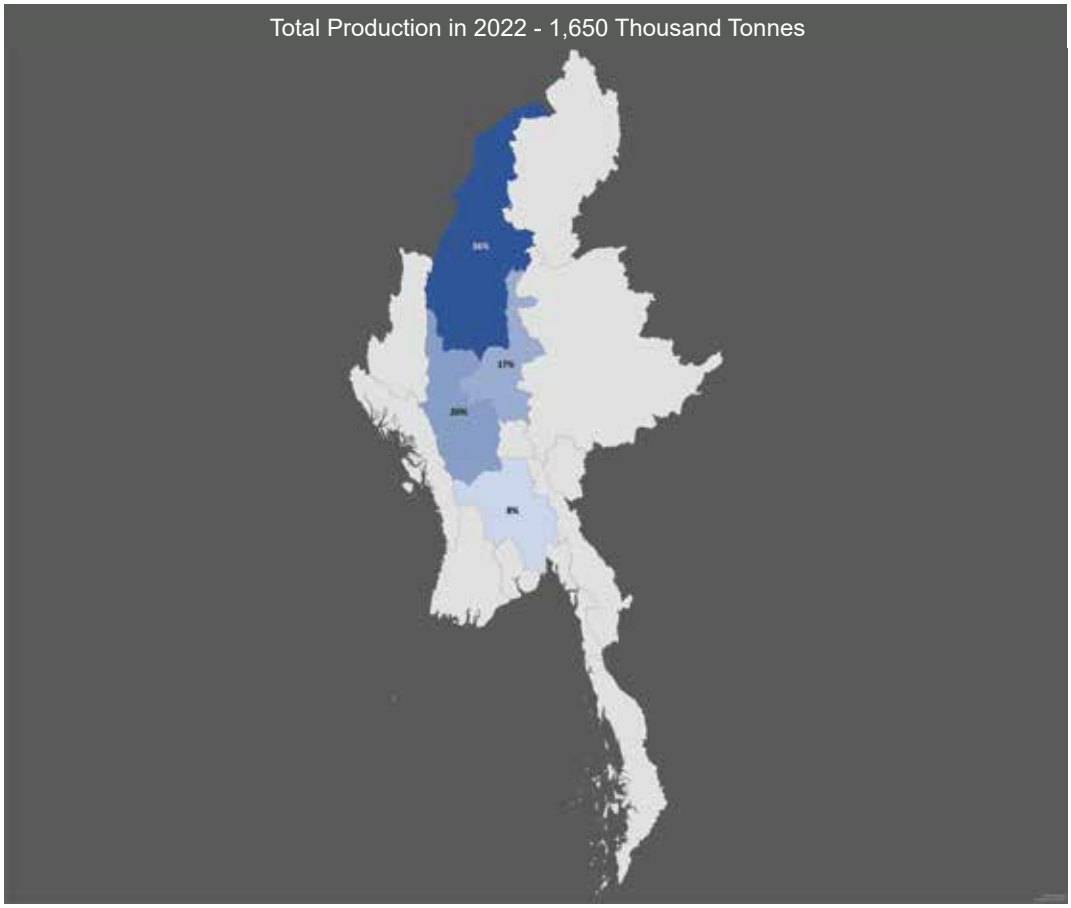
The cultivation of peanuts in Sudan is a testament to the adaptability of farmers who employ a combination of traditional and modern practices to navigate the country's diverse agro-climatic conditions. Sustainable water management practices are crucial for the resilience of peanut farming in Sudan, contributing to the country's agricultural success.

Myanmar

Figure 1.9 Major peanut growing region in Myanmar

Myanmar, with its rich cultural heritage and diverse landscapes, is also an important player in the global peanut market, predominantly cultivating peanuts in its central dry zone, which includes the Mandalay, Magway, and Sagaing regions. This area is characterized by a tropical climate with distinct wet and dry seasons, making it particularly suitable for peanut cultivation. Typically, peanuts are grown during the monsoon season (June to October), utilizing the ample seasonal rainfall, while the dry season (November to May) sees little rainfall and higher temperatures, necessitating irrigation for peanut farming. The region's sandy loam or loamy sand soils, prevalent in the central areas, provide excellent drainage, crucial for preventing waterlogging in peanut cultivation, and have a slightly acidic to neutral pH favorable for growing peanuts. Optimal peanut growth requires a warm climate, with temperatures ranging from 20°C to 30°C, a condition met during the central dry zone's monsoon season. The monsoon also brings about 500-1000 mm of annual rainfall, essential for peanut planting and growth, although excessive rainfall can be detrimental, affecting yield and increasing disease risk. Additionally, peanuts benefit from the long daylight hours during Myanmar's growing season, which aids in photosynthesis and the development of peanut pods.

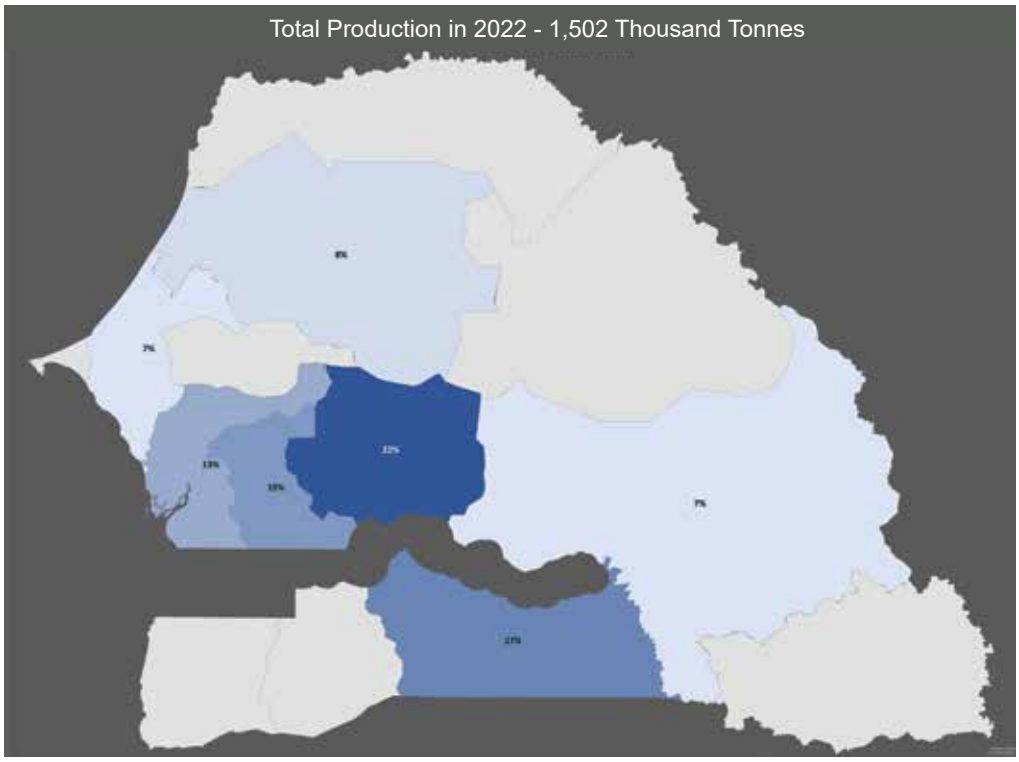
Figure 1.9 Major peanut growing region in Myanmar



Source: USDA

Senegal

Figure 1.10 Major peanut growing region in Senegal



Senegal, located in West Africa, has established itself as a significant player in peanut production, contributing substantially to its agricultural sector and economy. The country's agro-climatic profile plays a pivotal role in shaping the peanut cultivation landscape.

Senegal experiences a diverse range of climates, ranging from arid to semi-arid, with a distinct dry season from November to May and a short rainy season from June to October. These conditions vary across regions, influencing the agricultural practices and crop suitability. Peanuts, being a warm-season crop, thrive in the well-drained sandy soils prevalent in many parts of Senegal.

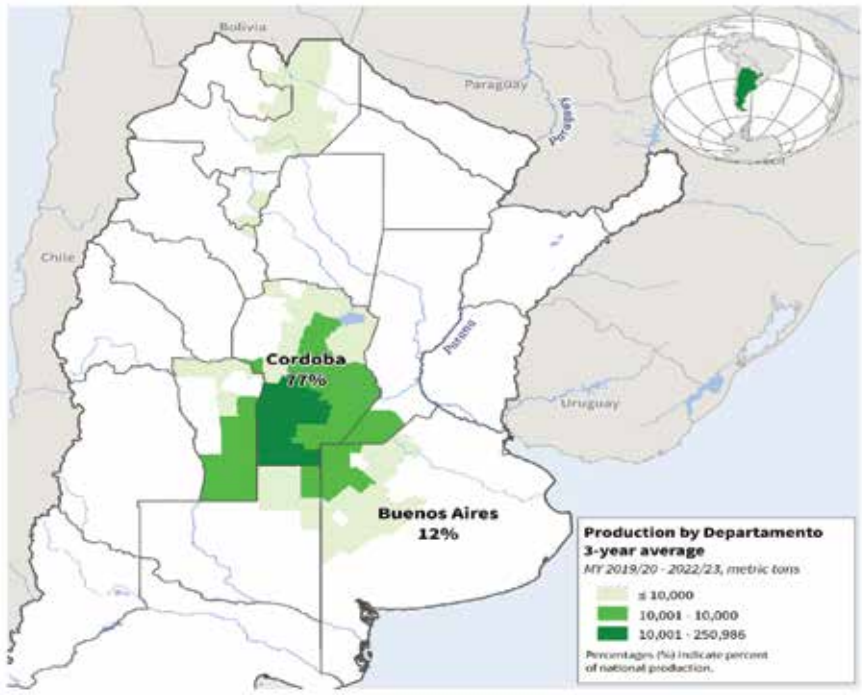
The agro-climatic conditions, coupled with strategic agricultural practices, contribute to successful peanut cultivation.

In Senegal, peanut production is distributed across various regions, each contributing to the nation's agricultural output. Notable production shares are observed in Kaffrine (22%), Kolda (17%), Kaolack (15%), Fatick (13%), Louga (8%), Tambacounda (7%), and Thies (7%). These regions showcase the adaptability of Senegalese farmers to diverse agro-climatic conditions, collectively contributing to the success of peanut cultivation in the country.

Argentina

Figure 1.11 Major peanut growing region in Argentina

Total Production – 963 thousand tonnes



Source: USDA

Argentina, a key player in global peanut production, thrives in its primary peanut-growing regions, notably Córdoba and Buenos Aires, thanks to specific agro-climatic conditions ideal for this crop. The country's peanut farms benefit from well-drained, sandy loam and loamy soils, which are essential for root development and pegging in peanut plants. Coupled with a climate that offers warm, sunny summers, these conditions are perfect for the warm-season peanut crop, supporting successful germination, flowering, and pod formation. While rainfall in these regions is generally adequate and well-distributed, essential for the peanut-growing season, irrigation is also employed in some areas to ensure consistent moisture levels. The altitude and topography of these regions, generally lower to mid-altitudes, create favorable microclimates for peanut cultivation. Moreover, the typical growing season, from spring planting in October or November to the autumn harvest in March or April, aligns well with the climatic requirements of the peanut crop, allowing it to complete its growth cycle effectively under optimal conditions.

The Red Sea Crisis and its Impact on China's Peanut Import Strategy

The recent escalation of tensions in the Red Sea has brought the geopolitical situation into sharp focus, notably affecting global trade routes. A particular point of concern is the impact on China's peanut imports from Sudan, given the country's strategic position along the Red Sea and its significant role as a major supplier of peanuts to China. The ongoing shipping crisis, precipitated by the Red Sea tensions, has morphed from a potential to a highly probable threat to China's peanut supply chain, particularly affecting the timing and volume of imports from Sudan.

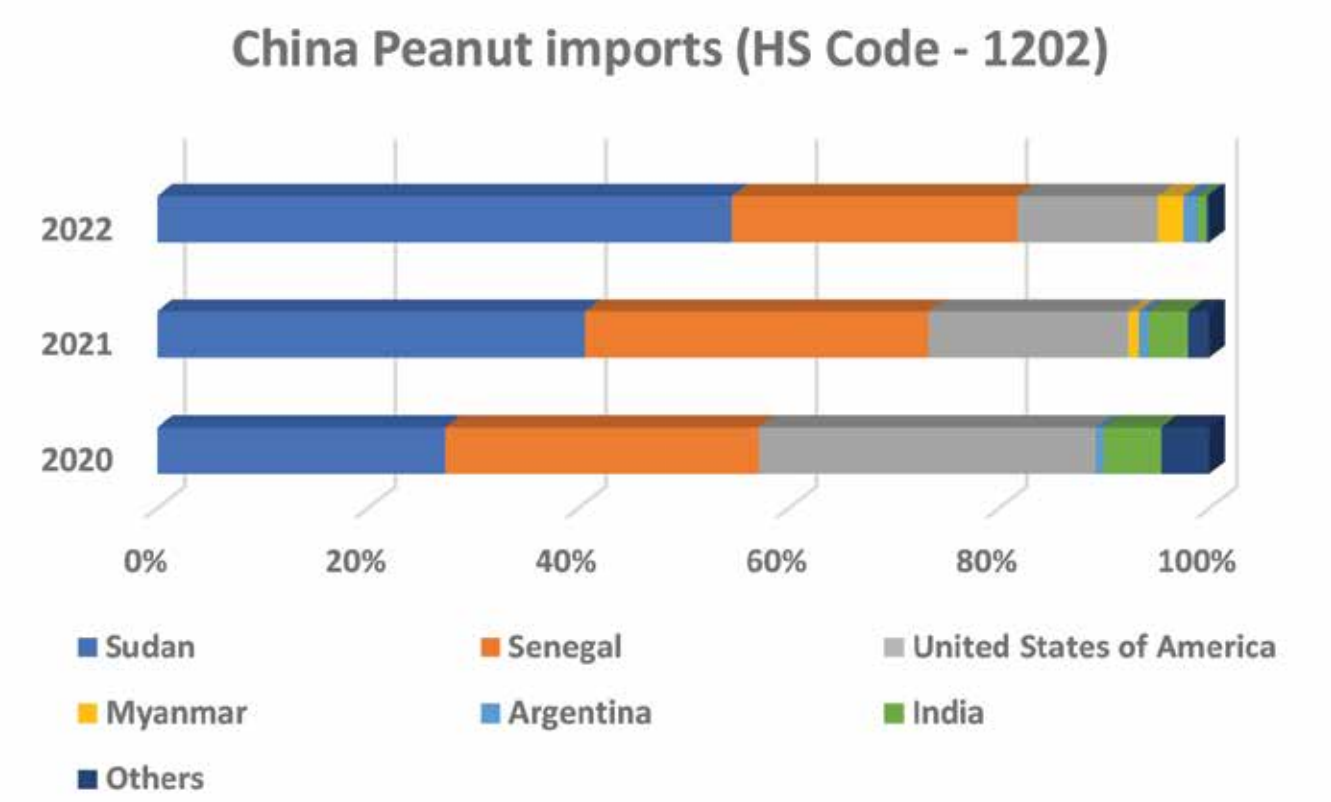
The crucial role of sudanese peanuts in china's market

China's annual peanut imports typically hover between 700,000 to 1 million tons, constituting approximately 8% to 10% of its total domestic demand. Notably, a significant majority of these imports—over half—traditionally stem from Sudan. In 2022, Sudan supplied a substantial 360,000 tons of peanuts to China, accounting for a notable 55% of its total peanut imports. Projections for the period spanning January to November 2023 suggest a continuation of this trend, with Sudanese peanuts expected to comprise approximately 53% of total imports during this timeframe. The cultivation cycle of Sudanese peanuts commences with planting in June, followed by harvest in October, and subsequent availability in the market by late October. The process from harvest to shipment typically spans around two weeks, with the earliest shipments departing from Port Sudan to Huang Dao Port in China by mid-November. With a shipping duration averaging between 22 to 30 days, the period from February to March emerges as a critical window for imports, particularly following the conclusion of the Spring Festival.

Navigating the escalating red sea crisis: assessing implications for china's peanut imports

The ongoing escalation of the Red Sea crisis poses a substantial threat to the timely importation of Sudanese peanuts, especially as the Spring Festival marks a pivotal juncture for shipping operations. Any disruptions or delays in the shipping schedule could exert significant repercussions on the availability and pricing of Sudanese peanuts in China.

Presently, off-season import prices for Sudanese peanuts already surpass those of domestic varieties, with quotations averaging at US$1,150 per ton, translating to approximately 9,200 yuan per ton. The exacerbation of this disparity is further fueled by factors such as escalating freight charges, surging fuel costs, and soaring insurance premiums, all of which collectively contribute to the mounting challenges confronting importers.



Dynamics of the domestic market and strategies for import substitution

The potential reduction in Sudanese peanut imports due to the Red Sea crisis necessitates a nuanced examination of its implications for China's domestic market. If post-Spring Festival, domestic peanut stocks remain elevated due to sluggish import shipments, the demand for imports may experience a downturn, thereby alleviating some of the strain on domestic supplies and potentially stabilizing prices.

Conversely, in scenarios where domestic consumption remains robust and importation remains economically viable, China may opt to diversify its sources by bolstering imports from alternative origins such as Senegal, the United States, and notably, Brazil.

Brazil: A promising alternative source

The formalization of a phytosanitary protocol between China and Brazil in 2022 has paved the way for Brazilian peanuts to emerge as a viable substitute for Sudanese imports. While Brazil traditionally focused on catering to the EU market, challenges such as pesticide residues have prompted a re-evaluation of export destinations. Despite Brazil's annual peanut production falling short of one million tons, its export volume stands at approximately 400,000 tons, owing to relatively modest domestic consumption levels. This underscores Brazil's potential to partially offset the absence of Sudanese peanuts in China's import portfolio. However, the divergent harvest and export schedules between Brazil and Sudan may necessitate adjustments to the seasonal dynamics of China's peanut imports, potentially moderating supply and price fluctuations typically observed from March to August.

Conclusion: Embracing adaptability and seizing opportunities amidst challenges

The Red Sea crisis presents a formidable challenge to China's peanut import strategy, given its substantial reliance on Sudanese supplies. As the crisis unfolds, it underscores the imperative for a flexible and adaptable approach to sourcing, with Brazil and other prospective substitutes offering avenues for diversification.

By harnessing alternative sources and closely monitoring market dynamics, China can mitigate risks and safeguard the stability of its peanut market amidst geopolitical uncertainties. Moreover, proactive measures such as strategic collaborations and investments in domestic production could enhance resilience and position China to capitalize on emerging opportunities within the global peanut trade landscape.

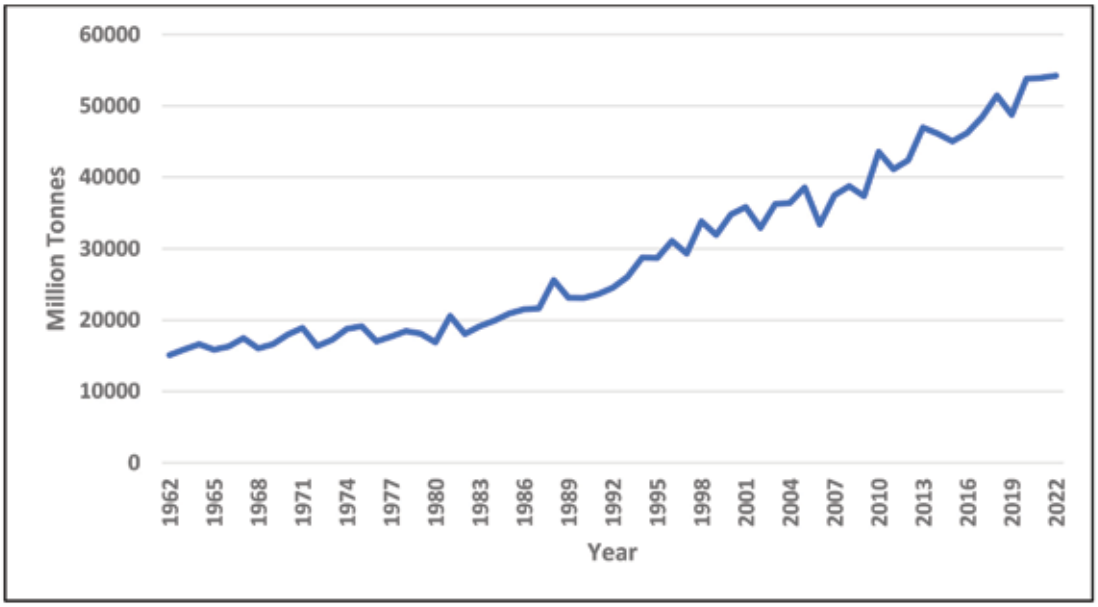
Chapter 2

Global Peanut Market and Trade

PRODUCTION

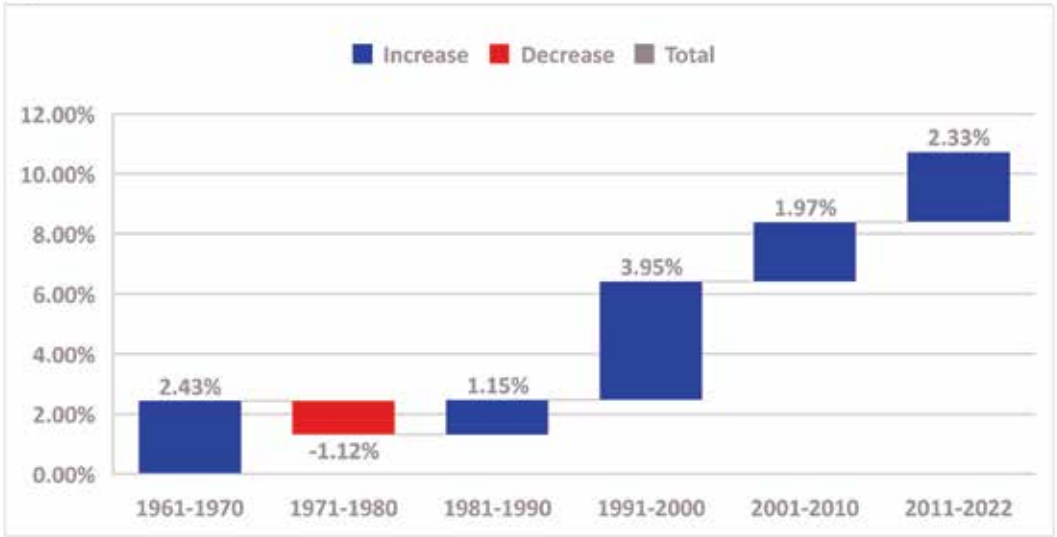
Trends in global area and production (1962 – till date)

Figure 2.1 Global peanut production over the years



Source: FAO Statistics

Figure 2.2 Compound annual growth rate (CAGR) in production over the years



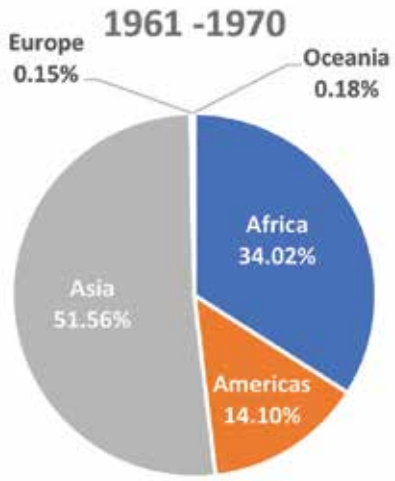
Source: FAO Statistics

Table 2.1 Major producers of peanuts during the period 1961 to 1970

1961-1970	
Country	Average Production (Thousand Tonnes)
India	5163.7
China	1876.6
Nigeria	1778.3
USA	1032.7
Senegal	950.0
Brazil	713.0
Indonesia	431.8
Myanmar	365.5
Argentina	334.7
Sudan (former)	329.5
Others	3332.8

Source: FAO Statistics

Figure 2.3 Region-wise distribution of peanut production during 1961 - 1970



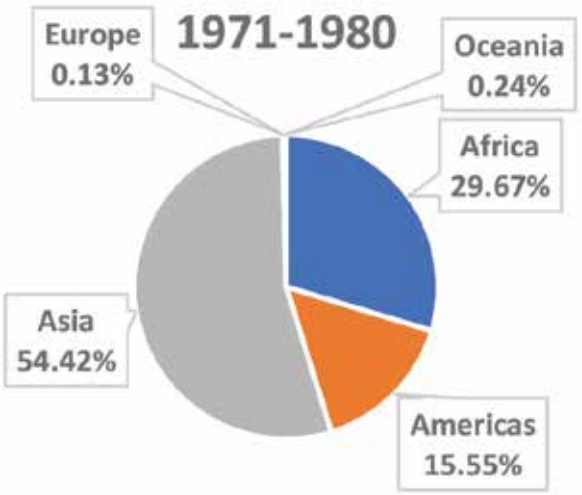
Source: FAO Statistics

Table 2.2 Major producers of peanuts during the period 1971 to 1980

1971-1980	
Country	Average Production (Thousand Tonnes)
India	5640.2
China	2460.2
USA	1585.1
Nigeria	874.3
Senegal	871.2
Sudan	736.1
Indonesia	615.3
Brazil	548.6
Myanmar	430.8
Argentina	401.9
Others	3784.4

Source: FAO Statistics

Figure 2.4 Region-wise distribution of peanut production during 1971 – 1980



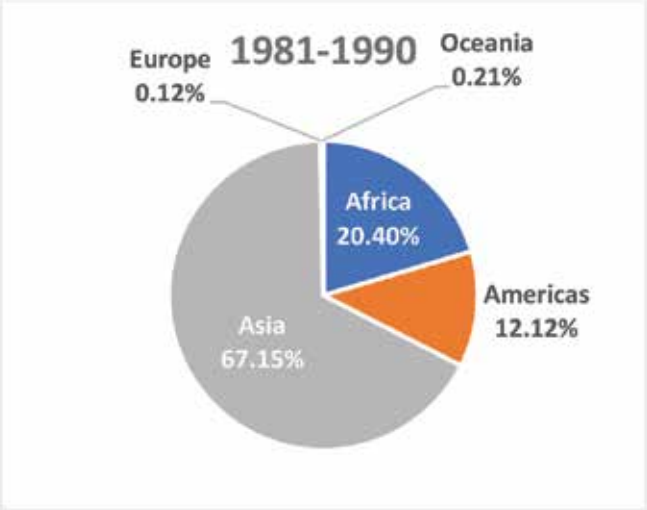
Source: FAO Statistics

Table 2.3 Major producers of peanuts during the period 1981 to 1990

1981-1990	
Country	Average Production (Thousand Tonnes)
India	6814.9
China	5345.2
USA	1729.7
Indonesia	961.0
Senegal	760.6
Nigeria	752.8
Myanmar	527.9
Congo	411.1
Sudan (former)	400.1
Argentina	322.7
Others	3416.8

Source: FAO Statistics

Figure 2.5 Region-wise distribution of peanut production during 1981 – 1990



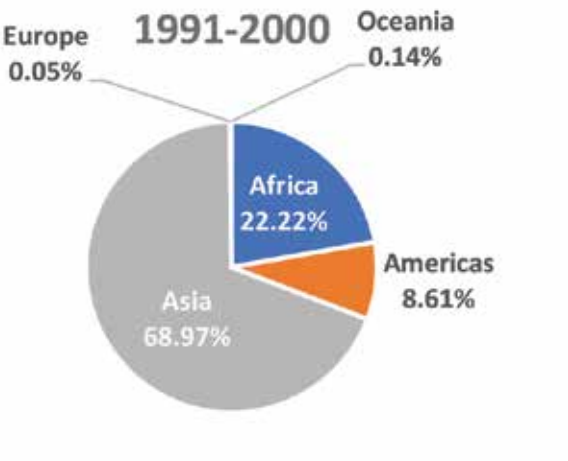
Source: FAO Statistics

Table 2.4 Major producers of peanuts during the period 1991 to 2000

1991-2000	
Country	Average Production (Thousand Tonnes)
China	10013.1
India	7586.4
Nigeria	2015.1
USA	1749.6
Indonesia	1189.8
Senegal	724.5
Sudan (former)	712.9
Myanmar	527.7
Congo	465.0
Argentina	334.2
Others	4067.3

Source: FAO Statistics

Figure 2.6 Region-wise distribution of peanut production during 1991 – 2000



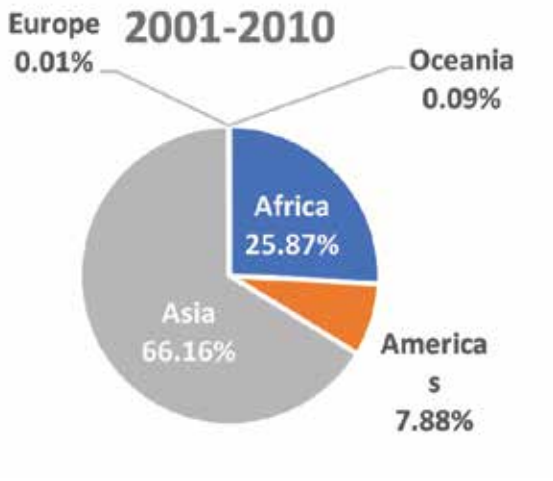
Source: FAO Statistics

Table 2.5 Major producers of peanuts during the period 2001 to 2010

2001-2010	
Country	Average Production (Thousand Tonnes)
China	14237.0
India	6895.0
Nigeria	3162.5
USA	1865.4
Indonesia	1375.8
Myanmar	1050.9
Sudan (former)	789.7
Senegal	673.7
Chad	516.8
Viet Nam	462.9
Others	6089.2

Source: FAO Statistics

Figure 2.7 Region-wise distribution of peanut production during 2001 – 2010



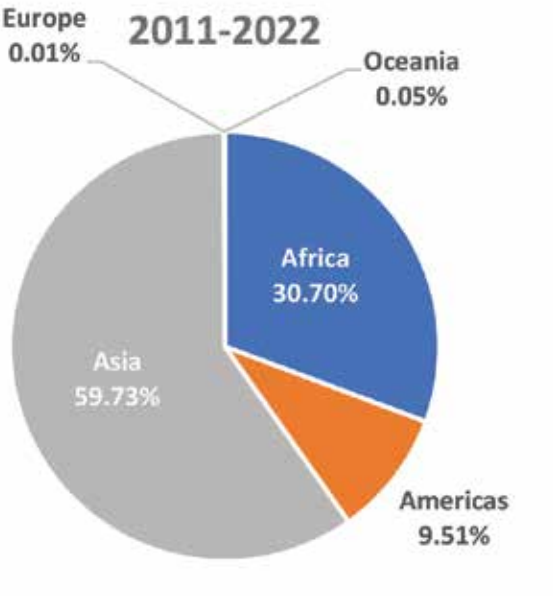
Source: FAO Statistics

Table 2.6 Major producers of peanuts during the period 2011 to 2022

2011-2022	
Country	Average Production (Thousand Tonnes)
China	17157.3
India	8041.7
Nigeria	3849.0
USA	2560.2
Sudan	2047.8
Myanmar	1556.0
Sudan (former)	1185.0
Senegal	1136.7
Argentina	1064.9
Tanzania	925.6
Others	10232.3

Source: FAO Statistics

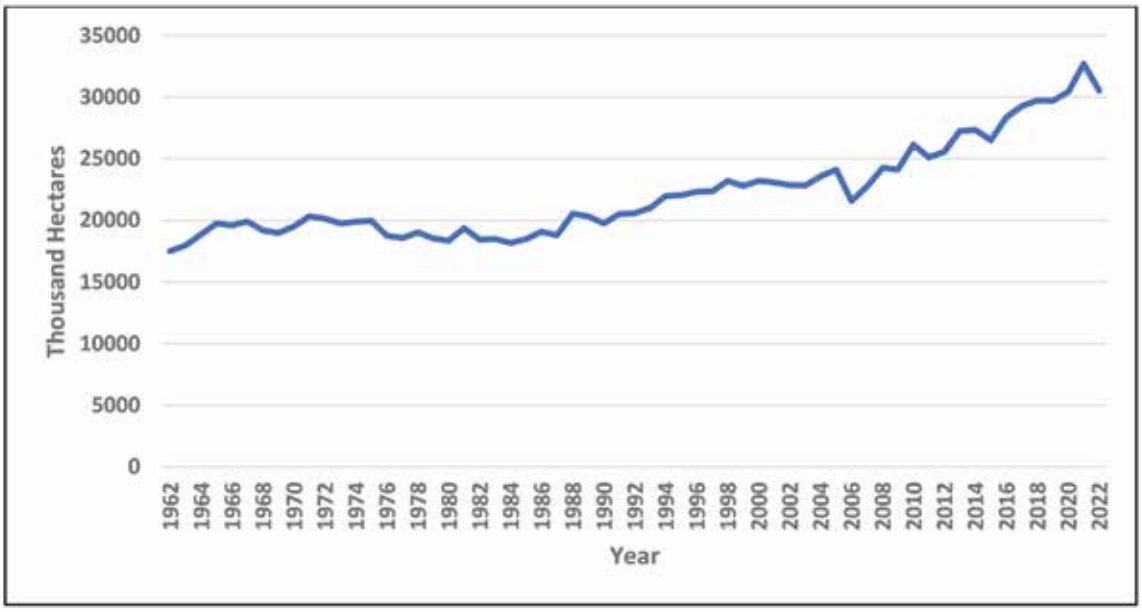
Figure 2.8 Region-wise distribution of peanut production during 2011 – 2022



Source: FAO Statistics

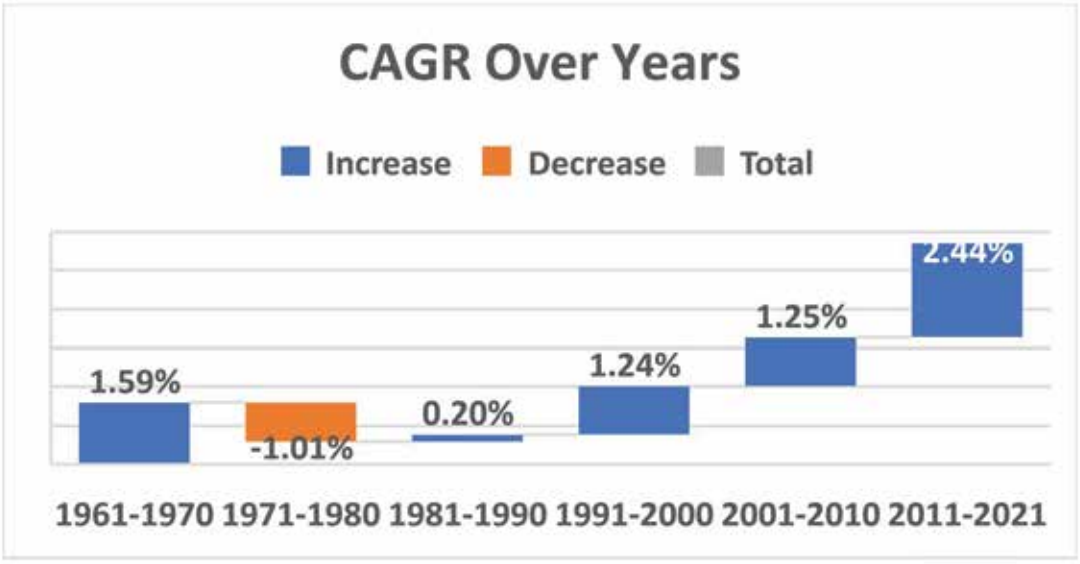
AREA

Figure 2.9 Global peanut area over the years



Source: FAO Statistics

Figure 2.10: Compound annual growth rate in area over the years



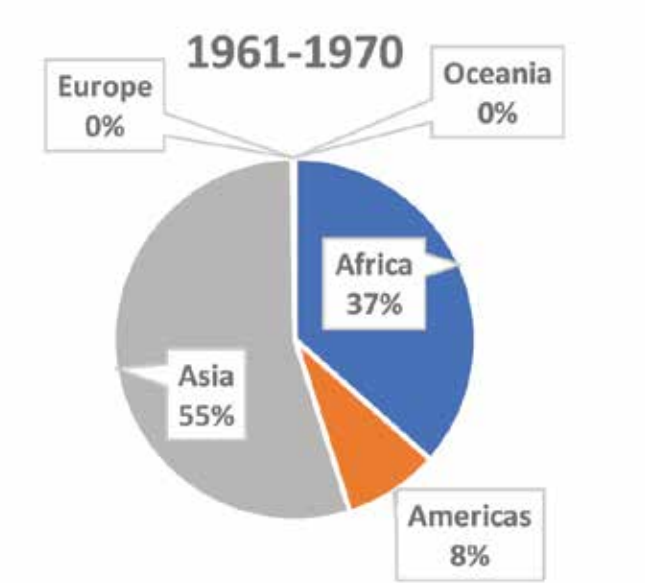
Source: FAO Statistics

Table 2.7 Major peanuts grown area during the period 1961 to 1970

1961-1970	
Country	Average Area (Thousand Hectares)
India	7252
Nigeria	1936
China	1759
Senegal	1072
USA	575
Brazil	553
Myanmar	534
Indonesia	370
Sudan	346
Niger	345
Others	4049

Source: FAO Statistics

Figure 2.11 Region-wise distribution of peanut production during 1961 – 1970



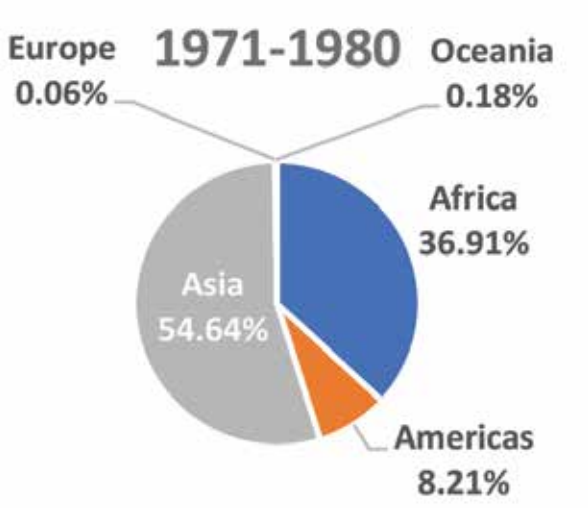
Source: FAO Statistics

Table 2.8 Major peanuts grown area during the period 1971 to 1980

1971-1980	
Country	Average Area (Thousand Hectares)
India	7139
China	1946
Nigeria	1236
Senegal	1143
Sudan	858
Myanmar	604
USA	602
Indonesia	444
Congo	434
Brazil	417
Others	4516

Source: FAO Statistics

Figure 2.12 Region-wise distribution of peanut production during 1971 – 1980



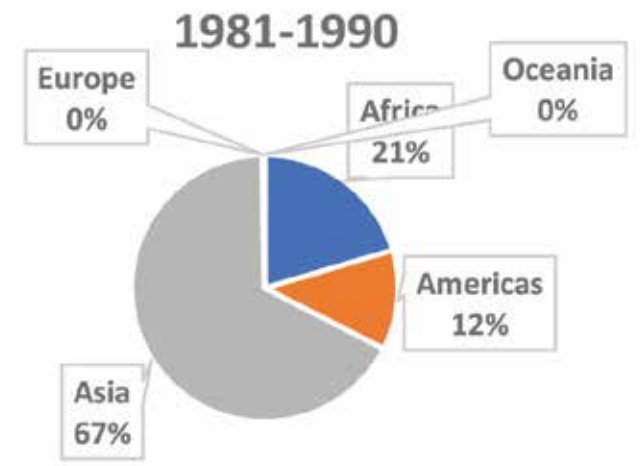
Source: FAO Statistics

Table 2.9 Major peanuts grown area during the period 1981 to 1990

1981-1990	
Country	Average Area (Thousand Hectares)
India	7585
China	2840
Senegal	900
Nigeria	660
Sudan	624
USA	619
Indonesia	553
Congo	544
Myanmar	534
Mozambique	331
Others	3952

Source: FAO Statistics

Figure 2.13 Region-wise distribution of peanut production during 1981 – 1990



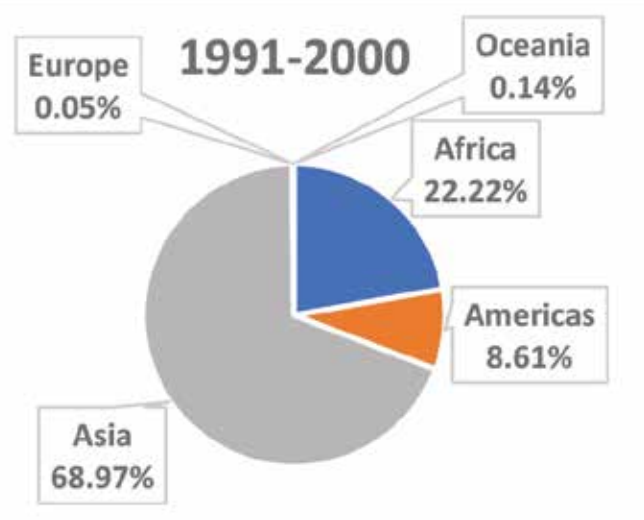
Source: FAO Statistics

Table 2.10 Major peanuts grown area during the period 1991 to 2000

1991-2000	
Country	Average Area (Thousand Hectares)
India	7604
China	3766
Nigeria	1762
Sudan	1037
Senegal	858
Indonesia	663
USA	629
Congo	594
Myanmar	499
Chad	332
Others	4296

Source: FAO Statistics

Figure 2.14 Region-wise distribution of peanut production during 1991 – 2000



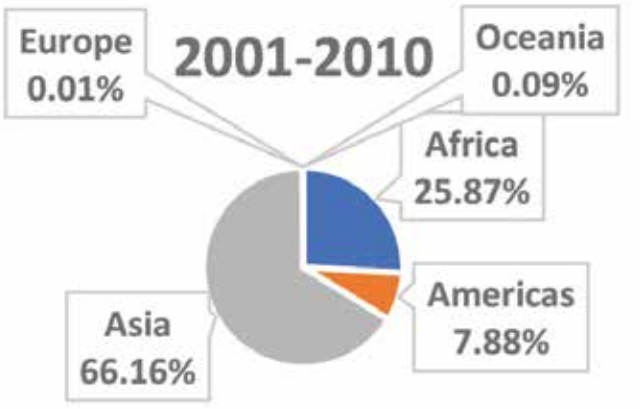
Source: FAO Statistics

Table 2.11 Major peanuts grown area during the period 2001 to 2010

2001-2010	
Country	Average Area (Thousand Hectares)
India	6095
China	4566
Nigeria	2207
Sudan	1021
Senegal	807
Myanmar	737
Indonesia	668
USA	538
Chad	532
Congo	471
Others	5897

Source: FAO Statistics

Figure 2.15 Region-wise distribution of peanut production during 2000 - 2010



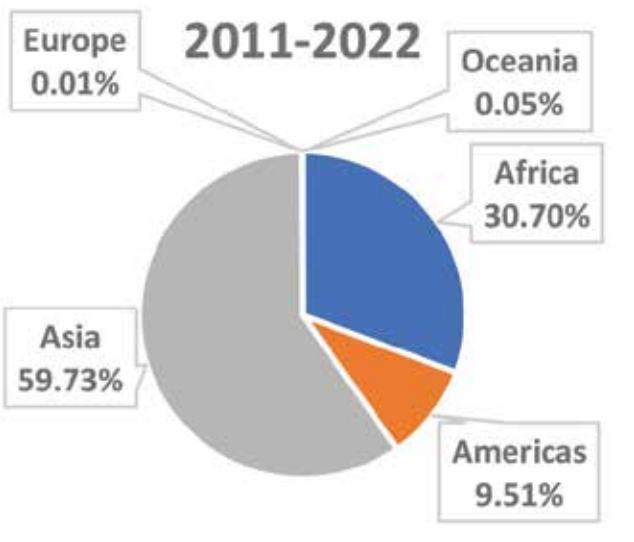
Source: FAO Statistics

Table 2.12 Major peanuts grown area during the period 2011 to 2022

2011-2022	
Country	Average Area (Thousand Hectares)
India	5081
China	4610
Nigeria	3318
Sudan	2529
Sudan	1698
Tanzania	1055
Senegal	1029
Myanmar	1009
Niger	815
Chad	770
Others	8251

Source: FAO Statistics

Figure 2.16 Region-wise distribution of peanut production during 2011 - 2022



Source: FAO Statistics

Trend in Area, Production and Yield for Major Producing Countries

China

Table 2.13 Trend in area, production and yield of peanuts in China

Market	Area	Production	Yield
Year	(1000 Ha)	(1000 Tons)	(T/Ha)
2013/2014	4396	16082	3.66
2014/2015	4370	15901	3.64
2015/2016	4386	15961	3.64
2016/2017	4448	16361	3.68
2017/2018	4608	17092	3.71
2018/2019	4620	17333	3.75
2019/2020	4633	17520	3.78
2020/2021	4731	17993	3.80
2021/2022	4805	18308	3.81
2022/2023	4684	18330	3.91
2023/2024	4820	18600	3.86
5-year Average 2018/19 - 2022/23	4694.60	17896.80	3.81
Percent Change From 5 Year Average (%)	2.7%	3.9%	1.2%

Source: PS&D, USDA

India

Table 2.14 Trend in area, production and yield of peanuts in India

Market	Area	Production	Yield
Year	(1000 Ha)	(1000 Tons)	(T/Ha)
2013/2014	5505	7040	1.28
2014/2015	4768	5365	1.13
2015/2016	4597	4879	1.06
2016/2017	5339	5409	1.01
2017/2018	4888	6706	1.37
2018/2019	4731	4879	1.03
2019/2020	4825	7214	1.50
2020/2021	6015	7424	1.23
2021/2022	5705	7330	1.28
2022/2023	4960	7465	1.51
2023/2024	5300	6400	1.21
5-year Average 2018/19 - 2022/23	5247.20	6862.42	1.31
Percent Change From 5-Year Average (%)	1.0%	-6.7%	-0.08

Source: PS&D, USDA

Nigeria

Table 2.15 Trend in area, production and yield of peanuts in Nigeria

Market	Area	Production	Yield
Year	(1000 Ha)	(1000 Tons)	(T/Ha)
2013/2014	2733	2475	0.91
2014/2015	2800	3399	1.21
2015/2016	2802	3467	1.24
2016/2017	3459	4361	1.26
2017/2018	3597	4521	1.26
2018/2019	3500	4422	1.26
2019/2020	3300	4441	1.35
2020/2021	3250	4231	1.30
2021/2022	3500	4228	1.21
2022/2023	3400	4284	1.26
2023/2024	3450	4300	1.25
5-year Average 2018/19 - 2022/23	3390.00	4321.20	1.28
Percent Change From 5 Year Average (%)	1.8%	-0.5%	-2.3%

Source: PS&D, USDA

USA

Table 2.16 Trend in area, production and yield of peanuts in USA

Market	Area	Production	Yield
Year	(1000 Ha)	(1000 Tons)	(T/Ha)
2013/2014	422	1893	4.49
2014/2015	535	2354	4.40
2015/2016	632	2722	4.31
2016/2017	622	2532	4.07
2017/2018	719	3228	4.49
2018/2019	556	2493	4.48
2019/2020	562	2480	4.41
2020/2021	654	2793	4.27
2021/2022	623	2885	4.63
2022/2023	560	2514	4.49
2023/2024	647	2714	4.19
5-year Average 2018/19 - 2022/23	591.00	2633.00	4.46
Percent Change From 5 Year Average (%)	9.5%	3.1%	-5.9%

Source: PS&D, USDA

Sudan

Table 2.17 Trend in area, production and yield of peanuts in Sudan

Market	Area	Production	Yield
Year	(1000 Ha)	(1000 Tons)	(T/Ha)
2013/2014	2162	1767	0.82
2014/2015	2183	1871	0.86
2015/2016	1465	1042	0.71
2016/2017	2315	1826	0.79
2017/2018	2215	1648	0.74
2018/2019	3065	2884	0.94
2019/2020	3130	2828	0.90
2020/2021	3197	2773	0.87
2021/2022	3936	2355	0.60
2022/2023	3000	2500	0.83
2023/2024	3000	2500	0.83
5-year Average 2018/19 - 2022/23	3265.60	2668.00	0.83
Percent Change From 5 Year Average (%)	-8.1%	-6.3%	0.6%

Source: PS&D, USDA

Senegal

Table 2.18 Trend in area, production and yield of peanuts in Senegal

Market	Area	Production	Yield
Year	(1000 Ha)	(1000 Tons)	(T/Ha)
2013/2014	917	677	0.74
2014/2015	879	669	0.76
2015/2016	1135	1050	0.93
2016/2017	1212	991	0.82
2017/2018	1254	1405	1.12
2018/2019	1134	1502	1.32
2019/2020	1111	1421	1.28
2020/2021	1225	1797	1.47
2021/2022	1214	1678	1.38
2022/2023	1225	1502	1.23
2023/2024	1225	1715	1.40
5-year Average 2018/19 - 2022/23	1181.80	1580.00	1.34
Percent Change From 5-Year Average (%)	3.7%	8.5%	4.8%

Source: PS&D, USDA

Trade flow analysis

Table 2.19 Top 10 Major exporters of peanut according to year 2022 (hs code – 1202)

Exporters	2020	2021	2022	Volume share '22
Argentina	675.08	634.08	592.06	18.15%
India	679.61	563.27	579.29	17.75%
USA	612.03	444.32	417.44	12.79%
Sudan	328.90	423.52	394.88	12.10%
Brazil	259.04	256.59	285.52	8.75%
Senegal	266.60	336.00	177.92	5.45%
Netherlands	143.75	138.47	133.05	4.08%
China	131.53	104.32	95.73	2.93%
Nicaragua	72.72	84.87	87.33	2.68%
Malawi	46.51	38.61	75.82	2.32%
Others	399.38	381.03	423.82	12.99%
World	3615.15	3405.07	3262.86	100.00%

In Thousand tonnes
Source: Trade map

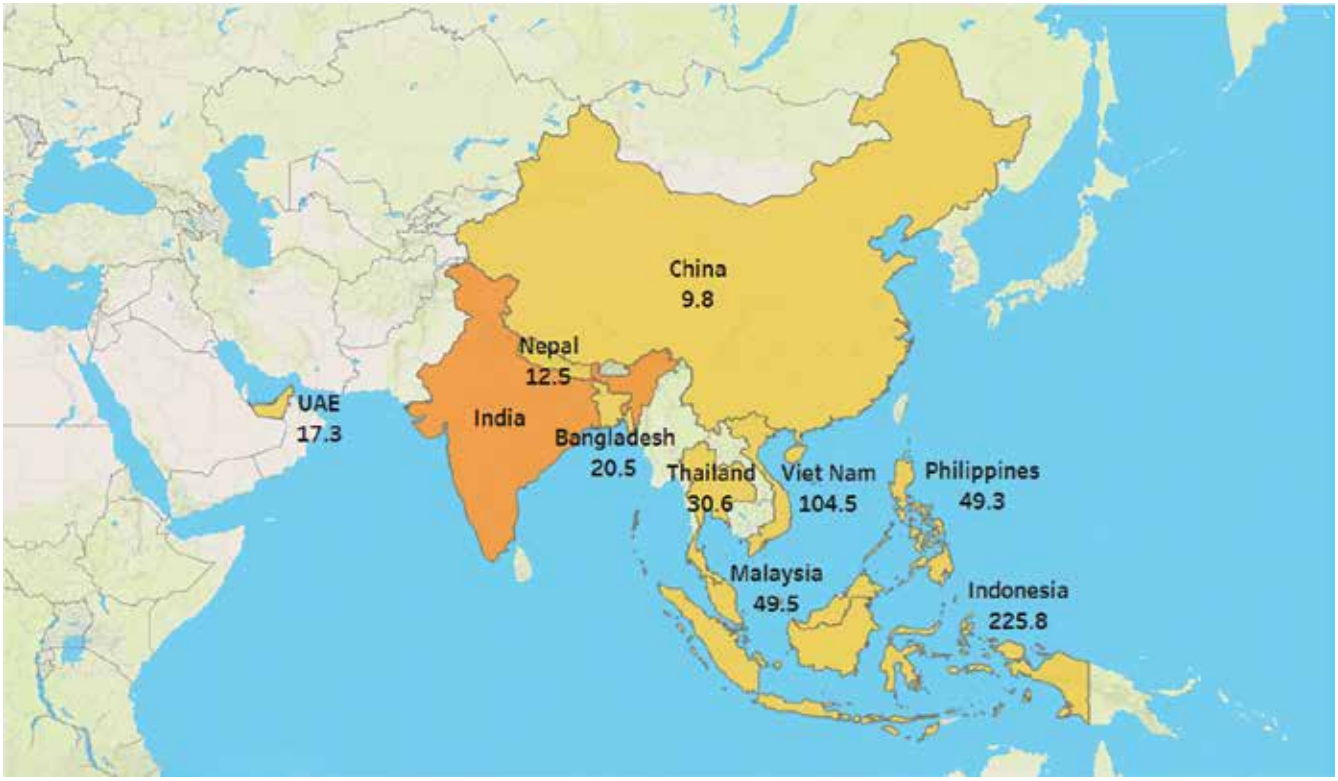
Table 2.20 Top 10 Major importers of peanut according to year 2022 (hs code – 1202)

Importers	2020	2021	2022	Volume share '22
China	1084.50	1002.60	664.07	22.29%
Indonesia	299.81	287.10	369.42	12.40%
Netherlands	374.96	320.40	347.03	11.65%
United Kingdom	162.09	124.46	205.67	6.90%
Germany	140.80	135.25	127.21	4.27%
Canada	115.72	107.65	113.21	3.80%
Philippines	66.80	76.68	96.98	3.26%
Viet Nam	100.37	89.04	94.95	3.19%
Poland	68.84	68.12	78.99	2.65%
Malaysia	50.90	50.13	64.83	2.18%
Others	1086.40	951.28	816.46	27.41%
World	3551.17	3212.70	2978.83	100.00%

In Thousand tonnes
Source: Trade map

Indian Export Destination

Figure 2.17 World map showing India's major exporting destinations



In Thousand tonnes

Table 2.21 Major exporting destinations for India with their volume share and growth

Importers	2021	2022	Volume share '22	Volume GR ('22/'21)
Indonesia	253.51	225.77	40.25%	-10.94%
Viet Nam	83.27	104.47	18.62%	25.45%
Malaysia	42.73	49.51	8.83%	15.86%
Philippines	51.21	49.30	8.79%	-3.71%
Thailand	21.52	30.55	5.45%	41.95%
UAE	20.43	16.75	2.99%	-17.99%
Bangladesh	9.03	16.30	2.91%	80.49%
China	12.74	9.76	1.74%	-23.41%
Iran	8.06	7.64	1.36%	-5.16%
Singapore	3.95	6.89	1.23%	74.37%
Others	47.46	43.98	7.84%	-7.33%
Total (Shelled)	553.90	560.91	100.00%	1.27%

Source: Trade map

Argentinian Export Destinations

Figure 2.18 World map showing Argentina's major exporting destinations

In Thousand tonnes

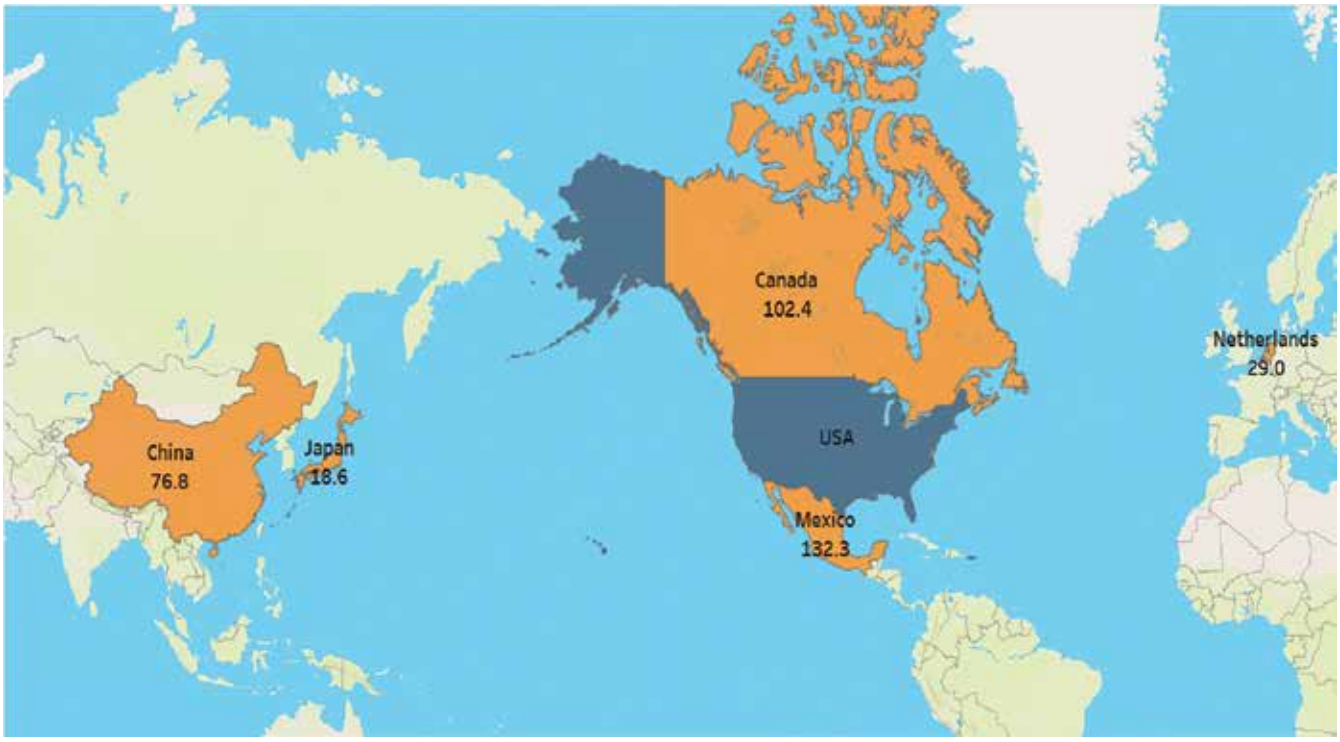
Table 2.22 Major exporting destinations for Argentina with their volume share and growth

Importers	2021	2022	Volume share '22	Volume GR ('22/'21)
Netherlands	238.87	266.19	44.96%	11.44%
United Kingdom	51.01	45.50	7.69%	-10.80%
Poland	47.01	45.17	7.63%	-3.93%
Italy	19.52	21.78	3.68%	11.60%
Russian Federation	39.70	21.28	3.59%	-46.39%
Germany	19.95	19.72	3.33%	-1.14%
France	15.61	18.52	3.13%	18.68%
Spain	16.86	17.80	3.01%	5.58%
Australia	16.86	14.61	2.47%	-13.37%
Belgium	16.62	14.23	2.40%	-14.34%
Others	152.09	107.27	18.12%	-29.47%
Total (Shelled)	634.08	592.06	100.00%	-6.63%

Source: Trade map

USA Exports Destinations

Figure 2.19 World map showing USA's major exporting destinations



In Thousand tonnes

Table 2.23 Major exporting destinations for ESA with their volume share and growth

Importers	2021	2022	Volume share '22	Volume GR '22/'21
In-shell	160.50	141.35	35.48%	-11.93%
China	107.88	72.38	18.17%	-32.91%
Mexico	7.93	21.56	5.41%	171.95%
Germany	7.70	8.54	2.14%	10.99%
Canada	6.77	7.40	1.86%	9.21%
United Kingdom	4.53	5.98	1.50%	32.13%
Netherlands	5.44	5.41	1.36%	-0.64%
Others	20.25	20.08	5.04%	-0.82%
Shelled	273.59	257.02	64.52%	-6.06%
Canada	85.95	94.94	23.83%	10.45%
Mexico	104.35	93.82	23.55%	-10.09%
Netherlands	18.59	23.60	5.92%	26.95%
Japan	13.47	17.11	4.30%	27.08%
United Kingdom	11.78	8.11	2.04%	-31.11%
China	20.76	4.38	1.10%	-78.88%
Others	18.69	15.05	3.78%	-19.48%
Total	434.09	398.37	100.00%	-8.23%

Source: Trade map

China Export Destination

Figure 2.20 World map showing China's major exporting destinations

In Thousand tonnes

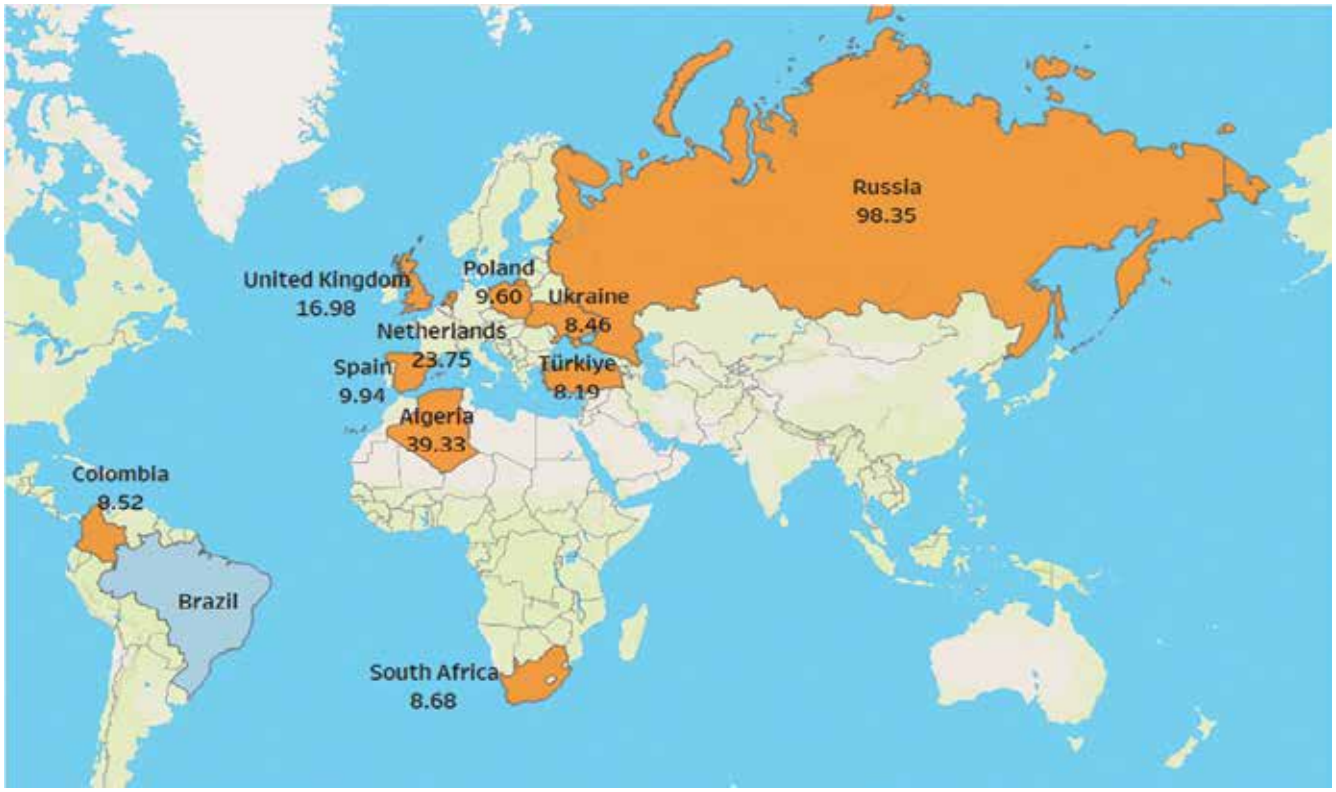
Table 2.24 Major exporting destinations for China with their volume share and growth

Importers	2021	2022	Volume share '22	Volume GR '22/'21
In-shell	18.26	14.79	15.45%	-18.99%
Spain	6.82	5.23	5.46%	-23.33%
Viet Nam	0.06	1.77	1.85%	2906.78%
Portugal	1.60	0.97	1.02%	-39.17%
Malaysia	0.59	0.87	0.90%	45.62%
Thailand	0.66	0.81	0.84%	22.71%
United Kingdom	1.13	0.73	0.76%	-35.64%
Others	7.40	4.42	4.62%	-40.30%
Shelled	86.06	80.94	84.55%	-5.94%
Japan	10.82	14.22	14.85%	31.44%
Thailand	9.79	11.58	12.10%	18.26%
Netherlands	5.10	6.47	6.76%	26.90%
Canada	9.42	6.25	6.53%	-33.66%
Malaysia	5.10	6.13	6.40%	20.29%
Philippines	5.51	5.77	6.03%	4.76%
Singapore	4.47	4.32	4.51%	-3.27%
Others	35.87	26.21	27.38%	-26.92%
Total	104.32	95.73	100.00%	-8.23%

Source: Trade map

Brazil Export Destination

Figure 2.21 World map showing Brazil's major exporting destinations



In Thousand tonnes

Table 2.25 Major Exporting Destinations for Brazil with their volume share and growth

Importers	2021	2022	Volume share '22	Volume GR '22/'21
Shelled	256.486	285.315	100.00%	11.24%
Russian Federation	103.585	98.346	34.47%	-5.06%
Algeria	40.65	39.325	13.78%	-3.26%
Netherlands	21.286	23.748	8.32%	11.57%
United Kingdom	5.501	16.975	5.95%	208.58%
Spain	6.462	9.942	3.48%	53.85%
Poland	4.542	9.601	3.37%	111.38%
South Africa	11.528	8.676	3.04%	-24.74%
Colombia	8.613	8.52	2.99%	-1.08%
Ukraine	22.25	8.458	2.96%	-61.99%
Türkiye	1.877	8.186	2.87%	336.12%
Others	30.192	53.538	18.76%	77.33%
Total	256.486	285.315	100.00%	11.24%

Source: Trade map

China Import Destination

Figure 2.22 World map showing China's major Importing Destinations

In Thousand tonnes

Table 2.26 Major importing destinations for China with their volume share and growth

Exporters	2021	2022	Volume share '22	Volume GR ('22/'21)
In-shell	182.67	87.63	13.20%	-52.03%
USA	180.47	87.11	13.12%	-51.73%
Myanmar	0.10	0.42	0.06%	304.76%
Vietnam	2.09	0.08	0.01%	-96.37%
Shelled	819.93	576.44	86.80%	-29.70%
Sudan	407.87	362.38	54.57%	-11.15%
Senegal	327.11	180.59	27.19%	-44.79%
Myanmar	9.41	15.83	2.38%	68.24%
Argentina	9.08	8.61	1.30%	-5.21%
India	37.85	5.86	0.88%	-84.51%
United States of America	10.61	1.49	0.22%	-85.99%
Ethiopia	15.47	0.92	0.14%	-94.07%
Uzbekistan	2.52	0.73	0.11%	-70.82%
China*	0	0.02	0.00%	0.00%
Total	1002.60	664.07	100.00%	-33.77%

Source: Trade map

Indonesia Import Destination

Figure 2.23 World map showing Indonesia's major importing destinations

In Thousand tonnes

Table 2.27 Major importing destinations for Indonesia with their volume share and growth

Exporters	2021	2022	Volume share '22	Volume GR ('22/'21)
In-Shell	2.83	1.83	0.00	-0.35
India	2.64	1.77	0.00	-0.33
China	0.01	0.07	0.00	8.43
Shelled	284.24	367.59	1.00	0.29
India	236.53	256.48	0.69	0.08
China	29.94	41.62	0.11	0.39
Mozambique	0.17	34.55	0.09	201.02
Sudan	12.85	30.46	0.08	1.37
United Arab Emirates	0.13	1.50	0.00	10.38
Togo	1.82	0.89	0.00	-0.51
Malaysia	0.41	0.77	0.00	0.89
Tanzania	2.04	0.37	0.00	-0.82
Others	0.35	0.96	0.00	1.73
Total	287.10	369.42	1.00	0.29

Source: Trade map

Netherlands Import Destinations

Figure 2.24 World map showing Netherland's major importing destinations

In Thousand tonnes

Table 2.28 Major importing destinations for Netherlands with their volume share and growth

Exporters	2021	2022	Volume share '22	Volume GR ('22/'21)
In-Shell	3.70	2.76	0.80%	-25.34%
China	0.89	0.58	0.17%	-34.46%
Egypt	1.11	0.51	0.15%	-54.10%
Uzbekistan	0.17	0.35	0.10%	101.16%
Others	1.53	1.32	0.38%	-13.36%
Shelled	316.56	344.22	99.20%	8.74%
Argentina	224.50	248.71	71.68%	10.78%
United States of America	16.58	24.02	6.92%	44.86%
Brazil	19.90	16.52	4.76%	-16.98%
China	17.09	15.52	4.47%	-9.22%
Germany	11.16	12.43	3.58%	11.37%
Nicaragua	7.87	12.03	3.47%	52.89%
India	3.39	4.39	1.27%	29.44%
Egypt	5.94	2.90	0.84%	-51.15%
Chile	1.23	2.85	0.82%	132.49%
Spain	3.22	1.01	0.29%	-68.68%
Others	5.70	3.86	1.11%	-32.22%
Total	320.26	346.98	100.00%	8.34%

Source: Trade map

United Kingdom Import Destination

Figure 2.25 World map showing United Kingdom's major importing destinations

In Thousand tonnes

Table 2.29 Major importing destinations for United Kingdom with their volume share and growth

Exporters	2021	2022	Volume share '22	Volume GR ('22/'21)
Seed	10.33	96.17	46.76%	830.64%
USA	10.21	96.17	46.76%	841.94%
Netherlands	0.12	0.00	0.00%	-100.00%
In-shell	2.98	3.51	1.71%	17.91%
USA	0.28	1.29	0.63%	368.36%
Egypt	0.30	0.82	0.40%	169.97%
China	1.45	0.58	0.28%	-59.75%
Others	0.95	0.82	0.40%	-13.76%
Shelled	111.15	105.99	51.53%	-4.64%
Argentina	51.68	45.99	22.36%	-11.01%
Brazil	5.17	18.07	8.79%	249.60%
USA	18.62	15.64	7.60%	-15.99%
Nicaragua	16.53	13.93	6.77%	-15.74%
China	12.19	6.34	3.08%	-47.98%
Netherlands	4.69	3.76	1.83%	-19.81%
Others	2.28	2.26	1.10%	-0.61%
Total	124.46	205.67	100.00%	65.26%

Germany Import Destination

Figure 2.26 World map showing Germany's major importing destinations

In Thousand tonnes

Table 2.30 Major importing destinations for Germany with their volume share and growth

Exporters	2021	2022	Volume share '22	Volume GR ('22/'21)
In-shell	41.30	45.96	22.99%	11.28%
USA	14.00	22.29	11.15%	59.23%
Egypt	20.57	18.11	9.06%	-11.95%
Israel	5.94	5.07	2.54%	-14.57%
Others	0.80	0.49	0.24%	-38.97%
Shelled	176.96	153.90	76.99%	-13.03%
Netherlands	14.12	73.63	36.83%	421.57%
Argentina	121.43	52.52	26.27%	-56.75%
India	4.56	6.97	3.49%	52.72%
Nicaragua	2.95	5.49	2.74%	86.00%
China	7.02	3.67	1.83%	-47.79%
South Africa	11.69	3.47	1.74%	-70.29%
Others	15.18	8.16	4.08%	-46.27%
Total	218.32	199.90	100.00%	-8.44%

Source: Trade map

Balance Sheet for Major Producing Countries

Table 2.31 Demand and supply balance sheet for Major peanut-producing countries (2022) and their per capita consumption

Country	China	India	Nigeria	USA	Senegal	Argentina	Indonesia
(In thousand tonnes)							
Production (In-shell)	-	10297.00	-	-	-	-	-
Production (if shelled)	18330.00	7465.33	4284.00	2514.00	1715.00	963.00	930.00
Retained for Seeds	1283.10	746.53	299.88	175.98	120.05	67.41	65.10
Imports							
Seed	0.00	0.00	0.00	0.03	0.50	0.00	0.00
Shelled	576.44	1.20	9.39	2.54	0.12	0.83	460.84
In-shell	87.63	0.00	0.00	0.01	0.00	0.00	2.39
converting in-shell to shelled	61.34	0.00	0.00	0.01	0.00	0.00	1.67
Prepared Groundnut	302.22	2.80	0.00	44.42	0.00	0.00	0.00
Total (shelled basis)	940.00	4.00	9.39	47.00	0.62	0.83	462.52
Exports							
Seed	0.00	0.88	0.09	19.07	0.32	0.00	0.00
Shelled	80.94	560.91	0.00	257.02	177.42	744.19	0.15
In-shell	14.79	17.50	1.15	141.35	0.00	0.00	4.88
converting in-shell to shelled	10.35	12.25	0.80	98.95	0.00	0.00	3.42
Prepared Groundnut	366.70	41.20	1.11	166.97	0.00	5.81	2.44
Total (shelled basis)	458.00	615.24	2.00	542.00	177.74	750.00	6.00
Re-exports							
Seed	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Shelled	0.00	0.00	0.00	2.91	0.00	0.00	0.00
In-shell	0.00	0.00	0.00	11.42	0.00	0.00	0.00
converting in-shell to shelled	0.00	0.00	0.00	8.00	0.00	0.00	0.00
Total (shelled basis)	0.00	0.00	0.00	10.94	0.00	0.00	0.00
Derived Domestic Consumption (shelled basis)	17528.90	6107.55	3991.51	1832.07	1417.83	146.43	1321.41
Derived Domestic Consumption (In-shelled basis)	25041.29	8725.07	5702.15	2617.25	2025.47	209.18	1887.73
Population (In thousands)	1412175	1417173	218541	333288	17316	46235	275501
Per Capita Consumption (In Kilograms) (Shelled basis)	12.41	4.31	18.26	5.50	81.88	3.17	4.80

Source: USDA, Trade MAP, DA&FW India, World Bank.

Peanut Breeding: Varieties, New Breeding Tools, and Food Safety

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1. Introduction

Peanut, also known as groundnut, is an important food, oil, and feed crop. With a global area of 30.53 million hectares (FAOSTAT, 2023), it is grown in ~100 countries across the globe. It is cultivated in diverse agro-ecological conditions such as deserts in Rajasthan, India and Sudan; riverine soils of Bangladesh; red loamy soils in Asia and Africa; and deep, fine, sandy loam soils in the USA. The crop growing duration varies from 100 to 160 days across the growing ecologies. Peanut cultivation is mechanized in the USA, Argentina, China, and in Rajasthan state of India.

However, in large parts of India and other countries in Africa and Asia, mechanization is low. Peanuts are grown under both rainfed and irrigated conditions. Peanut kernels are valued for their protein (~25%) and fat (~50%) content and they are also rich in several minerals, vitamins, antioxidants, and dietary fiber. Peanut-based RUTFs (ready-to-use therapeutic foods) and RUSFs (ready-to-use supplementary foods) are widely used by UNESCO and other agencies to treat malnutrition, and the infant and elderly food formulations and protein supplements also use peanut (Janila et al 2026). Peanut butter market is expanding in Africa and Asia. Peanut haulms are rich protein source for livestock.

The peanut breeders worldwide aim to develop peanut cultivars with improved pod yield potential, ability to thrive under biotic and abiotic stress, and possess desirable market traits preferred by consumers, industry, and traders such as, shelling outturn, kernel grades, high oleic acid (HOA) content, sensory etc. Gene bank at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India as well as other national gene banks in Brazil, USA, India and China have a large collection of cultivated and wild Arachis species. The genetic resources in the gene banks serve as source of genetic variability for use in peanut breeding. The elite peanut breeding lines developed at the peanut breeding institutes such, as ICRISAT and other national institutes are a valuable genetic resource, as these elite peanut lines have accumulated favorable alleles for various agronomic traits through recurrent cycles of breeding and

selection. ICRISAT's peanut breeding program has contributed to the commercialization of 232 peanut cultivars in 29 different countries, mostly in Africa and Asia. ICRISAT is a non-profit agricultural research organization with a mission to improve food security and livelihoods in the semi-arid regions of Africa and Asia. Established in 1972, ICRISAT focuses on the development of resilient and sustainable crop varieties of millets, sorghum, chickpea, pigeonpea, and peanut), particularly for smallholder farmers in arid and semi-arid areas. The institute collaborates with public and private sector partners to implement innovative solutions for sustainable agriculture, emphasizing climate resilience and nutritional security. In this article, we explore the use of 'new breeding tools' in peanut breeding at ICRISAT as well as share perspectives on food safety concerns posed by aflatoxin contamination in the peanut value chain.

2. Groundnut breeding at ICRISAT

Groundnut breeding at ICRISAT started in 1976, focusing on improving tolerance to drought and foliar fungal diseases, the key constrains to production in the semi-arid tropics of Africa and Asia. The current demand-led groundnut breeding program at ICRISAT operates within two distinct Market Segments, viz., Market Segment 1 (MS 1) - groundnuts for oil extraction and home consumption; and Market Segment 2 (MS 2) - groundnuts for food, snacks, and confectionery. The key Target Product Profile (TPP) traits for these twoMarket Segments are designed though engagement with stakeholders, that include the food, oil, and seed industry; private and public sectors; extension agents; traders; and farmer organizations.

In 2011, ICIRSAT's groundnut breeding program prioritized the improvement of the fatty acid profile of groundnuts and developed elite high oleic acid (HOA) lines with ~80% oleic acid content, compared to ~48% in normal groundnuts. Combining HOA in the agronomically elite genetic background was possible by the use of genomic and phenomic tools and rapid generation advancement (RGA) coupled with an extensive testing for adaptability in the target environments under a multi-environment testing (MET) system. So far, ICRISAT shared over 100 high oleic acid elite peanut lines with partners in 11 different countries. A few releases since 2020 from the groundnut breeding program at ICRISAT, Patancheru, India are:

1. HOA peanut varieties, ICGV 15083 (Girnar 4), ICGV 15090 (Girnar 5), ICGV 16668 (GG 40) and ICGV 16697 (GG 39) in India (Market Segment 2)
2. High oil yielding varieties, ICGV 03043 (GJG 32) and ICGV 06420 (Chattisgarh Mungfali 1) in India (Market Segment 1)
3. Drought and disease tolerant, dual-purpose peanut variety, ICGV 02266 (Kalinga Groundnut-101) in India (Market Segment 1)
4. Early-maturing and drought tolerant variety, ICGV 07219 (BARI Chinabadam-12) in Bangladesh.

3. New breeding tools

At ICRISAT, new breeding tools are developed, optimized, and deployed in groundnut breeding with an objective to increase the rate of genetic gain, and achieve operational- and cost-efficiency. Capacity building activities of ICRISAT enabled the use of new breeding tools by national program partners in Africa and Asia.

(i) Genomic Tools: Genotyping involves analyzing the genetic makeup of an individual to identify specific DNA sequences or markers associated with desirable traits. It is used for selecting lines with desirable trait in a large segregation population, estimation of genetic purity of available varieties and confirmation of hybrids derived from two-parent or multi-parent crosses. Researchers at ICRISAT developed trait specific and mid-density assays for use in groundnut breeding program across Africa and Asia (https://excellenceinbreeding.org/module3/kasp). Leaf disc and seed-chip sampling methods are used for genotyping (Parmar et al., 2021) (Fig. 1). The integration of genotyping technology into the groundnut breeding schema increased selection intensity and thus increases the rate of realized genetic gain.

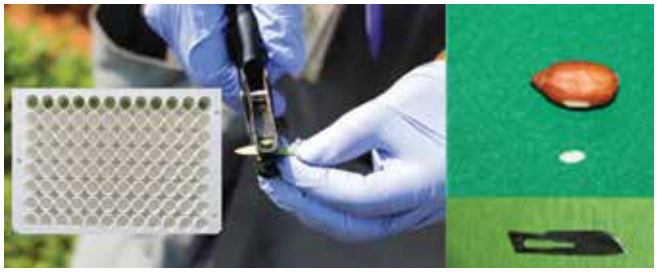

Fig. 1. Collection of leaf disc for leaf sampling and seed chipping for genotyping.

(ii) Computer Tomography (CT): CT scan is a non-destructive, X-ray based technology that provides a rapid estimation of the physical traits. The X-ray radiography method has been integrated into the groundnut breeding pipeline for estimating shelling outturn, kernel weight and kernel grades (sizes) without shelling the pods (Fig. 2).

This technology represents an important step in groundnut breeding for fast (3 min to scan one sample) and accurate estimates of three key market traits of groundnut to support crop improvement programs in selecting and developing new groundnut varieties.

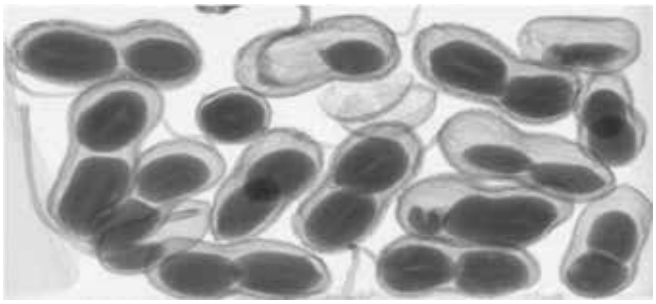

Fig. 2. X-ray image of groundnut pods

(iii) Rapid Generation Advancement (RGA): RGA, sometimes referred to as speed breeding, reduces the breeding cycle time by reducing the duration to generate homozygous lines after hybridization (Sajja et al., 2024). This enables the quick recycling of elite lines as parents with desirable alleles. RGA is the simplest and most cost-effective strategy to increase the rate of genetic gain and thus has become popular across both public and private sector crop breeding programs. At ICRISAT, RGA protocol for peanut was developed by harvesting immature pods, resulting in a reduced cycle duration of 65-75 days from 105-120 days. The protocol is optimized of routine use in breeding pipeline.

(iv) Harvest Master: The Harvest Master system is designed to collect yield data after harvest. It allows precise yield data collection, after adjusting the moisture percentage enabling peanut breeders to evaluate the yield performance of different line and make decisions on advancing the best-bet line. ICRISAT's groundnut breeding program utilizes Harvest Master to measure the pod yield data curated by moisture percentage, immediately after harvesting.

(v) Near-Infrared Reflectance Spectroscopy (NIRS): NIRS provides a rapid, cost effective and non-destructive analysis of oil, protein, starch, fatty acids and other organic constituents. Quantifying quality parameters is essential in the peanut breeding pipeline to develop cultivars that suit the market demand such as, high oleic acid (~80% of fat) by food processing industry and high kernel oil content by oil extraction industry. At ICRISAT, NIRS is utilized to estimate the oil, fatty acid and protein content in groundnut kernels (Fig. 3) and the equation gave high fidelity with the reference to biochemical values, as indicated by high values of the coefficient of determination in external validation (r2) for oleic acid (r2=0.96), linoleic acid (r2=0.96), moisture (r2=0.96) and moderately for oil (r2=0.89), protein (r2=0.83) and palmitic acid (r2=0.80) (Deshmukh et al., 2021). The oleic and linoleic acid content of both single seed and bulk seed materials are recorded and used to identify high-oleic acid lines.

Fig. 3. NIRS for estimating oleic acid content

(vi) LeasyScan: A two-step screening methodology was developed at ICRISAT (Ankush et al., 2022) to identify climate-resilient peanut lines. The lines developed at ICRISAT breeding program are first screened under LeasyScan, a high-throughput phenotyping platform (HTPP) that aids in selecting the lines based on early vigour (measured as digital biomass and leaf score index), a key adaptation trait for drought tolerance. The selected lines are then screening for yield in a managed stress environment that includes two contrasting conditions, viz., fieldwell-watered and water-stressed conditions. The well-watered plots receive irrigation as per the schedule while mid-season drought is imposed in water-stress plots by withholding irrigation from 60 days after planting (DAP) (~1000 Growing Degree Days (GDD). The lines that record superior yield performance in well-watered conditions, and how minimum penality under water-stress are selected based on estimated stress index values.

4. Food safety

Food-safety, a human health burden is a complex problem and involves stakeholders all the way from farmers to the consumers. Aflatoxin is a potent carcinogen with detrimental health effects, hence, a serious food safety concern. The countries have imposed permissible limits for aflatoxin contamination in the food, which is as low as 4.0 ppb for EU. Aflatoxin-producing fungi, Aspergillus flavus and Aspergillus parasiticus, significantly impact groundnut food safety. The infection can happen in the field (pre-harvest) or during handling and storage

(post-harvest). The post-harvest infection must be managed using appropriate drying and storage practices, and by adopting good handling processes along the value chain (shelling, storing, transport etc.). The drought condition at harvest exacerbate the infection of Aspergillus from field. The per-harvest Aspergillus infection from the field is one of the important source of infection and to assess genetic resistance for Aspergillus infection before harvest, ICRISAT employs a three-step screening process viz., (a) assessing pre-harvest infection in pods, (b) seed coat mediated in vitro seed colonization and (c) aflatoxin production in cotyledons. Evaluation criteria include mycelial growth, green color, and colony formation on a scale of 0-10 and aflatoxin contamination is measured with enzyme-linked immunosorbent assay (ELISA) procedures ((Bangaru et al., 2023). The field screening for pre-harvest aflatoxin contamination (PAC) results are biased due to sampling and analysis errors. To address this, increasing plot length or using large plot sizes was proposed to reduce the standard deviation among plots, thereby minimizing variability in aflatoxin content and identify resistant lines. ICRISAT is working on standardizing the plot sizes for screening in Aspergillus sick plot. Ferulic acid, a major phenolic compound, accounts for about 75% of the total phenolics in plants, has been explored for its potential to mitigate aflatoxin contamination.

Advances in genomics have enabled researchers to make progress in identifying specific regions of peanut genome that influence susceptibility or resistance for Aspergillus infection and aflatoxin production. Genomic studies identified some potential candidate genes have been identified and validated using transgenic approaches. In addition, omics-approaches enable understanding the mechanism of multiplexed host-induced gene silencing (Prasad et al., 2023) have identified several resistant proteins and potential susceptibility-associated proteins for aflatoxin resistance. Omics-approaches enable the understanding of the genetics of resistance to PAC and aflatoxin contamination, which is required for developing groundnut cultivars for the future. While the research is on-going to identify and understand genetic resistance to PAC and aflatoxin contamination, in the interim, adoption of good agricultural practices (GAPs), including good post-harvest handling such as, drying, storage, shelling, and transport, and monitoring the contamination along the value chain has to be adopted to contain the aflatoxin contamination within permissible limits.

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Chapter 3

Peanut Varieties and Applications

Most Cultivated Peanut Types

Runners or Bold

Regions grown - Most commonly grown peanuts in the U.S. and Argentina, representing more than 75 percent of the U.S. crop and 95 percent of the Argentine crop.

Characteristics:

1. Medium-sized peanuts with bold kernels.
2. Delicious flavor with excellent roasting characteristics.
3. High yield producers.
4. Covered with light red skins that darken quickly.

Uses:

1. Widely used in peanut butter production.
2. Preferred peanut-based products due to their flavour and quality.
3. Enjoyed as snacks and in various culinary applications globally.

Runners, also known as Bold-type peanuts, represent a globally favoured variety due to their delicious flavour, outstanding roasting characteristics, and high yields. Widely consumed and cherished, these medium-sized peanuts have earned their place as a preferred choice for peanut-based products, particularly peanut butter. Cultivation of Runner peanuts is influenced by specific environmental requirements. They thrive in warm climates and well-drained, sandy soils, making regions around the world with such conditions suitable for their growth. These areas often include countries with tropical and subtropical climates, contributing to the global cultivation of Runners.

From a worldwide perspective, Runner peanuts are not confined to the United States alone; they have become integral to global peanut production. Regions in Africa, Asia, and South America, among others, cultivate Runners to meet the high demand for these versatile and flavorful peanuts. Their adaptability to various climates has made them a staple in the agriculture of multiple countries.

The appeal of Runner Peanuts extends beyond geographical boundaries. In many countries, they are not only enjoyed as a snack or used in peanut butter but also find applications in local cuisines, confectioneries, and a wide array of culinary delights. Their global popularity is a testament to their versatility and the appreciation for their distinct taste.

Whether in Africa, Asia, the Americas, or other peanut-producing regions worldwide, Runner peanuts play a crucial role in meeting the demand for peanut products. Their widespread cultivation and consumption underscore their importance on a global scale, making them a significant contributor to the agricultural and culinary landscapes across various continents.

Spanish Peanuts (Java)

Regions grown – Common type grown in Nigeria, Sudan, Senegal, and similar regions in West Africa. A significant share is grown in China and India, mostly due to their high oil content and flavour.

Characteristics:

1. Small, round kernels with a reddish-brown skin.
2. Higher oil content than other varieties.
3. Notable for the Ole Spanish variety with high oleic acid content.

Uses:

1. Preferred in the production of candies and coated confectionery items.
2. Utilized in salted nuts and peanut butter.
3. Valued for oil extraction due to their high oil content.

Spanish peanuts, distinguished by their smaller kernels and reddish-brown skin, play a significant role in the world of peanut products, particularly in peanut candies, snacks, and peanut butter. These peanuts are easily recognizable due to their compact size and distinct colouration. With a higher oil content than other peanut varieties, Spanish peanuts are particularly valued for oil extraction.

The small kernels of Spanish peanuts are covered with a reddish-brown skin, giving them a unique appearance. Their primary use in peanut candies showcases their ability to impart a rich, nutty flavour to confectioneries. Additionally, Spanish peanuts find applications in salted nuts and peanut butter, contributing to a diverse range of culinary delights.

Notably, the Ole Spanish variety, introduced in 2015 after extensive research, stands out for its high oleic acid content. Oleic acid is a beneficial monounsaturated fatty acid known for its health benefits. The Ole Spanish peanuts exhibit a high roasted peanut score and an extended shelf life, making them an ideal choice for candy bars and snack nuts.

Geographically, small Spanish peanuts are cultivated in regions such as South Africa, as well as the southwestern and southeastern United States. Historically, until 1940, the majority of peanuts grown in the state of Georgia in the United States were of the Spanish type. However, changing trends since then have seen a shift towards larger-seeded, higher-yielding, and more disease-resistant cultivars.

Spanish peanuts' higher oil content not only makes them valuable for culinary purposes but also positions them as an excellent source for oil extraction. Their adaptability to various uses, from candies to oils, underscores their versatility and importance in the global peanut industry. While their prominence may have shifted over the years, Spanish peanuts remain a crucial component in the world of peanut-based products, contributing to the diverse array of flavours and textures enjoyed by people worldwide.

Virginia Peanuts

Regions grown: Virginia peanuts are primarily cultivated in the southeastern United States and are also significantly produced in India. Additionally, these peanuts are grown, albeit on a smaller scale, in specific regions of Argentina and China.

Characteristics:

1. Large kernels, making them the largest among peanut varieties.
2. Known as “cocktail nuts” due to their popularity in social settings.
3. Premium quality with a hearty crunch.

Uses:

1. Ideal for in-shell roasting and salting, often served at social gatherings.
2. Suitable for a generous coating of seasonings, making them perfect for flavoured or salted peanuts.
3. Employed in confections and snacks, enhancing the product.

Virginia peanuts, renowned globally for their exceptional size, taste, and quality, represent a pinnacle of agricultural achievement in the peanut industry. Although named after the state where they were first cultivated extensively, these peanuts are celebrated far beyond the borders of the United States, finding their place in markets, kitchens, and cuisines around the world. The unique climate and geographical conditions of the southeastern U.S., including Virginia, North Carolina, South Carolina, and parts of Georgia, provide the perfect environment for growing Virginia peanuts. This region’s warm, temperate climate, characterized by hot summers and mild winters, coupled with sandy, well-drained soil, mirrors conditions in other parts of the world where agriculture thrives, making the cultivation of Virginia peanuts a testament to the importance of region and climate in agricultural production.

Virginia peanuts are distinguished by their large kernels, which are significantly bigger than those of other peanut varieties like the Runner, Spanish, or Valencia. This characteristic, along with their crunchy texture and rich, buttery flavor, makes Virginia peanuts a favored ingredient in gourmet products worldwide. From high-end confectioneries to premium snack mixes, the appeal of Virginia peanuts crosses cultural and culinary boundaries, showcasing their versatility and superior quality. Additionally, their nutritional profile, rich in protein, healthy fats, vitamins, and minerals, contributes to their global popularity, aligning with a growing international focus on health and wellness.

The cultivation of Virginia peanuts is a labor of love, requiring careful attention and a commitment to quality that is evident in the final product. This dedication to excellence has positioned Virginia peanuts as a luxury item in international markets, prized for both their flavor and nutritional value. As they continue to be a symbol of gourmet quality around the globe, Virginia peanuts exemplify how traditional agricultural practices can meet global demand, bridging cultures through the universal language of food. Their story is not just one of American heritage but a narrative of how a product can gain international acclaim and appreciation, reflecting the interconnectedness of global agricultural practices and culinary traditions.

Valencia Peanuts
(Red Natal or Red-skin)

Region grown: Valencia peanuts are primarily cultivated in the southwestern United States, particularly in states like Texas and New Mexico. They are also grown in various peanut-producing regions worldwide, including South Africa and China, to meet global demand for this peanut variety.

Characteristics:

1. Sweet flavor with vibrant red skin.
2. Longer shells that contain three or more kernels.

Uses:

1. Often roasted and sold in-shell, appreciated for their natural sweetness.
2. Suitable for boiling, offering a unique flavor and freshness.
3. Used in the production of natural peanut butter, contributing a sweet taste profile.

Valencia peanuts stand out as a unique variety within the peanut family, distinguished by their sweet flavor and typically containing three to five kernels per shell. This variety is named after Valencia, a region in Spain, but it thrives in various parts of the world, notably in the arid and semi-arid regions where the climate conditions align perfectly for their cultivation. Valencia peanuts are predominantly grown in the United States, particularly in New Mexico, but their cultivation spans across several countries, including parts of South America and Africa. The warm, dry climate of these regions provides an ideal environment for growing Valencia peanuts, as they require a long, warm growing season to develop their full flavor and nutritional profile.

Characteristically, Valencia peanuts are known for their bright red skins and the higher number of kernels per pod. This variety is especially sought after for roasting and boiling, a testament to their superior taste and versatility in culinary applications. The sweet flavor of Valencia peanuts makes them a preferred choice for all-natural peanut butter production and a popular snack, either roasted or boiled. In addition to their culinary uses, Valencia peanuts are appreciated for their high nutritional value, being an excellent source of protein, healthy fats, vitamins, and minerals that contribute to a balanced diet.

Globally, the demand for Valencia peanuts underscores the growing interest in diverse and nutritious food sources. The cultivation practices for Valencia peanuts, while concentrated in certain regions, reflect a broader agricultural knowledge and adaptability to varying climate conditions. As consumers worldwide become more interested in the quality and origin of their food, Valencia peanuts represent an intersection of traditional agriculture and global culinary trends. Their unique characteristics and the specialized regions in which they are grown highlight the importance of agricultural diversity and the potential for traditional crops to find a place in the international market.

Indian Peanut Varieties

India's significant reliance on imported edible oils due to a domestic shortfall highlights the crucial role of groundnut cultivation in mitigating this gap. Groundnut, accounting for around 45% of the oilseeds area and 55% of the oilseeds production, offers potential for bridging the vegetable oil deficit. However, the average yield in India is low compared to global standards, primarily because of the widespread non-adoption of improved varieties that could increase yield by about 20%. Therefore, over the past 5-10 years, a lot of improved groundnut varieties have been developed in India, encompassing three main botanical groups: pish and Valencia types, known as "Bunch," which are erect-growing with light green foliage and clustered pods at the base, and the Virginia group, including semi-spreading and spreading types, characterized by dark green foliage with pods scattered along the branches. Groundnut cultivation spans two main seasons, Kharif (rainy) and Rabi/Summer (post-rainy), with a preference for shorter-duration varieties under irrigated conditions during the Rabi/Summer season. This diversity in groundnut varieties underscores the crop's potential to improve India's edible oil production scenario, emphasising the importance of adopting improved cultivars to enhance yields.

Table 3.1 Some of the important peanut varieties produced in India

Variety	Year of Release	Yield Potential (Kg/ha)	Oil Content (%)	Safety Features/Traits
TG-39	2008	2054-3154	-	Medium duration
TG 51	2008	2675	-	Tolerant to stem rot and root rot; suitable for rabi-summer season
Ajeya (R 2001-3)	2008	2440	46-48	Resistant to PBND; drought-tolerant; recommended for kharif season
Girnar 2 (PBS-24030)	2008	2907	51	Virginia bunch type with 'stay green' leaves; tolerant to rust, LLS, PSND; recommended for kharif season
Utkarsh (CSMG 9510)	2009	21.92	49	Resistant to rust, possesses fresh seed dormancy up to 40-45 days; recommended for kharif season
Kadiri 9	2009	2500-3000	52	Tolerant of thrips, jassids, nematodes; recommended for kharif season
Greeshma	2009	2000-2500 (R); 4000-4700	49	Tolerant to LLS, drought, high temperature, aflatoxin; recommended for kharif and rabi-summer season
Mallika (ICHG 00440)	2009	2579	48	Resistant to collar rot, PBND; bold-seeded; recommended for kharif season
Jawahar Groundnut 23	2009	1631	49	Tolerant to ELS and LLS; drought-tolerant; recommended for kharif season

Kadiri Harithanhra (K1319)	2010	3728	48	Multiple diseases and insect pests resistant, fresh seed dormancy up to 20 days; recommended for rabi-summer season
Bheema	2010	3500-5000	45	Suited to Kharif and rabi regions
Pratap Raj Mungphalli	2011	1600-2200	48	Moderately tolerant to ELS, LLS, PBND; suited for Kharif and Summer
ALG-06-320	2011	3500	49	Suitable for rabi/summer
RG-510	2011	2600	49	Resistant to collar rot, stem rot, early leaf spot, rust, stem necrosis
Phule vyas (JL-220)	2011	2000	52	Early maturing, high oil content
Rohini	2011	3700-4000	50	Suited to Kharif and rabi areas; tolerant to mid and end-season
Guj Jun Groundnut-34 (GJG-34) (AG2012-6)	2019	3715	52.8 (High oil content)	Tolerant to stem rot, collar rot, dry root rot, foliar fungal, PBND, tolerant to Helicoverpa & Spodeptera leaf damage
Dheeraj (TCGS 1073)	2019	K-2547, Rabi-3690	48-49	Spanish Bunch, Maturity 105-115 days; heat tolerance, high water use efficiency
Phule Unnati (RHRS-6083)	2019	2854-K, 3990-R/S	52 (High oil content)	Tolerant to leafspot (Tikka), stem rot, rust, spodeptera, thrips; 2-3 (mostly 3) seeds per pod
Konkan Bhuratna (RTNG-29)	2019*	2500-3000	50	Resistant to leaf spot, rust, PBND, alternaria, thrips, jassids, leaf miner, defoliater insects & pests
Gujarat Groundnut HPS2 (GG-HPS 2)	2019*	2835	48.8	Resistant to stem rot, collar rot, rust
Central Pragati (TCGS-894)	2020	2816	41	Spanish Bunch, high yield, high shelling (70%), maturity 115 days
Dh256	2020	3258	47	Tolerant to rust, LLS, spodoptera, thrips; drought-resistant, small green leaved, pod with moderate constriction, tan colour kernels, shelling 73%
TMV-14	2019	K-2129 R-2280	48	Moderately resistant to rust, LLS disease; less incidence of spodoptera litura, thrips, and leafminer

Source: Seed Division, GOI Website (seednet.gov.in) & ICAR Institutes.

Peanut Forms

Peanuts, cherished for their versatility and nutritional value, come in various forms to suit diverse culinary preferences and applications. From the natural allure of in-shell peanuts to the convenience of shelled varieties, each form offers unique characteristics that enhance both flavor and texture in a multitude of dishes.

In-shell

In-shell peanuts, encased in their protective shells, offer a delightful crunch and are often enjoyed as a traditional snack or roasted for added flavor.

Shelled (with skin)

Shelled peanuts, conveniently stripped of their outer covering, are versatile ingredients for both savory and sweet dishes, adding a rich nutty flavor and texture.

Blanched (Shelled without skin)

Blanched peanuts, with their skins removed, provide a smooth and creamy consistency, making them perfect for creating silky peanut butter or adding depth to baked goods.

Splits (Halves)

Peanut splits, halved during processing, are excellent for enhancing the presentation of dishes like salads, desserts, and stir-fries, offering a unique shape and texture.

Flour

Peanut flour, crafted from finely ground peanuts, serves as a gluten-free alternative in baking and cooking, adding a nutty flavor and protein boost to recipes while maintaining a light texture.

Peanut Butter

Peanut butter, a beloved spread made from ground peanuts, provides a creamy or crunchy indulgence perfect for sandwiches, smoothies, and baking, offering a satisfying balance of sweetness and richness.

Peanut Oil

Peanut oil, extracted from peanut kernels, boasts a high smoke point and a mild flavor profile, making it an ideal choice for frying, sautéing, and baking. With its ability to withstand high temperatures without imparting unwanted flavors it lends dishes a crisp texture and a subtle nutty essence.

Famous Peanut Cuisines

Peanuts are a global culinary treasure, weaving their way into a myriad of cuisines worldwide. From the aromatic spices of India to the fiery stir-fries of China and the comforting stews of Africa, peanuts feature prominently in diverse culinary traditions, adding depth, flavor, and texture to a wide array of dishes.

Kung Pao Chicken, China

Kung Pao Chicken, a signature dish from China's Sichuan province, is a fiery stir-fry of chicken, peanuts, chili peppers, and vegetables, renowned for its bold flavors and contrasting textures.
The inclusion of peanuts in Kung Pao Chicken not only provides a satisfying crunch but also adds a nutty richness that enhances the dish's overall complexity, showcasing how peanuts are integral to achieving the perfect balance of flavors and textures in Chinese cuisine.

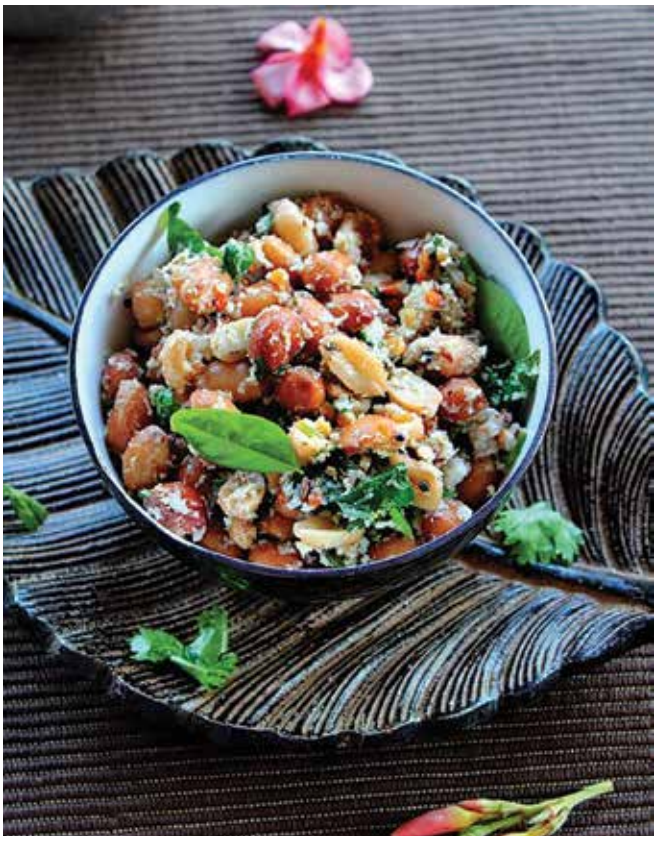
Dan Dan Noodles, China

Dan Dan Noodles, another celebrated dish from Sichuan cuisine, features tender noodles bathed in a spicy peanut sauce and topped with minced meat, preserved vegetables, and peanuts. The creamy peanut sauce not only imparts a luscious texture but also infuses the dish with a nutty depth of flavor, highlighting the indispensable role of peanuts in creating the distinctively bold and aromatic taste of Sichuan cuisine.

Peanut Chutney, India

Peanut Chutney, a staple condiment in South Indian cuisine, is a flavorful blend of roasted peanuts, coconut, spices, and herbs, served alongside dosas, idlis, and other traditional dishes. The creamy consistency and nutty aroma of peanut chutney complement the spiciness of South Indian fare, demonstrating how peanuts elevate the dining experience by adding a unique depth of flavor and richness to each bite.

Peanut Sundal, India

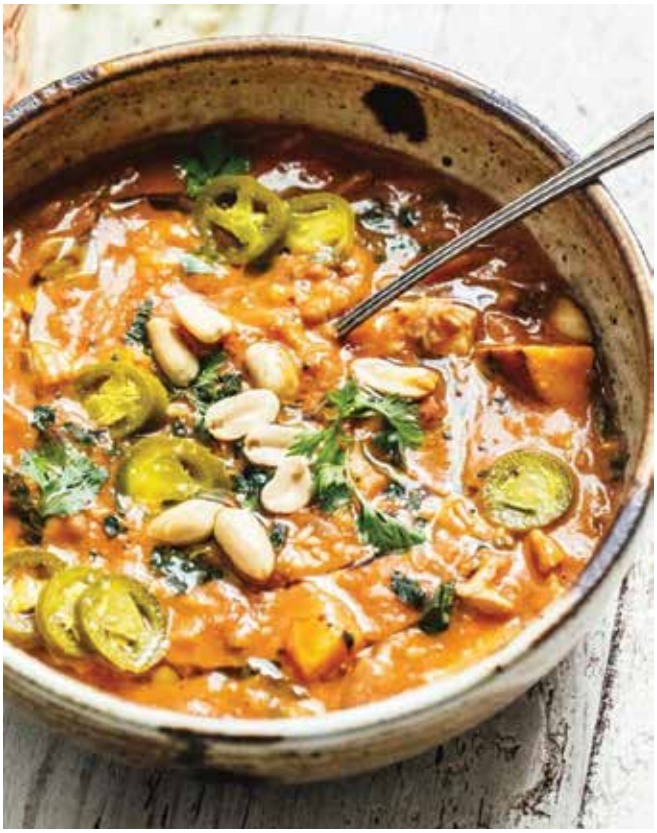


Peanut Sundal, a popular snack enjoyed during Indian festivals, features boiled peanuts tossed with coconut, spices, and herbs, offering a crunchy and nutritious treat bursting with flavor. The inclusion of peanuts in Sundal not only provides a satisfying crunch but also enhances the dish with its wholesome goodness, showcasing how peanuts are cherished for their nutritional value and versatility in Indian cuisine.

Masala Peanuts, India

Masala Peanuts, a beloved street food across India, are peanuts coated in a spicy and tangy flour mixture and then deep-fried or roasted. This snack highlights the peanut's ability to pair perfectly with a wide range of spices, creating a crispy, flavorful treat that's both irresistible and indicative of the peanut's adaptability to Indian flavors, celebrating its capacity to carry the rich and vibrant spices that define Indian cuisine.

Maafe, Senegal (West Africa)



Maafe, a comforting stew from Senegal, West Africa, features meat, vegetables, and a rich sauce thickened with ground peanuts. This dish exemplifies the peanut's role in adding creaminess and a subtle, nutty sweetness that complements the savory components, illustrating how peanuts can transform simple ingredients into a deeply satisfying and nourishing meal, integral to West African culinary traditions.

Spicy Peanut Stew (Groundnut soup), Nigeria

Spicy Peanut Stew, also known as Groundnut Soup in Nigeria, combines peanuts with spices, tomatoes, and often chicken or fish, creating a thick, hearty stew. The peanuts not only thicken the stew but also contribute a rich, creamy texture and a depth of flavor that is both comforting and complex, showcasing the peanut's essential role in enriching Nigerian cuisine with its distinctive taste and nutritional value.

Nkatie Cake (Peanut Brittle), Ghana

Nkatie Cake (Peanut Brittle) in Ghana is a simple yet delightful confection made from caramelized sugar and roasted peanuts. This sweet treat emphasizes the peanut's versatility, transforming it into a crunchy, sweet snack that's deeply embedded in Ghanaian snack culture. The peanut's natural oils and flavor meld beautifully with the caramel, highlighting how peanuts can enhance the sweetness of desserts and snacks, making them even more enjoyable.

Pad Thai peanut, Thailand

Pad Thai, a globally beloved dish from Thailand, combines stir-fried rice noodles with eggs, tofu, tamarind pulp, fish sauce, and, crucially, peanuts. The sprinkled peanuts on top add a crucial crunch and nutty flavor that ties all the savory, sweet, and sour elements together, underlining the peanut's indispensable role in adding texture and depth to Thai cuisine, making every bite a perfect harmony of flavors.

Massaman Curry, Thailand

Massaman Curry, a rich Thai curry, blends the creaminess of coconut milk with tender meat, potatoes, and roasted peanuts. The peanuts in Massaman Curry not only contribute to the dish's thickness but also its layered flavor profile, offering a subtle nutty sweetness that balances the spice and acidity, showcasing how peanuts can elevate a curry into a creamy, comforting, and complex culinary delight.

Peanut Satay Sauce, Indonesia

Peanut Satay Sauce, originating from Indonesia, is a thick, spicy, and sweet sauce made from ground roasted peanuts, coconut milk, and various spices, typically served with grilled skewered meat. The sauce's creamy texture and rich, complex flavor profile exemplify how peanuts can be transformed into a condiment that enhances the taste and appeal of simple grilled meats, turning them into a deeply flavorful and satisfying meal.

Goi Cuon (Spring-roll with peanut dipping sauce), Vietnam

Goi Cuon, Vietnamese spring rolls filled with shrimp, pork, vegetables, and herbs, served with a peanut dipping sauce, demonstrate the peanut's versatility and importance in Vietnamese cuisine. The peanut sauce, with its creamy texture and savory-sweet flavor, complements the fresh, crisp ingredients of the rolls, showcasing how peanuts can bring together diverse flavors and textures, enhancing the overall dining experience with its rich, nutty taste.

China and India Peanut Consumption Pattern

China and India stand as two of the world's largest consumers of peanuts, showcasing distinct consumption patterns that reflect their diverse culinary cultures and economic landscapes. In China, peanuts play an integral role in both the culinary scene and as a raw material for oil production. The Chinese consumption pattern is heavily influenced by the nation's gastronomic traditions, where peanuts are used in a myriad of dishes ranging from stir-fries to cold salads, and even in sweets and snacks. The demand for peanuts in China is also driven by the widespread consumption of peanut oil, considered one of the primary cooking oils.

As a result, the country not only consumes a significant quantity of domestically produced peanuts but also imports to meet the demand. The festive season, particularly the Lunar New Year, sees a surge in peanut consumption as they are considered symbols of longevity and health, further embedding them into the cultural fabric of Chinese food consumption.

China

Table 3.2 Analytical overview of peanut consumption forms in China

Production	18330.00
Exports	458.00
Imports	940.00
Seed Purpose	1283.1
Total Consumption (Production + Imports - Exports - retained for seed purpose)	17528.90

Production

Seed Purpose	1283.10	7.00%
Oil	10081.50	55.00%
Food	6507.40	35.50%
Export	458.00	2.50%
Total	18330.00	100.00%

Import

For Oil Extraction	260.55	28%
For Food	679.45	72%
Total	940.00	100%
Export	458.00	2.50%
Total	18330.00	100.00%

India's peanut consumption pattern is equally rooted in its rich culinary traditions and economic considerations. Known locally as 'groundnuts,' peanuts in India are consumed in various forms - raw, roasted, boiled, and as a key ingredient in numerous traditional dishes. They are an essential source of protein for a significant portion of the Indian population, especially among vegetarians. Peanuts are also extensively used in the production of sweets and snacks that are ubiquitously consumed across the country.

Moreover, peanut oil holds a significant place in Indian kitchens, prized for its nutritional value and flavor. Seasonal consumption peaks during festivals like Diwali and Pongal, where peanuts are not only a culinary staple but also carry cultural significance. The snack market in India, characterized by a growing demand for healthier, convenient food options, continues to drive innovation in peanut-based products, further influencing the country's peanut consumption patterns.

Consumption

Oil Extraction	10342.05	59%
Food	7186.85	41%
Total	17528.90	100%
Export	458.00	2.50%
Total	18330.00	100.00%

Oil Extraction

Peanut Meal	5688.13	55%
Peanut Oil	4653.92	45%
Total	10342.05	100%
Export	458.00	2.50%
Total	18330.00	100.00%

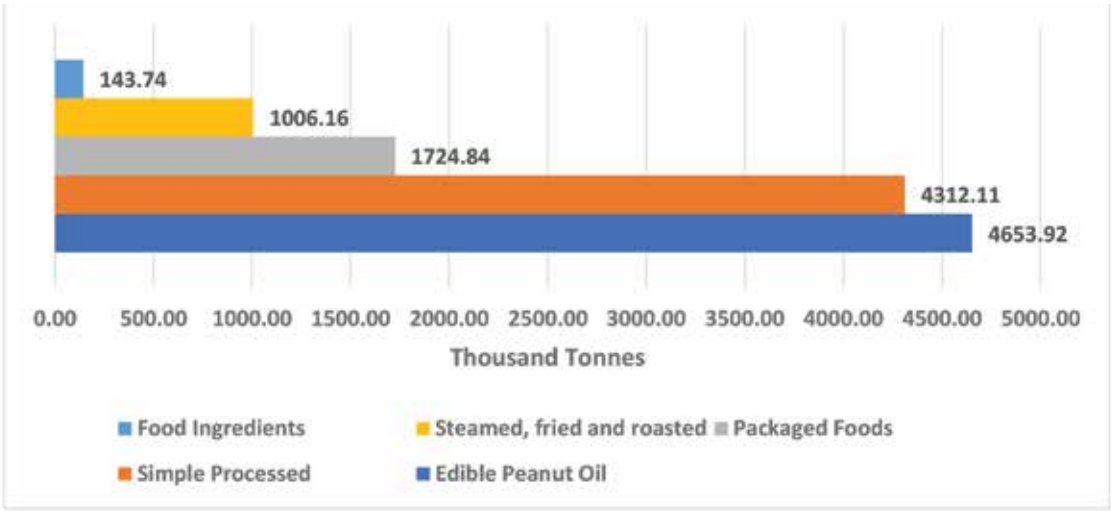
Food

Highly processed	2874.74	40%
Simple Processed	4312.11	60%
Total	7186.85	100%
Export	458.00	2.50%
Total	18330.00	100.00%

Highly Processed

Food Ingredients	143.74	5%
Packaged Food	1724.84	60%
Steamed, fried,roasted	1006.16	35%
Total	2874.74	100%
Total	18330.00	100.00%

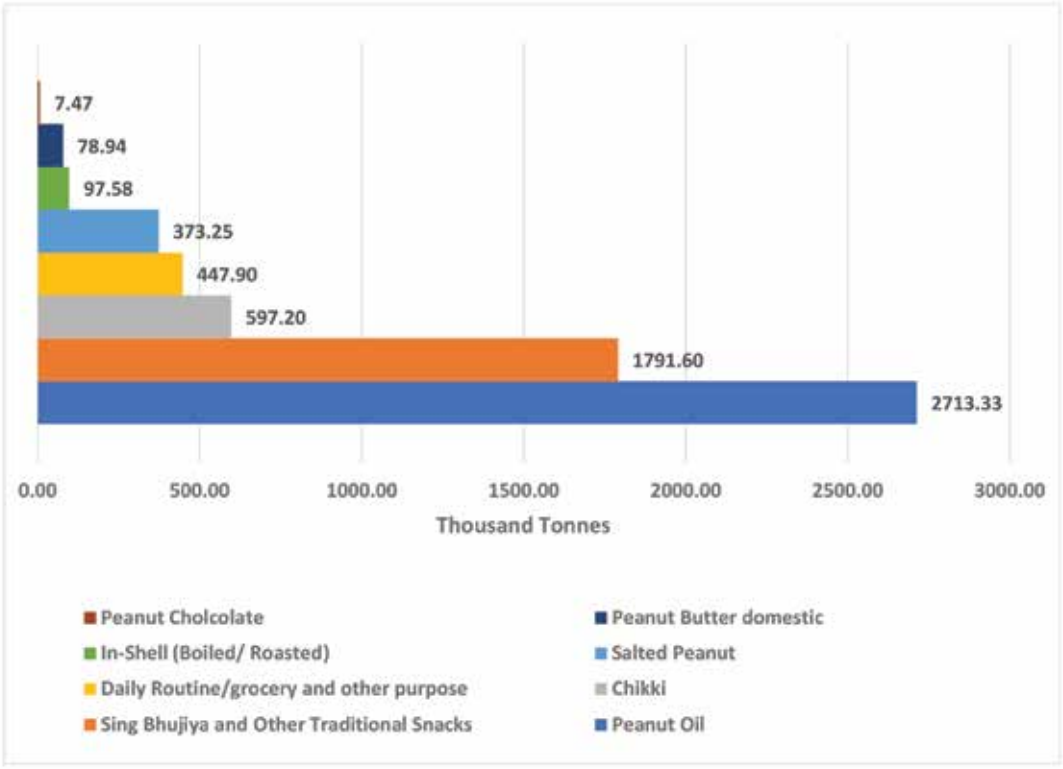
Figure 3.1 End-consumer consumption of peanuts in China



India

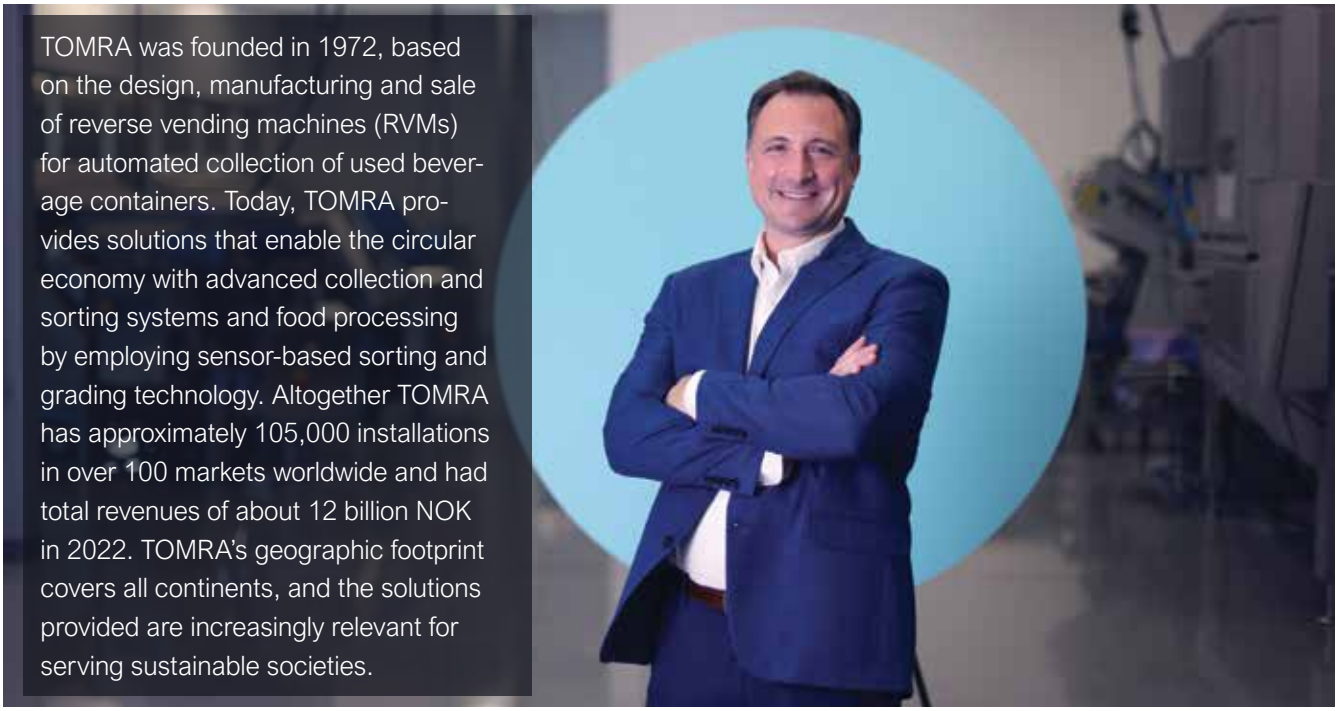
Table 3.3 Analytical overview of peanut consumption forms in India

Production	7465.00
Exports	615.24
Imports	4.00
Seed Purpose	746.50
Total Consumption (Production + Imports - Exports - retained for seed purpose)	6107.26



Source: Industry Sources and Eventell Global Research

Maximising Quality and Efficiency in Peanut Processing: TOMRA's Advanced Sorting Solutions



TOMRA was founded in 1972, based on the design, manufacturing and sale of reverse vending machines (RVMs) for automated collection of used beverage containers. Today, TOMRA provides solutions that enable the circular economy with advanced collection and sorting systems and food processing by employing sensor-based sorting and grading technology. Altogether TOMRA has approximately 105,000 installations in over 100 markets worldwide and had total revenues of about 12 billion NOK in 2022. TOMRA's geographic footprint covers all continents, and the solutions provided are increasingly relevant for serving sustainable societies.

Mr Brendan O'Donnell, Global Category Director - Nuts & Dried Fruit

TOMRA

Brendan O'Donnell is the Global Segment Director of Nuts and Citrus TOMRA Food. He has a bachelor's degree in Agricultural Systems and Environment from UC Davis and has more than 20 years' experience in the food industry. He is passionate about the impact that healthy, safe, and delicious food, specifically nuts and dried fruit, can bring to people around the world by dramatically improving their quality of life. As the Director for Nuts at TOMRA, Brendan is responsible for working with global nut and dried fruit organizations to fully understand the wants and needs of the industry, so together, we can focus resources toward improving the customer and consumer experience through state-of-the art sorting technology.

Peanuts are rightly celebrated for their high nutritional value, great taste, versatility and excellent protein source. As we continue to see rising demand for healthy, plant-based proteins, we should see their popularity continue to grow in the future. However, we in the peanut industry must stay vigilant to ensure the quality and safety of peanuts is never compromised if we want to ensure the long-term future of our business. As the demand for high-quality and safe food products continues to rise, the peanut shelling industry faces the challenge of ensuring that peanuts continue to meet increasing quality and safety standards. In this pursuit, TOMRA, the global leader in peanut sorting solutions, has developed advanced peanut sorting technology that maximizes efficiency, boosts overall yield, removes difficult defects like porous rock, allergens and freeze damage while also handling the critical issue of aflatoxin.

Importance of sorting in the peanut industry

In the world of peanut processing, sorting is not just a step in the production line; it's a critical quality control measure that determines the safety and value of the final product. Peanuts, like other agricultural products, are susceptible to various contaminants and defects. Among these, aflatoxins – toxic metabolites produced by certain fungi – pose a significant health risk and are a primary concern in the industry. Aflatoxin contamination can occur at any stage from pre-harvest to storage, making effective sorting a necessity for ensuring consumer safety and compliance with stringent international food safety regulations. Unfortunately, Aflatoxin is not the only concern to the industry. Additional challenges include contamination from other types of nuts, allergens, light weight porous rock with similar size, shape, color and density as peanuts as well as a common broken tooth claim- freeze damage. Fortunately, TOMRA has solutions to each of these unique challenges.

TOMRA's leadership in aflatoxin removal

At TOMRA, we've developed advanced sorting technologies that set industry benchmarks in aflatoxin removal. Our systems employ a combination of near-infrared (NIR) spectroscopy which we call BSI+ and laser technologies to detect and eliminate aflatoxin-contaminated nuts with remarkable precision. This multi-faceted approach allows us to identify and remove not only the visibly damaged peanuts but also those with hidden signs of contamination. Our commitment to innovation and excellence in this area has not only helped our clients meet food safety standards but also maintain consumer trust – a vital asset in the food industry. TOMRA has detox machines installed across many categories including almonds, peanuts, figs, brazil nuts and more. There are dozens of TOMRA detox sorters established in the global peanut industry today with customer testimonials available to support the proven effectiveness of these sorters.

Innovation with TOMRA's BSI+ system

The TOMRA BSI+ optical system is at the forefront of our sorting technology. This innovative BSI+ (Biometric Signature Identification) system utilizes many wavelengths both visible and non-visible to analyze the biometric characteristics of each peanut, like a digital fingerprint. Each product, whether peanut, stone, shell, or damage has its own unique fingerprint regardless of color, size, shape or density. Unlike traditional methods, BSI+ can detect subtle defects that are often invisible to the human eye or conventional sorting systems. This includes those light-colored, low-density stones we mentioned earlier, common damage and even freeze-damaged peanuts. Without the need to focus only on color or shape, the precision of BSI+ is a game-changer, allowing peanut shellers to achieve a higher level of purity in their product, reducing the risk of quality-related rejections, and enhancing overall brand reputation.

Efficiency in removing allergens

In addition to removing these difficult defects, the TOMRA BSI+ remains unmatched in allergen removal. Cross-contamination with other types of nuts can pose severe risks to individuals with allergies and cause massive recall claims if not handled properly. The BSI+ system's advanced detection capabilities enable it to identify and remove traces of other nuts with extreme efficiency. Common allergens removed using BSI+ include other nuts like almonds or pecans, chufa (nutgrass), corn, cocoa, cottonseed, coffee or any other crop that

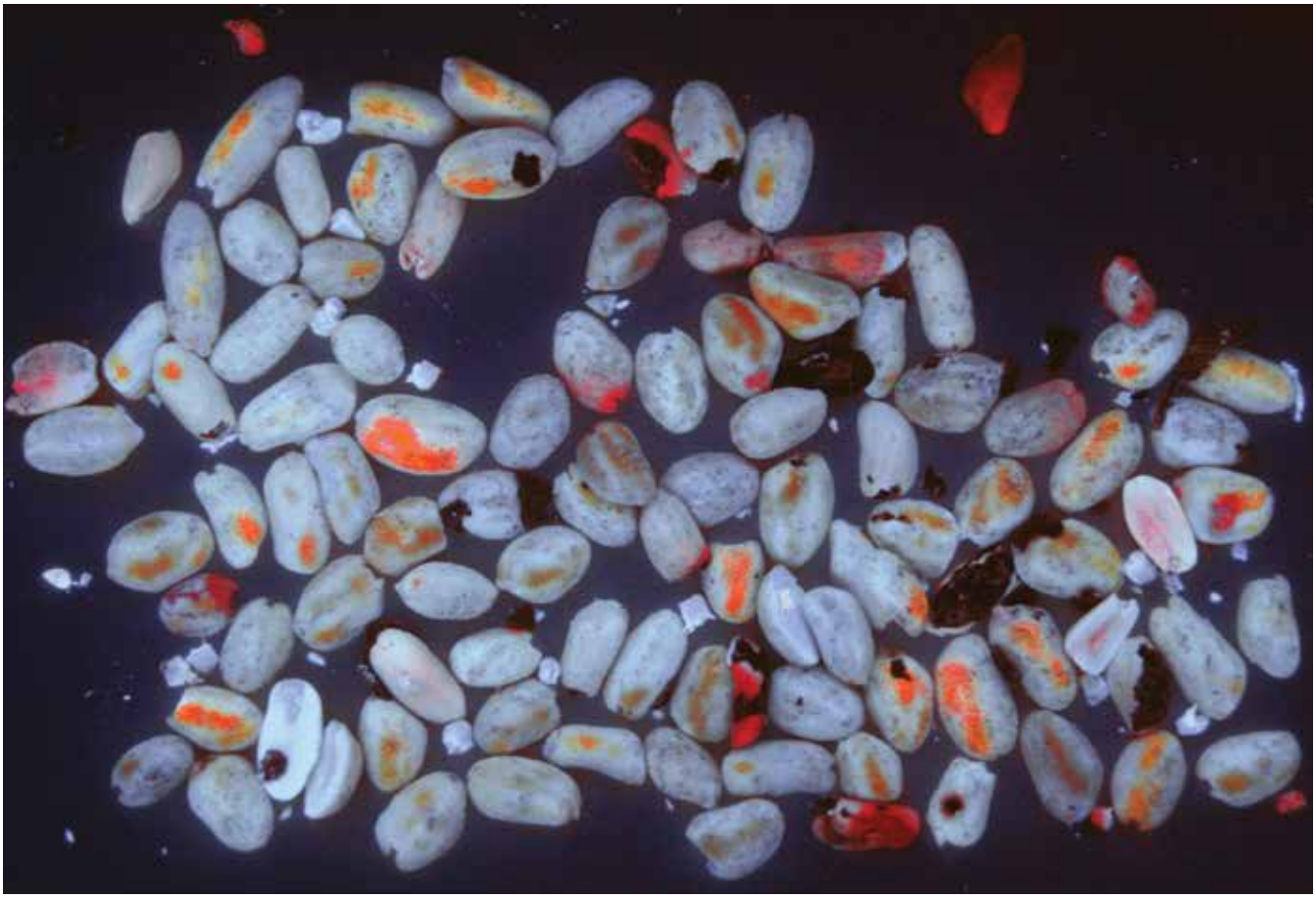
is harvested near the peanut production areas. This not only ensures the safety of the end product for consumers with allergies but also helps processors comply with the increasingly strict allergen labeling laws around the world.

Quality vs. Yield: Striking the balance

One of the biggest challenges in sorting is maximizing defect removal while minimizing the loss of good product. At TOMRA, we understand the economic impact of yield loss and have engineered our sorting solutions to strike an optimal balance. Our technologies are designed to identify and remove defects with unparalleled accuracy, ensuring that the maximum amount of good product remains in the processing line. To choose one unique aspect of our machines which helps us achieve this goal, we include a "rear-ejection system" for many products such as peanuts. This system allows the air rejection bar to be placed closer to the product, resulting in a more accurate, smaller and more powerful blast of air to remove defects while minimizing the chances that a good peanut will be taken out along with the defect. This added efficiency translates into higher overall yields, reduced waste, and increased profitability for our customers.

Conclusion

As we look to the future, TOMRA continues to innovate and lead in the peanut sorting industry. Our commitment to safety, efficiency, and quality has positioned us not only as a technology provider but as a trusted partner in the peanut shelling and global food industry. In my role at TOMRA as Global Segment Director, nuts and citrus, I am proud to be with a company that is making a tangible difference in food safety and quality. Our journey is far from over, and we remain dedicated to advancing our technologies and solutions to meet the evolving needs of the peanut industry and ensure a safer, more sustainable food supply for all.



Chapter 4
Global trade regulations and standards

Quality and safety requirements

The intricate realm of peanut quality and safety is defined by a delicate balance between the complexities of agricultural practices and the stringent international standards that govern their production. From the inherent challenges of controlling aflatoxin contamination to the careful management of pesticide residues, peanuts demand meticulous attention at every stage of cultivation and processing. The global community, as represented by entities like the Codex Alimentarius, has established comprehensive guidelines, addressing factors ranging from moisture content and foreign material control to the prevention of mold and decay. This multifaceted approach not only safeguards consumer health but also reflects an evolving landscape where scientific advancements and changing consumer expectations continually shape the intricate interplay of regulations, practices, and industry dynamics.

Quality factors (codex alimentarius)

Quality assurance:

- Peanuts designated for human consumption must meet safety and suitability criteria.
- Prohibited elements include abnormal flavours, undesirable odours, as well as the presence of living insects and mites.

Moisture content:

- Peanuts in-pod should not exceed 10% moisture content.
- Peanut kernels should have a moisture content of no more than 9%.

Kernels condition:

- The allowable percentage of moldy, rancid, or decayed kernels is limited to 0.2% by weight.

Filth control:

- The presence of impurities of animal origin, including dead insects, should not surpass 0.1% by weight.

Organic and inorganic matter:

- Peanuts in-pod and peanut kernels should both have a maximum tolerance of 0.5% for other organic and inorganic extraneous matter.

Contaminants

Table 4.1 International minimum levels for aflatoxins in ready-to-eat peanuts:

Country	Total Aflatoxins (B1-B2-G1-G2) (ppb)	Source
CODEX	15 (FP)	GENERAL STANDARD FOR CONTAMInANTS AND ToXInS In FOOD AND FEED CXS 193-1995 (Revised 2022)
Argentina	20 (RTE & FP)	eglamento Técnico Mercosur sobre Límites Máximos de Aflatoxinas Admisibles en Leche, Maní y Maíz (MERCOSUR/GMC/RES. Nº 25/02)
Brazil	20 (RTE & FP)	Resolução Nº7, de 18 de fevereiro de 2011, Ministério da Saúde da Brasil
China	-	GB 2761-2011 Food Safety National Standard for Maximum Levels of Mycotoxins in Foods
EU	15 (FP) 4 (RTE)	Commission Regulation (EU) Nº 165/2010
India	15 (FP) 10 (RTE)	Food Safety and Standards Authority of India (FSSAI)
USA	20 (RTE & FP)	U.S. Food and Drug Administration Compliance Policy Guides (CPG) Sec. 570.375. Aflatoxin in Peanuts and Peanut Products.

RTE - Ready to eat, FP - Finished-product

Pesticides

Table 4.2: Codex alimentarius maximum residue levels for peanuts (2023)

Pesticide	MRL	Year of Adoption
Abamectin	0.005 mg/kg	2016
Aldicarb	0.02 mg/kg	1997
Azoxystrobin	0.2 mg/kg	2009
Bentazone	0.05 mg/kg	2014
Benzovindiflupyr	0.04 mg/kg	2017
Bixafen	0.01 mg/kg	2022
Carbendazim	0.1 mg/kg	2006
Chlorantraniliprole	0.06 mg/kg	2017
Chlorothalonil	0.1 mg/kg	2011
Clethodim	5 mg/kg	2003
Difenoconazole	0.01 mg/kg	2016
Diflubenzuron	0.1 mg/kg	2013
Dimethenamid-P	0.01 mg/kg	2006
Disulfoton	0.1 mg/kg	
Dithiocarbamates	0.1 mg/kg	1999
Fenamiphos	0.05 mg/kg	2004
Fenbuconazole	0.1 mg/kg	2013
Flumioxazin	0.02 mg/kg	2016
Fluopyram	0.2 mg/kg	2018
Flupyradifurone	0.04 mg/kg	2017
Flutriafol	0.15 mg/kg	2012
Fluxapyroxad	0.01 mg/kg	2013
Hydrogen Phosphide	0.01 mg/kg	
Imazamox	0.01 mg/kg	2015
Imazapic	0.05 mg/kg	2014
Imazethapyr	0.1 mg/kg	2017
Imidacloprid	1 mg/kg	2009
Indoxacarb	0.02 mg/kg	2006
Isopyrazam	0.01 mg/kg	2018
Metconazole	0.04 mg/kg	2021
Methoxyfenozide	0.03 mg/kg	2010
Methyl Bromide	0.01 mg/kg	1999
Methyl Bromide	10 mg/kg	1999
Penthiopyrad	0.05 mg/kg	2014
Permethrin	0.1 mg/kg	
Propargite	0.1 mg/kg	
Prothioconazole	0.02 mg/kg	2009
Pydiflumetofen	0.05 mg/kg	2021
Pyrethrins	0.5 mg/kg	2003
Quintozene	0.5 mg/kg	2003
Saflufenacil	0.01 mg/kg	2017
Tebuconazole	0.15 mg/kg	2012
Trifloxystrobin	0.02 mg/kg	2006

Source: CODEX Alimentarius Pesticide Database

Standards and grades

Standards and Grades constitutes a vital framework that governs the quality and marketability of peanuts worldwide. These standards encompass a meticulous assessment of factors like size, color, and freedom from defects, ensuring product consistency and consumer safety. The grading system further refines categorizations, influencing the pricing and application of peanuts in various industries. As an integral part of international and national regulations, these standards reflect ongoing efforts to harmonize guidelines, adapting to advancements in agricultural practices, processing technologies, and evolving consumer preferences. Ultimately, this framework plays a pivotal role in sustaining the reputation and reliability of peanut products across the global market.

Quality Tolerance

Table 4.3: The codex standard quality tolerance levels applied to peanuts either in the pod or in the form of kernels

Quality Criteria	Specification
In-Pod Defects	
Empty Pods	Not to exceed 3% by mass.
Damaged Pods	Not to exceed 10% by mass.
Discolored Pods	Not to exceed 2% by mass.
Kernel Defects	
Damaged Kernels:	
Freezing Injury	Not to exceed 1% by mass.
Shriveled Kernels	Not to exceed 5% by mass.
Insect/Worm Damage	Not to exceed 2% by mass.
Mechanical Damage	Not to exceed 2% by mass.
Germinated Kernels	Not to exceed 2% by mass.
Discolored Kernels	Not to exceed 3% by mass.
Broken and Split Kernels	Not to exceed 3% by mass.
Other Criteria	
Peanuts of Designated Type	Not to exceed 5% by mass.

Source: CODEX STANDARD 200-1995 Codex Standard for Peanuts, International Nut & Dried Fruit Council.

India: In the context of India, specific grade specifications are applicable to peanut kernels recognized commercially as 'Red Natal/Peanuts' and 'Bold/Coromandal' (Arachis hypogaea L.). Regarding their general characteristics, these kernels are derived from pods commercially identified as 'Red Natal/Peanuts' or 'Bold/Coromandal'. They are expected to exhibit the distinctive shape, configuration, and appearance characteristic of the variety. Sourced from the latest crop season, these kernels should possess a dry texture, devoid of moisture on touch, and should exhibit no visible indications of insects or molds. Furthermore, they are mandated to be free from dirt and any unpleasant odors.

Table 4.4: Minimum quality standards applied to peanuts for human consumption marketed in the india

Maximum limit of tolerance			
	Red Natal/Peanuts (& Bold/ Coromandal)		
Grade designation	Special	Standard	General
Foreign matter %	1.0 (0.5)	2.0 (1)	3.0 (2)
Damaged pots %	0.5 (1)	1.0 (1.5)	2.0
Slightly damaged kernels %	0.5	1.0	2.0
Shriveled and immature kernels %	2.0	4.0	6.0
Splits and broken kernels %	5.0	10.0	15.0
Nooks %	1.0	2.0	3.0
Admixture of other varieties %	1.0	2.0	5.0

Source: Directorate of Marketing & Inspection (DMI), Ministry of Agriculture and Farmers Welfare, Government of India, International Nut & Dried Fruit Council.

USA

The following table would provide minimum quality standards, extracted from the USDA (Part 996.31), apply to domestic and imported peanuts for human consumption marketed in the United States.

Table 4.5: Minimum quality standards applied to domestic and imported peanuts for human consumption marketed in the United States

Type and grade category	Unshelled peanuts and damaged kernels and minor defects (%)	Total fall through sound whole kernels and/or sound split and broken kernels	Foreign materials (%)	Moisture (%)
Excluding Lots of "splits"				
Runner	3.5	6.00%; 17/64-inch round screen	0.2	9
Virginia (except No. 2)	3.5	6.00%; 17/64-inch round screen	0.2	9
Spanish and Valencia	3.5	6.00%; 16/64-inch round screen	0.2	9
No. 2 Virginia	3.5	6.00%; 17/64-inch round screen	0.2	9
Runner with splits (≤ 15% sound	3.5	6.00%; 17/64-inch round screen	0.2	9
splits)				
Virginia with splits (≤ 15% sound	3.5	6.00%; 17/64-inch round screen	0.2	9
splits)				
Spanish and Valencia with splits (≤	3.5	6.00%; 16/64-inch round screen	0.2	9
15% sound splits)				
Lots of "splits"				
Runner (≥ 90% splits)	3.5	6.00%; 17/64-inch round screen	0.2	9
Virginia (≥ 90% splits)	3.5	6.00%; 17/64-inch round screen	0.2	9
Spanish and Valencia (≥ 90% splits)	3.5	6.00%; 16/64-inch round screen	0.2	9

Source: USDA. Part 966 - Minimum Quality and Handling Standards for Domestic and Imported Peanuts Marketed in the United States, International Nut & Dried Fruit Council.

Sizing

India: Indian Oilseeds and Produce Export Promotion Council (IOPEPC) establishes the following standards for sizing.

Table 4.6: Standards for peanuts sizing in India

Bold		Java		Valencia	
Counts/ ounce	Equivalent HSM* (g)	Counts/ ounce	Equivalent HSM (g)	Counts/ ounce	Equivalent HSM* (g)
35/40	70.9-81.0				
38/42	67.5-74.6				
40/45	63.0-70.9				
45/50	56.7-63.0	40/50	56.7-70.9		
45/55	51.5-63.0	45/55	51.5-63.0		
50/60	47.3-56.7	50/60	47.3-56.7		
60/70	40.5-47.3	60/70	40.5-47.3		
70/80	35.4-40.5	70/80	35.4-40.5	70/80	35.4-40.5
		80/90	31.5-35.4	80/90	31.5-35.4
		90/100	28.4-31.5		

Source: Indian Oilseeds and Produce Export Promotion Council (IOPEPC)

US: In its Standard for Grades, the USDA establishes the following sizing.

Table 4.7: Standards for peanuts sizing in US

Designation/Grade	Variety	Minimum Size Requirements
No. 1 Runner	Runner	Does not pass through a screen with 16/64 x 3/4-inch openings
No. 2 Runner	Runner	Does not pass through a screen with 17/64-inch round openings
Runner Splits	Runner	Does not pass through a screen with 17/64 inch round openings
Extra Large Virginia	Virginia	Does not pass through a screen with 20/64 x 1 inch openings; No more than 512 peanuts per pound
Medium Virginia	Virginia	Does not pass through a screen with 18/64 x 1 inch openings; No more than 640 peanuts per pound
No. 1 Virginia	Virginia	Does not pass through a screen with 15/64 x 1 inch openings; No more than 864 peanuts per pound
No. 2 Virginia	Virginia	Does not pass through a screen with 17/64 inch round openings
Virginia Splits	Virginia	Does not pass through a screen with 20/64 inch round openings; At least 90% by weight must be splits

Source: USDA. Agricultural Marketing Service. 1956. United States Standards for Grades of Shelled Runner Type Peanuts, USDA. Agricultural Marketing Service. 1959. United States Standards for Grades of Shelled Virginia Type Peanuts, International Nut & Dried Fruit Council.

Import Tariffs

Peanut exporters worldwide must navigate a complex landscape of import tariffs when entering the global market. These tariffs can significantly affect the competitiveness and profitability of their products in foreign markets. Import tariffs are taxes imposed by countries on goods coming into their borders, and they can vary widely from one country to another, influenced by trade agreements, diplomatic relations, and strategic economic policies. For peanut exporters, understanding and managing these tariffs is crucial for setting prices, determining market strategies, and ensuring compliance with international trade laws. The importance of adeptly handling these tariffs lies in maximizing market access, optimizing cost structures, and fostering sustainable trade relationships, which are vital for the growth and stability of the global peanut industry.

Following are some of the major Peanuts exporters in the world and the list of duties (import tariffs) they face in the export market:

India

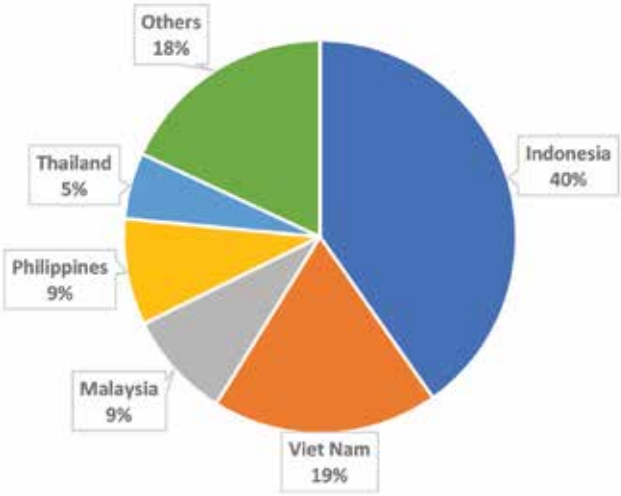
Table 4.8: Import duties faced by india in the export market

Tariffs		
	MFN Duties	Preferential duties
Indonesia[1]		
Seed	5%	3.11%
In-shell	5%	3.11%
Shelled	5%	3.11%
Vietnam[2]		
Seed	0%	0%
In-shell	10%	0%
Shelled	10%	0%
Malaysia		
Seed	5%	-
In-shell	5%	-
Shelled	5%	-
Philippines		
Seed	15%	-
In-shell	15%	-
Shelled	15%	-
Thailand		
Seed	10%	0%
In-shell	20%	0%
Shelled	20%	-
Australia		
Seed	5%	0%
In-shell	5%	0%
Shelled	5%	0%

1. ASEAN - India free-trade area duty rates
2. Free-trade agreement duty rate for India

Source: World Trade Organization (Tariff Data)

Figure 4.1: India peanuts export destination in 2022



Source: Trademap

Argentina

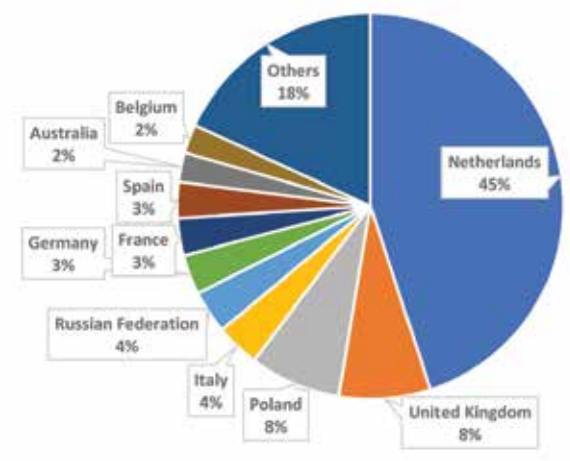
Table 4.9: Import duties faced by Argentina in the export market

Tariffs		
	MFN Duties	Preferential duties
European Union		
Seed	0%	-
In-shell	0%	-
Shelled	0%	-
Russian Federation		
Seed	0%	-
In-shell	0%	-
Shelled	0%	-
Australia[1]		
Seed	5%	4%
In-shell	5%	4%
Shelled	5%	4%
Egypt[2]		
Seed	5%	-
In-shell	5%	0%
Shelled	5%	3.75%

1. Generalized System of Preferences (GSP) scheme for developing countries in Part 4 of Schedule 1
2. Southern Common Market (MERCOSUR) – Egypt

Source: World Trade Organization (Tariff Data)

Figure 4.2: Argentina peanuts export destination in 2022



Source: Trademap

USA

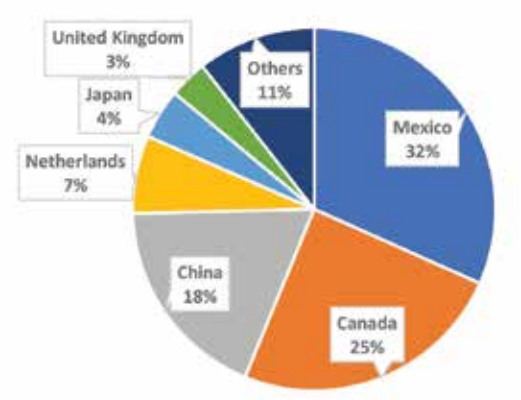
Table 4.10: Import duties faced by USA in the export market

Tariffs		
	MFN Duties	Preferential duties
European Union		
Seed	0%	-
In-shell	0%	-
Shelled	0%	-
China		
Seed	0%	-
In-shell	15%	-
Shelled	15%	-
Mexico		
Seed	0%	-
In-shell	0%	-
Shelled	0%	-
Trinidad and Tobago		
Seed	0%	-
In-shell	40%	-
Shelled	40%	-
Canada[1]		
Seed	0%	-
In-shell	0%	-
Shelled	6%	0%

(1) Free-trade area duty rate for the United States under the North American Free Trade Agreement (NAFTA)

Source: World Trade Organization (Tariff Data)

Figure 4.3: USA peanuts export destination in 2022



Source: Trademap

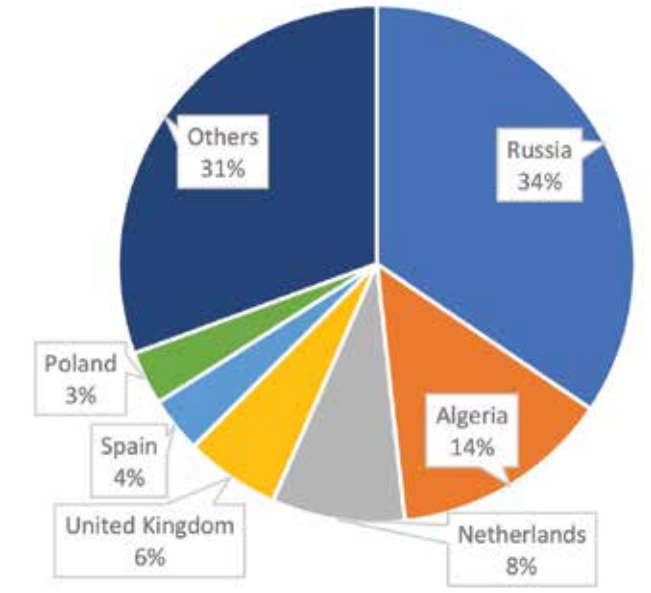
Brazil

Table 4.11: Import duties faced by Brazil in the export market

Tariffs		
	MFN Duties	Preferential duties
European Union		
Seed	0%	-
In-shell	0%	-
Shelled	0%	-
Russia		
Seed	0%	-
In-shell	0%	-
Shelled	0%	-
Algeria		
Seed	30%	0%
In-shell	30%	0%
Shelled	30%	0%

Source: World Trade Organization (Tariff Data)

Figure 4.4: Brazil peanuts export destination in 2022



Source: Trademap

China

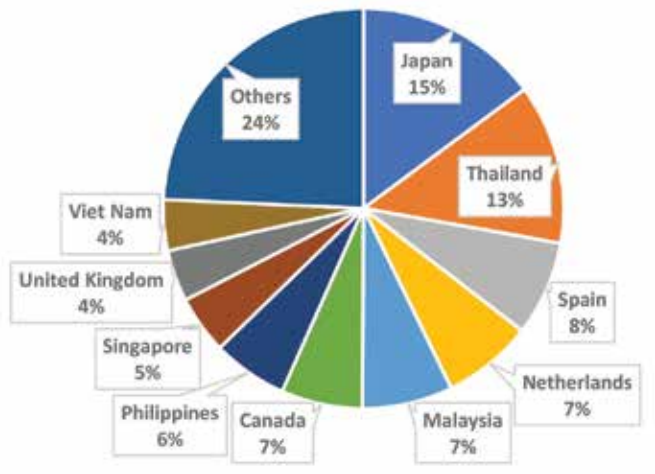
Table 4.12: Import duties faced by China in the export market

Tariffs		
	MFN Duties	Preferential duties
Japan		
Seed	10%	-
In-shell	10%	-
Shelled	10%	-
Thailand[1]		
Seed	10%	0%
In-shell	20%	0%
Shelled	20%	0%
Philippines[2]		
Seed	15%	0%
In-shell	15%	0%
Shelled	15%	0%
Vietnam[3]		
Seed	0%	0%
In-shell	10%	0%
Shelled	10%	0%

1. Regional Comprehensive Economic Partnership Agreement (RCEP)
2. ASEAN-China free trade area duty rates
3. ASEAN-China free trade area duty rates

Source: World Trade Organization (Tariff Data)

Figure 4.5: China peanuts export destination in 2022



Source: Trademap

Chapter 5
Europe: A Lucrative Market for Groundnuts

Europe stands as a significant market for groundnuts, driven by its status as a major importer and evolving consumer trends. Despite lacking commercial groundnut production, Europe's appetite for groundnuts continues to grow steadily, presenting lucrative opportunities for exporters worldwide. This chapter, backed by insightful data and market analysis, explores the reasons why Europe remains an attractive destination for groundnut exporters.

Market overview and import dynamics

European groundnut imports have seen a consistent upward trajectory, with an average annual growth rate of 2.6% in volume between 2018 and 2022. This growth is fuelled by rising demand for snacks, vegan products, and natural foods, reflecting evolving consumer preferences towards healthier and sustainable options. Despite potential challenges such as inflationary pressures, the European groundnut market is projected to maintain stable growth, with an expected annual growth rate of 2% in volume and 5% in value over the next three years.

Table 5.1: Europe peanut imports from 2018 to 2022

Year	Import Volume (Thousand Tonnes)	Import Value ($ Billion)	% Growth Volume	% Growth Value
2018	1220	2.15	-	-
2019	1230	2.21	0.8%	2.9%
2020	1235	2.23	0.4%	1.0%
2021	1240	2.25	0.4%	0.9%
2022	1245	2.26	0.4%	0.5%

Source: Trademap, Centre for the Promotion of Imports from developing countries, Autentika Global

This table illustrates the gradual growth in both the volume and value of groundnut imports into Europe, highlighting an increasing market size and slight price increases over time.

Supply sources and trade flows

Developing countries have been pivotal in supplying groundnuts to Europe, accounting for nearly 80% of imports in 2022, which are from outside Europe. This underscores Europe's dependency on these nations for groundnut supply and the opportunity for developing countries to enhance their market share. Here, the Developing country is referred to countries that are listed on the OECD-DAC list of ODA recipients.

Table 5.2: Developing countries export share to europe

Year	Volume (Tonnes)	Value ($ Million)	% Growth Volume	% Growth Value
2018	496	1009.46	-	-
2019	520	1030.49	4.84%	2.08%
2020	550	1056.78	5.77%	2.55%
2021	600	1083.07	9.09%	2.49%
2022	677	1140.90	12.83%	5.34%

Source: Trademap

Consumer Trends and Market Drivers

Several factors influence the market, including dietary trends towards veganism, natural foods, and healthy snacking options. These trends bolster the demand for groundnuts as a versatile and nutritious ingredient.

Table 5.3: Drivers of peanut market in Europe

Driver/Trend	Description
Health and Wellness	Increasing consumer awareness about health benefits associated with groundnut consumption.
Veganism and Plant-based Diets	The rise in veganism and plant-based diets boosting the demand for plant-based protein sources.
Snacking Trends	The growing trend of healthy snacking alternatives to conventional snack options.
Economic Factors	Inflation and economic stability affecting disposable income and spending patterns.

Source: Industry Experts

Market segmentation analysis

The European groundnut market can be segmented into three main categories: unprocessed, shelled, processed, and in-shell groundnuts. Each segment caters to different consumer needs and preferences, influencing import patterns and consumption trends.

Table 5.4: Segment wise share of imports to Europe

Segment	Volume Share	Value Share	Key Observations
Unprocessed Shelled	72%	60%	Dominant segment, preferred for versatility in use.
Processed Groundnuts	33%	21%	High value-added, growing demand for convenience foods.
In-shell Groundnuts	7%	7%	Niche market, seasonal consumption patterns.

Source: Trademap, Centre for the Promotion of Imports from developing countries , Autentika Global

Major Peanut Markets in Europe

Table 5.5: Major peanut importers in Europe

Country	Import Volume 2021 (Thousand Tonnes)	Import Volume 2022 (Thousand Tonnes)	% Change from 2021	Main Supplier
The Netherlands	320.40	347.03	8%	Argentina (72%)
Germany	135.25	127.21	-6%	The Netherlands (37%), Argentina (32%)
UK	124.46	205.67	65%	USA(55%) & Argentina(22%)
France	35.90	41.01	14%	Argentina (54%), Netherlands (17%)
Spain	60.61	63.00	4%	Argentina (30%), China (17%), USA (17%)
Poland	68.12	78.98	16%	Argentina (71%), Brazil (15%)

Source: Trade Map

Netherlands

The Netherlands plays a crucial role in the European market, particularly in the import and export of agricultural products, including groundnuts. Despite its small size, it is the largest importer of groundnuts in Europe, with imports reaching 347 thousand tonnes in 2022, marking significant growth from the previous year. This demand is driven by factors such as vegan and paleo diets, and a general trend towards healthy eating, which suggests a strong long-term market for groundnut exports to the Netherlands.

The country acts as a major transit hub for groundnuts, re-exporting a significant portion of its imports to other European countries, with Germany being the primary recipient. The Netherlands sources the majority of its groundnuts from Argentina, which is known for its high-quality peanuts. The import market is focused largely on unprocessed shelled groundnuts, with a notable volume coming from developing countries.

Processed groundnuts make up a smaller fraction of the imports, with roasted groundnuts and peanut butter being the main categories. The Dutch food processing industry is well-developed, with a preference for sourcing from specialized traders. Recent trends show a shift towards private label products over branded ones, driven by post-COVID inflation.

The Dutch consumer market is characterized by an aging population, urbanization, and increasing ethnic diversity, with a growing demand for organic, sustainable, and healthy food options. Plant-based diets are gaining popularity, presenting opportunities for groundnut suppliers. Key brands in the Netherlands include PepsiCo-owned Duyvis for peanuts and Unilever-owned Calvé for peanut butter, which is less sweet than its North American counterpart. Newer brands are differentiating themselves with health-focused offerings.

Germany

Germany, as the third-largest consumer market in Europe, boasts a large and well-developed food industry with a diverse range of consumer preferences. While cost remains a primary concern for buyers, there's a growing segment willing to pay more for quality or products aligning with their values, such as non-GMO, vegetarian, or vegan options. Clean label foods, superfoods, and 'free from' items are also gaining popularity, alongside a preference for locally sourced goods.

With changing lifestyles, sales of on-the-go products and snacks are increasing, reflecting a shift away from traditional meal patterns. Groundnuts constitute a significant market in Germany, with imports volume totalling 127 thousand tonnes. Despite a slight decline in volume, there's a steady annual value growth expected, driven by consumer trends like veganism, healthy snacking, and nutrition.

Germany imports a considerable portion of groundnuts from European suppliers, notably the Netherlands, as well as from developing countries like Argentina. While most imports are consumed domestically, a notable percentage is re-exported, with Luxembourg playing a role as a processor and packer.

The groundnuts market in Germany is concentrated, with a significant share imported from the Netherlands, followed by Argentina and the United States. The country imports a higher proportion of in-shell groundnuts compared to others in Europe. Discount supermarket chains dominate the German retail landscape, with the top five retailers commanding a significant portion of total revenue. However, smaller neighbourhood and convenience stores are experiencing renewed interest.

The United Kingdom

The UK is a key market for groundnut exporters, especially post-Brexit, as it seeks to diversify trade away from the EU. It's Europe's third-largest importer and second-largest consumer of groundnuts, with imports of 205 thousand tonnes in 2022. The UK's spike in demand for groundnuts is driven by its ethnic diversity and a shift towards healthier, plant-based diets.

Argentina, the United States and the Netherlands are major suppliers, with developing countries contributing 64% of imports by volume. The UK market emphasises sustainability and ethical sourcing, with a significant portion of groundnuts used in plant-based products, peanut butter manufacturing, and even bird and animal feed. Despite challenges like high inflation affecting short-term sales, the UK's groundnut market has strong long-term growth prospects due to demographic trends and ongoing dietary shifts.

France

France is the fourth-largest groundnut consumer and importer in Europe, with a market dominated by private label brands and a growing trend towards plant-based proteins like peanut butter. Imports have increased by 14% compared to the previous year to 41 thousand tonnes in 2022. While the Netherlands and Argentina are major suppliers, direct imports from developing countries are rising. The market is expected to continue growing at a rate of 4-5% annually, driven by snacking trends and a strong food industry. Sustainability and organic products are also gaining traction, providing opportunities for aligned producers like Jardin Bio.

Poland

Poland has become a significant importer of groundnuts, with import volumes rising by 5.3% annually from 2018 to 2022, reaching 79 thousand tonnes in 2022. The Argentina and Brazil with the Netherlands are key suppliers, with developing countries like Togo also playing a growing role. Notably, Poland serves as an important

reseller of groundnuts, with around 40% of imports re-exported to other European countries, including Germany, Romania, and Czechia.

However, Poland's economy has been impacted by the conflict in Ukraine, leading to a slowdown in economic growth in 2023. Despite short-term challenges, long-term prospects remain strong due to Poland's significant food processing industry and a growing trend towards healthier eating habits.

Spain

Spain stands out as a significant importer of groundnuts in Europe, with imports growing by 9.9% in value and 3.8% in quantity annually from 2018 to 2022. The country imported 63 thousand tonnes in 2022, with 48% coming from developing countries. Argentina is the primary supplier to Spain.

The Spanish groundnut market is expected to continue growing, with projections of an 8% annual increase in volume and 4% in value over the coming years. This growth is supported by Spain's strong food and snack industry, which utilizes groundnuts in various products, including confectionery, baked goods, and traditional dishes. Key players in the Spanish groundnut processing sector include Frit Ravich, Borges Agricultural & Industrial Nuts, and Importaco.

Table 5.6: Few major processors and retailers from peanut consuming European nations

Country	Company Name	Type
Netherlands	Bredabest	Processor
	Snack Connection	Processor
	Ültje	Retail
Germany	Meridian Foods	Processor
	Liberation Foods	Processor
France	Carrefour	Retail
	Auchan	Retail
	E. Leclerc	Retail
	Casino	Retail
Spain	Frit Ravich	Processor
	Borges Agricultural & Industrial Nuts	Processor
	Importaco	Processor
Poland	Bakalland	Trading/Processing

Source: Centre for the Promotion of Imports from developing countries, Autentika Global

Requirements and Certifications Peanuts has to comply with to enter the European market

Mandatory Requirements

Groundnuts intended for the European Union (EU) market must adhere to stringent safety standards and regulations. These include compliance with regulations on additives, limits on contaminants such as aflatoxins and pesticide residues, and measures to manage acrylamide formation during processing. Labels must clearly indicate potential allergens, as groundnuts can cause allergies.

Contaminants like aflatoxins, which can form due to fungal growth, are closely monitored. Groundnuts are subject to rigorous testing before import, and countries with repeated non-compliance face increased scrutiny at EU borders. Specific EU entry conditions are outlined for countries with aflatoxin risks.

Pesticide residue levels are regulated, although excessive residues are uncommon due to the removal of groundnut shells before consumption. Microbiological contaminants like salmonella and E. coli are also major concerns, requiring careful handling and processing.

Additional requirements buyers demand

The European market imposes strict requirements on groundnuts, encompassing quality, food safety, corporate social responsibility, packaging, and labelling standards. These requirements ensure consumer safety, product quality, and transparency in the supply chain.

Quality requirements:

General Standards: Groundnuts must be safe, free from abnormal flavors or odors, and devoid of contaminants like living insects or mites.

Specific Standards: Address factors like moldy or rancid kernels, moisture content, and hygiene.

Grading or Sizing: Utilizes grading categories such as those defined by the US grading classification.

Type (Variety) and Form: Various groundnut types and forms, including in-shell, kernels, and splits.

Classing: Classifies groundnuts into three classes: extra class, class I, and class II.

Food Safety Certification: Buyers often require certifications recognized by the Global Food Safety Initiative (GFSI), such as IFS, BRCGS, FSSC 22000, or SQF.

Corporate Social Responsibility: Some buyers may demand adherence to codes of conduct or standards like SMETA, ETI, amfori BSCI, or BCorp certification.

Packaging Requirements: Packaging materials vary based on shipment size and type of product. Common materials include jute and polypropylene bags for in-shell groundnuts and vacuum-sealed bags for kernels. Retail packaging ranges from small vacuum-sealed packets to larger containers or pouches, often completed in the importing country to comply with local regulations.

Labelling Requirements: Bulk package labels should include product name, lot identification, origin, commercial specifications, allergen information, and storage instructions. Retail packaging must comply with EU regulations on food information to consumers, including nutrition, origin, allergen, and legibility requirements.

Table 5.7: Common criteria defining peanut quality

Criteria	Description
Grading	Categories based on size, often using US grading classification.
Type (Variety)	Includes Runner, Spanish, Hsuji, and Virginia varieties.
Form	In-shell, kernels (whole or splits).
Classing	Groundnuts classified into three classes: extra class, class I, and class II.

Source: Industry Source

Table 5.8: Bulk package labelling information

Information	Description
Identification	Name and physical address of packer/dispatcher, nature of produce, origin, batch code or lot identification.
Commercial Specifications	Class, size, crop year, and best before date.
Allergen Information	Groundnuts must be clearly labelled as allergens.
Storage and Transport	Instructions for proper storage and transport conditions.

Source: Industry Source

Requirements for Niche Markets in the European Groundnut Industry

The European Green Deal aims to make Europe climate neutral by 2050, emphasizing sustainable practices and organic farming. Small and medium enterprises (SMEs) may face increased scrutiny of their environmental impact, creating a competitive advantage for those demonstrating sustainable practices or organic production. Key requirements for niche markets include:

Organic Groundnuts:

- Produced using organic methods audited by accredited certifiers.
- Compliance with EU organic regulations and certification bodies' standards like the Soil Association and Naturland.
- Importing organic products requires an electronic certificate of inspection (e-COI).

Sustainability Certification:

- Fairtrade International offers standards for nuts, setting fair prices and promoting sustainable practices.
- Rainforest Alliance Certification contributes to global climate change and deforestation efforts.
- The Sustainable Nut Initiative fosters sustainability across the nut supply chain.

Ethnic Certification:

- Halal and Kosher certifications are necessary for supplying Jewish or Islamic markets, ensuring compliance with dietary laws.
- Certification bodies such as KLBD and HCS provide guidelines and services for obtaining Halal and Kosher certifications.

Vegan Certification:

- Vital for catering to the growing interest in veganism and vegetarianism.
- Certifications from organizations like The Vegan Society and The Vegetarian Society ensure products meet vegan standards and are free from animal ingredients and testing.

End-market for peanuts in Europe

Table 5.9: End-market for peanuts in Europe

Segment	Description	Trends and Growth Areas
Snack Segment	It accounts for around 65% of groundnut imports in Europe, mainly consisting of roasted and salty snacks.	Growing interest in healthy, protein-rich options. Innovation in flavours and healthier alternatives like unsalted and dry-roasted peanuts.
Food Processing Segment	Uses groundnuts in confectionery, bakery products, snacks, bars, and desserts. Significant for its role in producing chocolate snacks, peanut butter, and as ingredients in protein and fruit-nut bars.	Rising demand for healthier, nutrient-rich, and vegan products. Expected growth driven by wellness and health trends, with the confectionery market projected to grow by around 4% by 2028.

Source: Eventell Research

Countries competing in European market

In the European groundnuts market, significant competition exists among suppliers, with Argentina and the United States leading the charge, collectively supplying over 70% of all groundnuts to Europe. China follows with a 10% market share. Key insights into these competitors are:

Argentina dominates as the leading supplier, exporting a significant portion (80%) of its groundnuts to Europe, with the Netherlands being the primary market. The country's groundnut production faced a decline due to drought conditions influenced by La Niña, alongside some farmers switching to grain cultivation due to the war in Ukraine. Argentina is known for its high-quality groundnuts, especially the Runner and High Oleic Runner types, with a strong emphasis on aflatoxin control for EU exports.

The United States ranks as the second world exporter and the fourth-largest producer, with a substantial domestic consumption that sees over half of its groundnuts processed into peanut butter. The U.S. mainly exports to the Netherlands within Europe, with a noted decrease

in peanut butter exports to the continent. The country focuses on Runner type groundnuts, which are predominantly processed into peanut butter.

Brazil emerges as a rising force in South America, being the second-largest peanut producer and exporter in the region. It has seen increased exports, especially to the Russian Federation, and maintains a stable production outlook. Brazil's exports to Europe are significant, with the Netherlands as a major destination.

China, the world's top producer of groundnuts, focuses on the 'Hsuji' cultivar for exports. While it exports globally, a substantial portion of its produce is destined for Europe, particularly the Netherlands, Spain, the UK, and France. The country's groundnut production is supported by research institutions focused on developing high-yield cultivars.

Nicaragua and Egypt are emerging as notable suppliers to the European market. Despite political and economic challenges, Nicaragua has seen stable exports to Europe, with the UK as a primary market. Egypt, mainly exporting to Italy and Germany, focuses on both shelled and in-shell groundnuts, with production expected to remain stable.

Emerging suppliers to the European groundnut market should closely monitor these competitors, especially Argentina's dominant position and the significant shares held by the US and China. Understanding these leading suppliers' dynamics, production challenges, and market preferences can provide valuable insights for new entrants aiming to penetrate or expand within the European market.

Table 5.10: Leading exporters from major exporting countries

Country	Leading Companies
Argentina	Aceitera General Deheza (AGD), Maniagro, Prodeman, Olega, Lorenzati Ruetsch y Cía
United States of America	Golden Peanut and Tree Nuts, Premium Peanut, Hampton Farms, Birdsong Peanuts, Galdisa USA
China	Rizhao Golden Nut Group, Rizhao Yatai Foodstuffs, Jilin City Changrong Agricultural & By Products Corporation, Qingdao Shengde Foods Foodlink
Nicaragua	Comasa, Cukra Industrial
Brazil	Coplana, Beatrice Peanuts, Jazam Peanuts, Santa Helena
Egypt	Green Valley, Nutsland, Kernile

Source: TradeMap, Centre for the Promotion of Imports from developing countries, Autentika Global

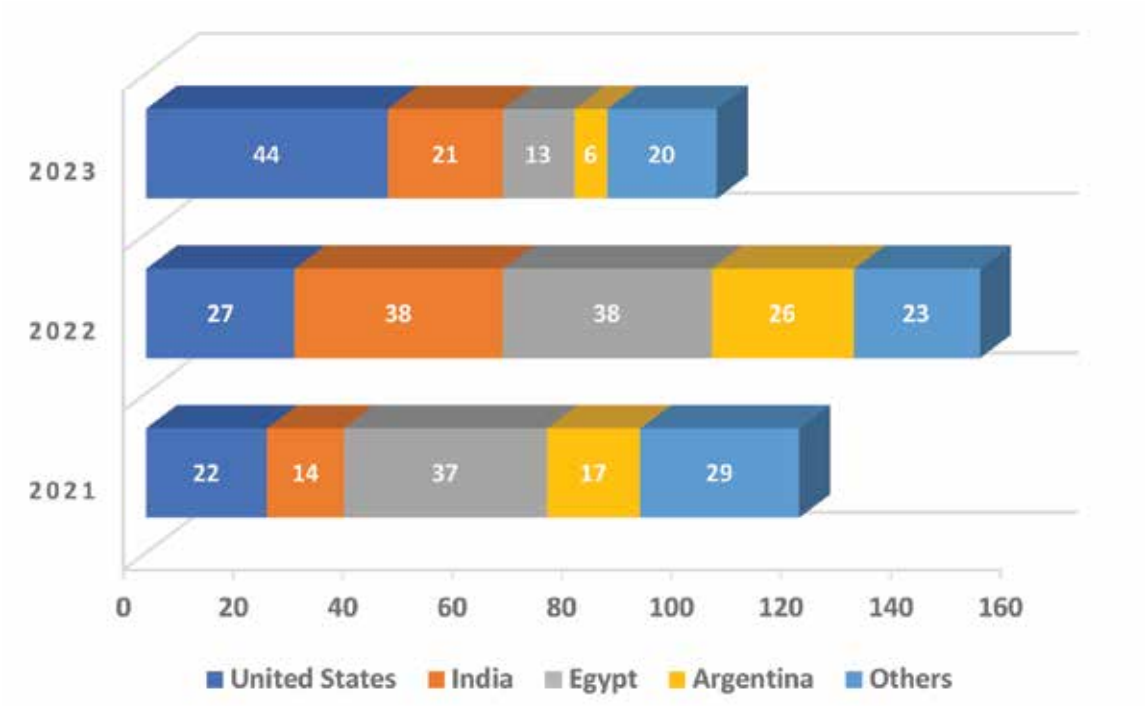
EU's Rapid alert system for food and feed (RASFF)

The Rapid Alert System for Food and Feed (RASFF) is a crucial tool employed by the European Union to ensure the safety of food and feed products circulating within its borders. Established in 1979, the RASFF facilitates the swift exchange of information among its member states regarding direct or indirect risks to human health deriving from food or feed. This network enables authorities in EU countries, plus the European Commission, to act quickly in response to threats, thereby ensuring the integrity of the food chain and protecting consumer health. Notifications within the RASFF system can cover a wide range of issues, including contamination with harmful bacteria, the presence of foreign objects, or the detection of unauthorized substances. By fostering an environment of transparency and responsiveness, the RASFF plays a pivotal role in maintaining high safety standards across the European food and feed market.

With respect to peanuts, the RASFF is particularly vigilant due to the high risk of allergens and the potential

for aflatoxin contamination, which is a potent carcinogen produced by certain molds. Peanuts are a common focus within the RASFF notifications for several reasons. Firstly, the presence of undeclared peanut proteins can pose severe risks to individuals with peanut allergies, necessitating prompt alerts and product recalls. Secondly, peanuts are susceptible to aflatoxin contamination under certain growing or storage conditions, making them a frequent subject of RASFF alerts when levels exceed the safe limits set by EU regulations. Through the RASFF, member states can rapidly share information about contaminated peanut shipments, facilitating quick action to prevent the distribution of unsafe products. This system underscores the importance of rigorous monitoring and compliance with safety standards among peanut exporters to the EU, highlighting the global impact of the RASFF on food safety practices.

Figure 5.1 Total border rejection counts from eu based on origins for the year 2023



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