

11

Other products

This chapter provides a market overview and description of the current market situation for roots and tubers (i.e. cassava, potato, yams, sweet potato, taro), pulses (field peas, broad beans, chickpeas, lentils), and banana and major tropical fruits (mango, mangosteen and guava, pineapple, avocado, and papaya) markets. It also provides the medium term (2024-33) projections for production, consumption and trade for these products and describes the main drivers shaping these projections.

11.1. Roots and tubers

11.1.1. Market overview

Roots and tubers are plants that yield starch derived from either their roots (e.g. cassava, sweet potato and yams) or stems (e.g. potatoes and taro). They are destined mainly for human consumption (as such or in processed form) and, like most other staple crops, can also be used for animal feed or industrial processing, notably in the manufacturing of starch, alcohol, and fermented beverages. Unless they are processed, they are highly perishable once harvested due to their low dry-matter content (20 to 40%). This limits the opportunities for trade and storage and makes roots and tubers a particularly important commodity in terms of food loss and waste.

Within the roots and tubers family, potato dominates in worldwide production, with cassava a distant second. With respect to global dietary importance, potato ranks fourth after maize, wheat and rice. This crop provides more calories, grows more quickly, uses less land, and can be cultivated in a broad range of climates. However, potato production, which forms the bulk of the root and tuber sectors in high-income countries, has been declining over several decades, with growth in production falling well below that of population.

Output of cassava is growing at well over 3% p.a., almost three times the rate of population growth. Cultivated mainly in the tropical belt and in some of the world's poorest regions, cassava production has doubled over two decades. Once considered a subsistence crop, it is now seen as a commodity and key for value-addition, rural development and poverty alleviation, food security, energy security; and for bringing important macroeconomic benefits. These factors are driving rapid commercialization of this crop and major investments in upscaling the processing of cassava, both which have contributed significantly to its global expansion.

11.1.2. Current market situation

The largest producing regions of roots and tubers in the base period are Asia (112 Mt) and Africa (90 Mt). In Sub Saharan Africa, roots play a significant role as a staple crop. Globally, about 138 Mt are used as food, 45 Mt as feed, and 32 Mt for other uses, mostly biofuel and starch. As the perishable nature of these crops prohibits significant international trade in fresh produce, countries tend to be self-sufficient. About 19 Mt are currently traded internationally, mostly in processed or dried form. Thailand and Viet Nam are the leading exporters and the People's Republic of China (hereafter "China") is the main destination.

Global production of roots and tubers reached 250 Mt (dry matter) in the base period (2021-23); about 6 Mt has been added annually in the past years and consumed mainly as food. The prices of roots and tubers (measured by the Cassava (flour) wholesale price in Bangkok) increased again significantly in 2023 as demand was strong, in particular in China. Global quantities traded increased by 1.3 Mt.

11.1.3. Main drivers for projections

Producing cassava requires few inputs and affords farmers greater flexibility in terms of timing the harvest as the crop can be left on the ground well after reaching maturation. Cassava's tolerance to erratic weather conditions, including drought, makes it an important part of climate change adaptation strategies. Compared to other staples, cassava competes favorably in terms of price and diversity of uses. In the form of High-Quality Cassava Flour (HQCF), cassava is increasingly targeted by governments in Africa as a strategic food crop which does not exhibit the same levels of price volatility as other imported cereals.

Mandatory blending with wheat flour helps reduce the volume of wheat imports, thereby lowering import bills and conserving precious foreign exchange. The drive towards energy security in Asia, combined with

mandatory blending requirements with gasoline, has led to the establishment of ethanol distilleries that use cassava as a feedstock. With regard to trade, processed cassava manages to compete successfully in the global arena, e.g. with maize-based starch and cereals for animal feeding applications.

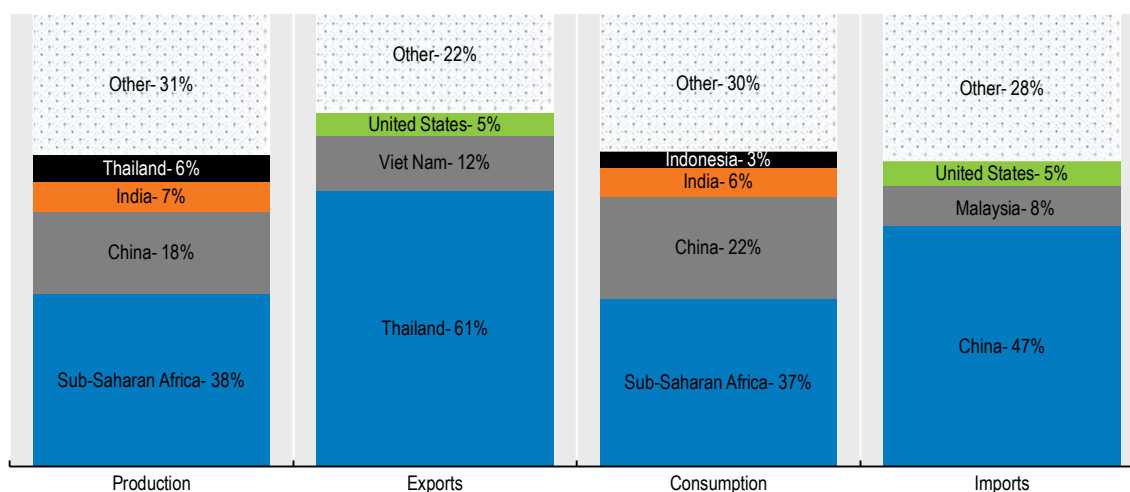
Potatoes are generally used only for food and are a substantial component of diets in high-income regions, particularly in Europe and North America. As overall food intake of potato in these regions is very high and may have reached saturation, the scope for consumption increases to outpace population growth remains limited. However, low-income regions provide some growth momentum to potato production at the world level.

Global sweet potato cultivation has declined in recent years, mostly due to a sharp decline in acreage (which shows no sign of abating) in China, the world's foremost producer. Food demand largely defines the growth potential of sweet potato and other less prominent roots and tuber crops given the limited commercial viability for diversified usage. Consequently, consumer preferences along with prices play important roles in shaping consumption.

11.1.4. Projection highlights

World production and utilization of roots and tubers is projected to increase by about 22% over the next decade. Production growth in low-income regions could reach 2.9% p.a. while supply in high-income countries should grow at only 0.3% annually. Global land use is projected to increase by 4 Mha to 65 Mha, but there will be some regional shifts. African countries are expected to increase their cultivation area, while reductions are projected for Europe and America. Moreover, many farmers in Thailand shifted from cassava to rice which had better production incentives. Production growth is mainly attributed to investments in yield improvements in Africa and Asia, and, to a lesser extent, an intensification of land use in Africa.

Figure 11.1. Global players in roots and tubers markets in 2033



Note: Presented numbers refer to shares in world totals of the respective variable

Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

StatLink 2 <https://stat.link/nfahvc>

By 2033, an additional 1.9 kg/capita per year of root crops will enter diets at the global level, driven mostly by consumers in Africa where per capita intake of roots and tubers could surpass 38 kg per year. Biofuel use, albeit from a low basis (4% of use), is expected to grow by 31% over the next ten years driven by the Chinese biofuel industry. Feed and other industrial use will remain significant, albeit with slower growth of about 19% and 14% respectively, over the *Outlook* period.

International trade in roots and tubers comprises about 7% of global market production. Over the medium term, this share is expected to remain constant. Exports from Thailand and Viet Nam are growing and are expected to reach a combined total of 16 Mt, mainly to supply the growing biofuel and starch industries in China.

After a decrease expected in 2024 partly due to lower demand in China, prices of roots and tubers are projected to follow a similar path to cereal prices in the medium term given the substitutability between roots and tubers and cereals on food and feed markets; namely, an increase in nominal prices but a decline in real terms.

11.2. Pulses

11.2.1. Market overview

Pulses are the edible seeds of plants in the legume family. Commonly, eleven types are recognized.¹ They provide high level of protein, dietary fibre, vitamins, minerals, phytochemicals, and complex carbohydrates. Apart from their contribution to calorie intake, pulses help to improve digestion, reduce blood glucose, minimise inflammation, lower blood cholesterol, and prevent chronic health issues such as diabetes, heart disease, and obesity. However, their consumption levels differ from region to region depending on dietary patterns and availability. Compared to other crops, pulses have a low contribution to total food wastage. Pulses can be stored for extended period without spoiling or reduction in nutritional quality. This characteristic helps minimise the risk of food waste caused by spoilage and makes pulses a wise option for households facing food insecurity.

Cultivation of pulses has a long tradition in almost all regions of the world. For centuries, legumes have played a fundamental role in the functioning of traditional agricultural systems. Prior to 2000, global production of pulses stagnated due to the widespread disappearance of traditional crop rotation systems in low-income countries. Production was further hampered by their weak resilience to diseases due to a lack of genetic diversity, limited access to high-yield varieties, and limited policy support to pulses growers. The sector began to recover in the early 2000s and has since seen an average annual increase of about 3% globally, led by Asia and Africa. These two regions combined accounted for more than half of the 12 Mt production increase in the past decade.

Global per capita consumption of pulses started to decline in the 1960s (Figure 11.2) as slow growth in yields pushed up prices. Income growth and urbanization shifted preferences away from pulses as human diets became richer in animal proteins, sugar, and fats. Nevertheless, pulses have remained an important source of protein in low-income countries, and average global per capita food consumption has increased to about 7 kg/year to date. This growth has been driven mainly by income gains in countries where pulses are an important source of protein; this is particularly true of India where vegetarians account for about 30% of the population.

Pulses can be processed into different forms such as whole pulses, split pulses, pulse flours, and pulse fractions like protein, starch and fibre. The flour and fractions have diverse applications in industries related to meat and snack foods, bakery and beverages, and batter and bread.

11.2.2. Current market conditions

India is by far the largest producer of pulses, accounting for about 28% of global production in the base period. Canada, China and the European Union are the next largest producing countries, with around 5% of global production. The Asian market accounts for 52% of all consumption but only about 43% of production, making it the most significant import destination. About 20% of global production is traded internationally with Canada (23% of global trade) by far the largest exporter and China the largest importer (14% of global trade). Africa has further expanded its production and consumption in the past decade and has remained largely self-sufficient.

In 2023, the global pulses market reached a volume of 95 Mt, after an average annual growth of 1.9% p.a. during the previous decade. This growth was led by Asia and Africa. World trade volumes were registered at 18.8 Mt, 1 Mt lower than in 2022. International prices for pulses, approximated by the Canadian field pea price, have continued to fall from their peak value of 2021 to USD 310/t in 2023.

11.2.3. Main drivers for projections

As pulses are associated with various health benefits and represent an important meat substitute due to their high protein content, health and environmentally conscious consumers are increasingly integrating them into their daily diets, which in turn is propelling the growth of the global pulses market. Rapid urbanization, changing lifestyles, and hectic work schedules are also making healthy snack foods popular amongst the working population, and pulses are increasingly used in the processing of ready-to-eat (RTE) food products.

The health and environmental benefits attributed to pulses are reasons why governments of pulses-producing countries are providing assistance to farmers, and thus supporting growth of the market. Support to the production of pulses production plays an important role in the Protein Strategy of the European Union where pulses are a major ingredient in products such as meat substitutes. Depending on the future dynamics of demand for such products, this could significantly change the future importance of pulses in the agricultural production mix.

11.2.4. Projection highlights

Pulses are expected to regain importance in diets in many regions of the world. This *Outlook* foresees this global growth to continue and projects global average annual per capita food use to increase to 8.6 kg by 2033. Per capita food consumption is projected to increase in almost all regions over the coming decade, with the largest increase expected in Europe (+3% p.a.) (Figure 11.2).

Global supply is projected to increase by 25 Mt. Almost 40% of this increase is expected to come from Asia, particularly India, the world's largest producer. Sustained yield improvements are projected to raise India's domestic production by an additional 8 Mt by 2033. India has introduced high-yielding hybrid seeds, supported mechanization, and implemented a minimum support price aimed at stabilizing farmer's income. In addition, the central government and some state governments have included pulses in their procurement programs, although not with the same geographical coverage as for wheat and rice.

This expected production expansion is driven by the assumption of continued intensification of pulses production systems due to improved yields and intensified land use. Almost 60% of production growth can be attributed to land use intensification during the projection period, and the remaining 40% to yield improvements. Particularly in Africa, a combination of area expansion and yield growth is estimated to add about 0.8 Mt annually to the region's production.

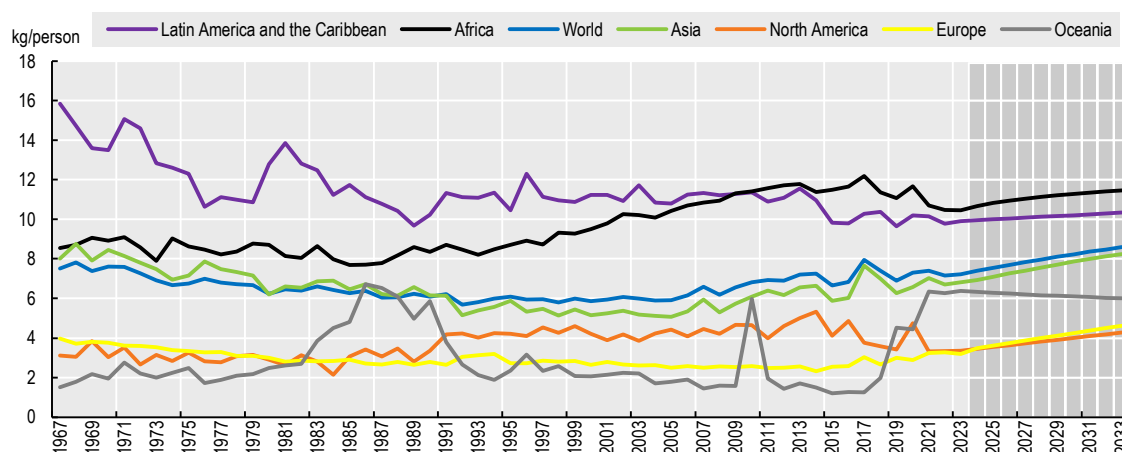
This *Outlook* assumes that growth will be sustained by increased intercropping of pulses with cereals, especially in Asia and Africa where smallholder farmers represent a large share of producers. The

projected yield improvements for pulses will continue to lag behind those for cereals and oilseeds because in most countries pulses are not overlooked in the development of high-yielding varieties, improved irrigation systems, and agricultural support policies.

World trade in pulses grew from 15 Mt to 19 Mt over the past decade and is projected to reach 22 Mt by 2033. Canada will remain the main exporter of pulses, with volumes expected to grow from 4.4 Mt at present to 5.7 Mt by 2033, followed by Australia and Russia with 2.8 Mt and 2.1 Mt of exports by 2033, respectively.

International prices in nominal terms are expected to decrease further until 2025 then increase slightly over the coming decade, while real prices will decline.

Figure 11.2. Per capita food consumption of pulses per continent



Source: OECD/FAO (2024), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>.

11.3. Bananas and major tropical fruits

11.3.1. Projection highlights

Bananas and the four major fresh tropical fruits – mango, pineapple, avocado and papaya – play a vital role in agricultural markets, especially in securing the nutrition and livelihoods of smallholders in tropical countries. In recent decades, rising incomes and changing consumer preferences in emerging and high-income markets, alongside improvements in transport and supply chain management, have facilitated fast growth in both consumption and international trade in these commodities.

Global production of bananas and major tropical fruits generates some USD 100 billion in revenues to support producers. Although only approximately 14% of global banana production and 8% of global major tropical fruit production are traded in international markets, the two commodity groups respectively generate around USD 11 billion and USD 12 billion per year in export revenues (provisional 2023 figures). In exporting countries, which are mostly low- or middle-income economies, production and trade revenues can weigh substantially in agricultural GDP, particularly for tropical Latin American countries. For instance, bananas represented about 50% of agricultural export revenue in Ecuador in 2022, while combined exports of pineapples and bananas accounted for some 40% of agricultural export revenue in Costa Rica. As such, trade in bananas and major tropical fruits can generate significant export earnings.

As with other agricultural commodities, price variations for bananas and tropical fruits increased substantially following the COVID-19 pandemic and shocks to the energy and fertiliser sectors associated with Russia's war against Ukraine. While the sector has shown relative resilience, in the medium-term, it is anticipated to first adjust to these shocks and then return to longer term trends in consumer behaviour and preferences. This will be characterised by future growth in per capita consumption and further expansion in exports from tropical regions toward developed and emerging developing economies.

Bananas

Market situation

Preliminary data and information on developments in 2023 indicate that global trade in bananas showed signs of recovery from the more severe supply shortages in the previous two years. Total exports reached some 19.2 Mt in 2023. However, developments diverged significantly among key global trade partners, as weather conditions and the economic backdrop proved to be beneficial to some and adverse to others. Ecuador and Guatemala reported greater supplies during the first eight months of the year, where favourable climatic conditions related to *El Niño* spurred production growth. Conversely, excessive rainfall, flooding and tropical storms reduced export supplies from Colombia, Mexico, Costa Rica and the Dominican Republic. Industry sources reported that reduced fertiliser application by farmers in 2022 continued to hamper the productivity and quality of banana production in the first half of 2023. The spread of plant diseases, particularly the Banana Fusarium Wilt Tropical Race 4 (TR4) disease in the Philippines, Peru and the Bolivarian Republic of Venezuela, continued to cause production losses as well as financial strain from the substantial costs of disease prevention. Suppliers in some Latin American countries also suffered losses and mitigation expenditures stemming from the placement of illegal substances in banana containers.

Import demand for bananas, meanwhile, remained firm in most key markets, with global imports reaching 18.7 Mt. Amid inflationary pressures, bananas benefited from their relative affordability, particularly in the European Union and the United States. Average import unit values displayed increases ranging from some 8 to 15% over the first nine months of 2023 in most key markets. Importers into the European Union attributed improved profitability to the appreciation of the Euro against the United States Dollar as well as lower freight costs, which had returned to near pre-pandemic levels by September 2023. The *Outlook* for 2024 and beyond therefore looks more positive than in the previous two years, provided that price variations in real terms will continue to be favourable and price increases at the export and import stages can be passed on to producers and to suppliers.

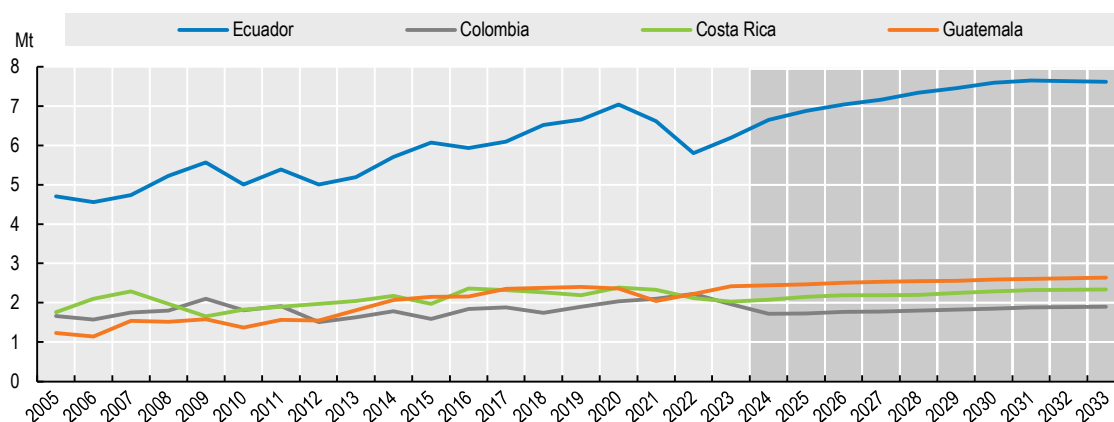
Projection highlights

Assuming normal weather conditions and no further spread of banana plant diseases, global banana production is expected to reach 160 Mt by 2033, from 135 Mt in the base period. As per capita demand for bananas is becoming increasingly saturated in most regions, growth in global production and consumption is expected to be primarily driven by population dynamics. In line with slowing world population growth, the current baseline projections expect world production and consumption of bananas to expand at a moderate 1.5% p.a. over the *Outlook* period. At the same time, in some emerging economies – principally in India and China – income growth is anticipated to stimulate changing health and nutrition perceptions and support demand for bananas beyond population growth. Accordingly, Asia, the current top producing region, is anticipated to remain so at a quantity share of over 50%, with India projected to reach an output of 43 Mt and a per capita consumption of 28 kg by 2033.

Production from the leading exporting region of Latin America and the Caribbean is projected to reach 37 Mt by 2033, encouraged by rising demand from key markets, most importantly the European Union and the United States. With economic pressures expected to continue in 2024 and potentially beyond, demand

for bananas is likely to be supported by the fruit's relative affordability. Rising import demand from China, where domestic production growth is likely to remain relatively low, is assumed to be an additional factor driving production growth in Latin America and the Caribbean. The largest exporters from the region – Ecuador, Guatemala, Colombia, and Costa Rica – are likely to benefit from this growth, provided that output can be shielded from the adverse effects of erratic weather events and disease outbreaks. Rising demand from the European Union and the United Kingdom is expected to benefit some Caribbean exporters, most notably the Dominican Republic and Belize, as well as exports from Africa, which are projected to expand at 0.3% p.a. over the *Outlook* period – led by Ivory Coast – to reach a total quantity of approximately 0.7 Mt in 2033. Against this background, world exports of bananas are projected to reach some 22.6 Mt by 2033.

Figure 11.3. Exports of bananas by the four major LAC exporters



Source: FAO data.

Mango, mangosteen and guava

Market situation

Global exports of mango, mangosteen and guava have grown to 2.3 Mt in 2023, an increase of 1% from the previous year. Higher exports of mangosteen from Thailand in the first half of the year, as well as of mangoes from Brazil, Peru and Mexico, were the main driving factors behind this. In terms of export quantities by type at the global level, mango accounted for 85% of global shipments and mangosteen for around 15%. Guava continued to have limited availability in import markets, in particular due to its lower suitability for transport.

Total global import quantities of fresh mangoes, mangosteens, and guavas rose to 2.3 Mt in 2023. The United States and the European Union remained the two leading global importers, with expected import shares of 27% and 17%, respectively. In both markets, consumer demand for mangoes increased slightly, driven by a growing awareness of the assumed nutritional health benefits of these fruits. Import growth in these markets was further supported by strong supply from Mexico, Peru and Brazil, the three leading origins for mangoes in the United States and the European Union. Overall, imports into the United States were expected to grow by some 4% in 2023 to approximately 0.61 Mt. Imports into the European Union, meanwhile, were estimated to rise by 2%, to some 0.39 Mt.

Projection highlights

Global production of mangoes, mangosteens and guavas is projected to increase at 3.6% p.a. over the next decade, to reach 86 Mt by 2033, from 60 Mt in the base period. Growth in mango production will mainly respond to income-driven growth in demand in producing countries, additionally supported by population dynamics. Asia, the native region of mangoes and mangosteens, will continue to account for over 70% of global production in 2033. This will be primarily due to strong growth in domestic demand in India, the leading producer and consumer of mangoes globally, with rising incomes and associated shifts in dietary preferences being the main drivers. Mango production in India is projected to account for over 38 Mt in 2033, or 45% of global production, destined largely for local, informal markets. As such, India is projected to experience increases in per capita consumption of 2.6% p.a. over the *Outlook* period, reaching 24.7 kg in 2033, compared to 18.6 kg in the base period, while average per capita consumption in Asia overall is expected to reach 14.1 kg in 2033, compared to 10.4 kg in the base period. By contrast, in Mexico and Thailand, the leading exporters, production growth will primarily be driven by expanding global import demand. Exports are anticipated to reach a 22% share of production in Mexico by 2033, and 34% in Thailand. However, at projected production quantities of 3.1 and 1.7 Mt in 2033, respectively, Mexico and Thailand will account for comparatively small shares in global production.

Global exports of mangoes, mangosteens and guavas are projected to reach 3.2 Mt in 2033, compared to 2.3 Mt in the base period, on account of higher procurements from the United States, China, and the European Union. Mexico, the leading supplier of mangoes, is expected to benefit from further growth in import demand from its major market, the United States, and reach a 24% share of world exports in 2033. Shipments from Thailand, almost exclusively mangosteens, will cater mainly to rising import demand from China, while supplies from Peru and Brazil, two emerging exporters, will be mostly mangoes destined for the European Union. While Thailand is projected to reach a share in global exports of 20% by 2033, Brazil and Peru are expected to hold some 14% and 8%, respectively. China, whose per capita mango, mangosteen and guava consumption of 2.7 kg in the base period is relatively low compared to other Asian countries, is expected to experience a rise in imports of 2.4% p.a., to some 0.8 Mt in 2033. This will be mainly due to a strong, income-driven increase in Chinese import demand for mangosteen, as domestic production of this fruit remains low in China.

Pineapple

Market situation

Based on preliminary trade data, global exports of pineapples grew by some 4% in 2023, to 3.2 Mt, driven largely by higher supplies from Costa Rica, the world's largest exporter at a market share of some 65%. According to industry information, weather conditions in key Costa Rican growing areas were favourable for the cultivation of pineapples during the first half of the year, resulting in higher yields and thus higher export supplies. Lower freight costs, especially to the United States, also supported Costa Rican export growth and shipments were expected to increase by some 3% in 2023, to around 2 Mt, in strong contrast with the near 5% drop experienced in 2022. In terms of leading destinations, pineapple shipments from Costa Rica continued to be almost exclusively destined for the United States and the European Union, where demand remained firm.

Preliminary trade data point to an increase in global imports of pineapples by approximately 1% in 2023 to 3 Mt. Demand in the United States and the European Union continued to be firm. A large share of pineapples is consumed outside of the home and aided by relatively stable sales in the hospitality sector, imports by the United States were expected to grow by some 1% in 2023 to 1.1 Mt. Conversely, imports by the European Union, the second largest importer, were expected to contract slightly due to supply procurement issues in Costa Rica. Over the full year, imports by the European Union were anticipated to stand at approximately 0.76 Mt, some 17% below their previous five-year average. Estimates suggest that

the United States procured about 39% of global export supplies over the full year of 2023, and the European Union some 26%.

Projection highlights

Over the next decade, global production of pineapple is projected to grow at 1.5% p.a., to reach 35 Mt in 2033, from 30 Mt in the base period, on account of a 1.1% expansion in harvested area. Asia is expected to remain the largest producing region accounting for 44% of global production, with sizeable pineapple production in the Philippines, Indonesia, China, India and Thailand. Cultivation in Asia will continue to largely cater to domestic demand and is projected to grow solidly in response to changing demographics and income growth, especially in India, Indonesia and China. Similarly, pineapple production in Latin America and the Caribbean, the second largest producing region at a projected 33% of world production in 2033, will be primarily driven by the evolving consumption needs of the region's growing and increasingly affluent population. Only Costa Rica and the Philippines, two important global producers and exporters, are anticipated to see additional stimulation from rising import demand, with exports accounting for approximately 68% of fresh pineapple production in Costa Rica and 24% in the Philippines in 2033.

Global exports of fresh pineapple are set to grow at 1% p.a., to 3.6 Mt in 2033, predominantly driven by demand from the United States and the European Union. With projected imports of 1.3 Mt in 2033 – equivalent to a 37% global share – the United States is expected to remain the largest importer. The European Union is expected to account for some 24% of global imports. In both key markets, demand is assumed to benefit from continuously low unit prices and, to some degree, the introduction of more premium novelty varieties. Rising import demand from China, where consumption growth has been outpacing production expansion in recent years, is expected to drive further expansion in global exports. By 2033, China is projected to reach import quantities of some 0.34 Mt per year, with supplies primarily sourced in the Philippines.

Avocado

Market situation

Global exports of avocado were expected to expand by approximately 20% in 2023, to around 3 Mt, on account of a positive supply situation in Mexico, the world's leading exporter. Preliminary data indicate that exports from several other origins, notably Peru and Kenya, also grew at fast rates. These developments marked a strong recovery from the weather-induced production losses and shortages in export supplies experienced in 2022.

Alongside significant growth in global supplies, continuously firm import demand in the United States and the European Union, which respectively accounted for some 44% (or 1.2 Mt) and 27% (or 0.8 Mt) of global imports in 2023, further supported this fast expansion in global trade. In both markets, consumption continued to gain in popularity, with avocados widely perceived as a highly nutritious fruit. While the United States imports 90% of avocados from Mexico, the European Union receives supplies mostly from Peru, Kenya, Israel and Morocco.

Projection highlights

Avocado has the lowest production level among the major tropical fruits but has experienced the fastest expansion in output in recent decades and is expected to remain the most rapidly growing over the *Outlook* period. Ample global demand, high returns per hectare and lucrative export unit prices continue to be the main drivers of this growth, stimulating investments in area expansion in both major and emerging production zones. By 2033, production is therefore projected to grow at 3.5% p.a. and reach 14 Mt p.a. – more than three times its level in 2013. While new growing areas have been emerging rapidly, avocado

production is likely to remain concentrated in a small number of regions and countries. The top four producing countries – Mexico, Colombia, Peru and the Dominican Republic – are projected to expand production substantially over the coming decade, together accounting for some 60% of global production by 2033. Output in Mexico, Colombia and Peru is set to increase by 60 to 80% from base period levels, so about 70% of avocado production is expected to remain in Latin America and the Caribbean.

Avocado is on track to become the most traded major tropical fruit, overtaking both pineapples and mangoes as early as 2025 and reaching 4.3 Mt of exports by 2033. The total value of global avocado exports would thus reach an estimated USD 10.4 billion in constant 2021-2023 value terms, making avocado one of the most valuable fruit commodities. Despite increasing competition from emerging exporters, Mexico is expected to retain its leading position in global exports with a 53% quantity share in 2033. This will be supported by output growth of 3.6% p.a. over the coming decade and continued growth in demand in the United States. Exports from Peru, the second leading exporter, will reach some 25% of global shipments, with supplies mainly catering to rising demand from the European Union.

The United States and the European Union, where consumer interest in avocados is fuelled by the fruit's claimed health benefits, are expected to remain the main importers, with 46% and 25% of global imports in 2033, respectively. However, imports are also set to rise substantially in the United Kingdom, Canada, China and some countries in the Middle East, on account of rising incomes and/or changing consumer preferences. Similarly, in many producing countries, per capita consumption of avocados is expected to rise with income growth, notably in Colombia, the Dominican Republic and Indonesia.

Papaya

Market situation

Preliminary trade data indicate a contraction in global exports of papayas by an estimated 3% in 2023, to some 0.365 Mt. Exports from Mexico, the largest global exporter of papayas, declined by about 4% over the full year, to some 0.19M t, on account of adverse weather conditions. Virtually all Mexican papaya exports are destined for the United States. However, the bulk of Mexican papaya production is for domestic consumption.

Global imports remained largely stable at some 0.35 Mt in 2023, with the United States remaining the largest importer with about 62% of global imports. Industry sources stated that demand for papayas in the United States remained solid over the first seven months of 2023, benefiting from their reputation of being a rich source of vitamin C. The European Union account for 9% of global imports, or 0.03 Mt in 2023.

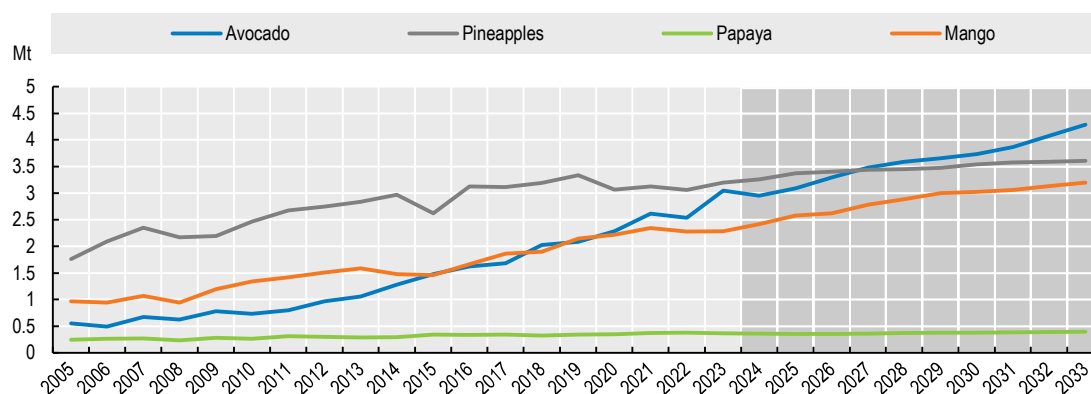
Projection highlights

Global papaya production is projected to rise by 1.5% p.a., to 17 Mt in 2033, from 14 Mt in the base period. The share of exports in production sits at some 2% in the base period and is mostly driven by domestic demand due to population and income growth. Asia, the top global producer, is expected to have the strongest production expansion, with its share of world production set to rise to 60% by 2033, from 58% in the base period. India, the world's single largest producer, is projected to increase production at a rate of 1% p.a., expanding its share of global output to 35% by 2033. Income and population growth will be the main factors behind this rise, with Indian per capita consumption of papayas expected to reach 4.1 kg in 2033, up slightly from 3.9 kg in the base period. In Indonesia, production is projected to grow by 2.3% p.a. over the *Outlook* period, primarily on account of increasing domestic demand as per-capita incomes are expected to expand at 4% p.a.

Global exports will predominantly be shaped by production expansion in Mexico and higher demand from the key importers. At an expected average annual rate of 1.2%, global papaya exports are projected to reach just under 0.4 Mt by 2033. A major obstacle to a significant expansion in international trade has so

far been the fruit's high perishability and sensitivity in transport, which makes produce problematic to supply to far afield destinations. Innovations in cold chain, packaging and transport technologies promise to facilitate a broader distribution of papaya, particularly in view of rising consumer demand for tropical fruits in import markets.

Figure 11.4. Global exports of the four major tropical fruits



Source: FAO data.

11.3.2. Uncertainties

The *Outlook* for global production, trade and consumption of bananas and major fresh tropical fruits is subject to several potentially significant obstacles and uncertainties. Elevated inflation rates, high interest expenses and exchange rate fluctuations threaten to hinder demand in domestic and import markets, especially for poorer consumers. Given the typically high unit values and high income and price elasticities of demand for tropical fruits, changes in consumer incomes or prices may quickly affect demand. Geopolitical uncertainties that may result in the disruption of established trade relationships and potentially cause large effects on domestic and global markets are of further concern. A recent example was the temporary discontinuation of banana imports by the Russian Federation from Ecuador.

On the supply side, the effects of climate change are resulting in a higher occurrence of droughts, floods, hurricanes and other natural disasters, which render the production of bananas and major tropical fruits increasingly difficult and costly. Given the perishable nature of tropical fruits in production, trade and distribution, environmental challenges and insufficient infrastructure continue to jeopardise international production and supply. This is a particularly acute difficulty since most of tropical fruits are produced in remote, informal settings disconnected from major transport routes, where cultivation is highly dependent on rainfall and prone to the adverse effects of increasingly erratic weather events. With several ongoing wars affecting the global economy, the risks of potential future disruptions to local and global supply chains, fertiliser markets, transport routes and access to export markets add further uncertainties to the *Outlook*.

In the face of rising temperatures, more rapid and severe spreads of plant pests and diseases such as Banana Fusarium Wilt are being observed. The currently expanding strain of this disease, Tropical Race 4 (TR4), poses particularly high risks to global banana supplies as it can affect a much broader range of banana and plantain cultivars than other strains. Furthermore, despite recent breakthroughs in the engineering of resistant varieties, no effective fungicide or other eradication method is currently available. According to official information, TR4 is currently confirmed in 22 countries, predominantly in South and Southeast Asia, but also in the Middle East, Africa, Oceania and Latin America. A further spread of TR4

would, *inter alia*, entail considerable loss of income and employment in the banana sector in the affected countries, as well as significantly higher consumer costs in importing countries.

Given the popularity of bananas, pineapples and avocados in import markets, their global value chains have been characterised by intense competition among market actors all the way to the retail level. For bananas and pineapples, this has exerted downward pressure on prices at each stage, keeping producer prices low and with little fluctuation. Rising production costs, low prices and tight profit margins greatly hinder the adequate remuneration of workers and smallholder farmers in these industries and act as a major obstacle for producers in coping with emerging challenges and supply chain disruptions. The prospects for production are therefore further threatened by elevated competitive pressures, with smallholder producers discouraged from continuing their operations by low or even negative producer margins, potentially reducing supplies to world markets and consequently causing higher prices. Data and information on developments in world export markets in recent years already point in this direction, with lower value fruits such as bananas and pineapples being particularly affected.

Note

¹ Pulses types: dry beans, dry broad beans, dry peas, chickpeas, cow peas, pigeon peas, lentils, Bambara beans, vetches, lupines and minor pulses (not elsewhere specified).

Table C.45. Roots and tubers projections: Production and food consumption

Calendar year

	PRODUCTION (kt)		Growth (%) ⁴		FOOD (kg/cap)		Growth (%) ⁴	
	Average 2021-23est	2033	2014-23	2024-33	Average 2021-23est	2033	2014-23	2024-33
WORLD	250 187	305 906	2.40	1.65	17.4	19.3	1.45	0.82
NORTH AMERICA	6 051	6 308	1.44	0.27	12.7	12.5	1.14	-0.22
Canada	1 148	1 237	2.37	0.38	15.5	14.8	0.23	-0.47
United States	4 903	5 072	1.22	0.24	12.4	12.2	1.25	-0.19
LATIN AMERICA	14 577	16 406	0.53	1.07	12.8	14.0	0.34	0.74
Argentina	714	806	2.77	0.91	10.6	10.3	1.33	-0.40
Brazil	5 798	5 343	-2.37	-0.53	13.1	12.1	-1.99	-0.62
Chile	221	228	-1.37	0.31	9.6	9.7	-1.11	0.56
Colombia	1 639	2 232	4.12	2.70	24.8	33.3	2.69	2.31
Mexico	394	438	-0.13	1.10	3.2	3.7	-0.32	1.04
Paraguay	1128	1480	3.19	2.26	56.7	64.7	2.12	0.94
Peru	1 861	2 342	3.08	1.91	29.0	33.4	0.72	1.13
EUROPE	27 680	29 520	0.80	0.43	15.4	16.1	-0.31	0.27
European Union ¹	10 948	11 549	-1.19	0.00	7.4	6.8	-5.54	-1.01
United Kingdom	1 142	1 309	-0.16	1.06	14.6	16.3	-4.29	0.94
Russia	8 159	8 235	3.03	0.45	35.5	38.7	4.55	0.50
Ukraine	6 047	6 943	3.16	1.02	35.6	43.1	6.15	2.01
AFRICA	89 571	121 734	2.66	2.66	35.1	38.6	0.10	0.78
Egypt	1 675	2 171	6.16	2.15	8.5	9.5	5.21	0.90
Ethiopia	2 591	3 306	1.62	2.08	13.6	13.5	-2.16	-0.14
Nigeria	35 876	48 006	3.08	2.61	81.6	90.0	0.32	0.92
South Africa	565	655	2.10	0.95	5.5	5.9	1.87	0.38
ASIA	111 702	131 222	2.95	1.20	13.4	14.1	2.39	0.28
China ²	52 585	56 091	3.35	0.26	24.9	25.7	4.01	0.01
India	16 260	20 462	3.64	1.81	7.2	8.2	2.26	1.06
Indonesia	9 576	11 826	1.60	1.84	22.6	25.0	-1.00	0.92
Iran	543	587	-8.33	0.73	3.6	3.8	-10.53	0.63
Japan	674	648	-2.51	-0.19	6.0	6.0	-0.88	0.05
Kazakhstan	855	1 040	2.50	1.42	17.9	19.5	-0.22	0.64
Korea	288	315	2.21	0.35	6.2	7.4	2.30	1.18
Malaysia	46	65	3.98	3.17	9.7	15.0	8.85	3.62
Pakistan	1 410	1 889	5.60	2.39	3.5	3.9	3.91	0.90
Philippines	1 206	1 607	3.57	2.57	5.3	7.2	4.43	2.53
Saudi Arabia	64	94	-2.64	4.00	3.5	3.3	-5.50	0.19
Thailand	13 111	17 447	4.12	2.24	3.5	5.5	4.24	3.69
Türkiye	704	742	-1.41	0.28	5.3	5.0	-2.35	-0.23
Viet Nam	3 795	4 536	-0.04	1.47	3.7	5.3	1.34	3.07
OCEANIA	606	716	2.64	1.41	12.5	12.8	0.13	-0.07
Australia	296	331	1.90	0.90	13.0	12.5	0.96	-0.57
New Zealand	157	163	3.25	0.49	16.1	15.1	-3.00	-0.71
DEVELOPED COUNTRIES	38 075	40 856	0.94	0.50	13.4	13.8	0.23	0.20
DEVELOPING COUNTRIES	212 113	265 049	2.68	1.84	18.2	20.4	1.63	0.87
LEAST DEVELOPED COUNTRIES	39 423	55 952	2.82	3.01	25.4	28.9	0.56	1.00
OECD³	22 781	24 553	-0.07	0.40	9.3	9.6	-1.53	0.16

Note : Calendar year. Average 2021-23est: Data for 2023 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member countries.

2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.

3. Excludes Iceland and Costa Rica but includes all current European Union member countries.

4. Least-squares growth rate (see glossary).

Source : OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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Table C.46. Pulses projections: Production and food consumption

Calendar year

	PRODUCTION (kt)		Growth (%) ⁴		FOOD (kg/cap)		Growth (%) ⁴	
	Average 2021-23est	2033	2014-23	2024-33	Average 2021-23est	2033	2014-23	2024-33
WORLD	93 927	118 849	1.86	2.18	7.3	8.6	0.52	1.68
NORTH AMERICA	7 311	10 247	-2.63	2.99	3.3	4.3	-2.04	2.42
Canada	5 073	6 851	-3.03	2.31	4.3	4.7	3.00	1.01
United States	2 238	3 396	-1.77	4.51	3.2	4.2	-2.61	2.61
LATIN AMERICA	7 766	9 024	0.37	1.34	9.9	10.3	-0.61	0.42
Argentina	1 108	1 306	4.01	1.43	10.5	9.7	17.85	-0.90
Brazil	3 003	3 263	-0.50	0.67	12.0	12.7	-2.52	0.50
Chile	58	72	4.11	1.30	2.6	2.8	2.11	0.55
Colombia	159	203	-4.55	2.71	4.9	5.4	-3.16	0.82
Mexico	1 669	1 955	1.11	1.30	11.8	11.5	0.52	0.00
Paraguay	174	194	1.16	0.92	10.2	11.8	1.34	1.20
Peru	289	314	1.57	0.82	7.9	8.9	0.71	0.96
EUROPE	11 038	13 422	2.85	1.86	3.2	4.6	2.86	3.18
European Union ¹	4 498	6 123	2.28	3.18	3.4	5.1	3.35	3.82
United Kingdom	1 214	1 316	4.26	0.89	1.5	2.9	-9.53	5.36
Russia	3 991	4 500	4.69	0.94	3.0	3.5	3.01	1.29
Ukraine	707	782	0.47	0.55	3.5	4.6	11.03	2.15
AFRICA	23 042	31 669	2.38	3.02	10.5	11.5	-1.15	0.78
Egypt	320	435	1.26	2.79	3.4	3.7	-6.95	1.27
Ethiopia	3 154	4 140	0.62	2.62	22.1	22.4	-0.38	0.22
Nigeria	3 781	4 884	2.66	2.36	10.7	11.2	0.62	0.30
South Africa	88	115	0.02	2.21	1.3	1.4	-1.95	0.35
ASIA	40 838	50 305	2.41	1.93	6.8	8.2	1.07	1.95
China ²	5 129	5 884	1.99	1.12	2.0	2.1	5.32	0.93
India	26 453	34 233	4.15	2.38	15.0	18.2	0.42	2.06
Indonesia	197	208	-4.72	0.84	0.8	0.9	-2.38	1.70
Iran	422	421	-5.12	-0.03	3.7	3.7	-5.85	-0.10
Japan	97	121	-4.10	1.26	1.1	1.2	-5.29	1.49
Kazakhstan	324	365	6.63	1.01	4.4	4.5	0.92	0.62
Korea	13	23	-5.03	5.06	1.6	1.6	1.98	0.18
Malaysia	0	0	2.0	2.0	-2.63	0.23
Pakistan	549	660	-0.66	1.43	4.8	5.5	5.10	1.41
Philippines	68	75	1.01	0.92	1.2	1.4	1.79	1.05
Saudi Arabia	15	17	-0.10	0.98	4.6	4.5	-2.68	0.18
Thailand	225	235	0.63	0.43	2.1	2.5	1.01	1.40
Türkiye	1 062	1 220	-1.05	1.36	9.4	9.4	-0.02	0.01
Viet Nam	291	322	-0.92	1.03	2.5	3.0	1.63	1.72
OCEANIA	3 932	4 182	5.42	0.23	6.3	6.0	25.39	-0.59
Australia	3 889	4 136	5.51	0.22	9.5	8.9	44.50	-0.67
New Zealand	28	30	-0.22	0.50	2.9	3.2	-3.33	1.14
DEVELOPED COUNTRIES	23 279	29 023	1.08	1.96	3.1	4.1	1.37	2.57
DEVELOPING COUNTRIES	70 648	89 826	2.16	2.25	8.2	9.5	0.34	1.52
LEAST DEVELOPED COUNTRIES	17 432	23 325	1.79	2.84	10.5	11.8	-0.37	1.09
OECD³	20 067	25 519	0.36	2.18	4.3	5.3	0.64	1.90

Note : Calendar year. Average 2021-23est: Data for 2023 are estimated. Production and consumption are expressed on dry weight basis.

1. Refers to all current European Union member countries.

2. Refers to mainland only. The economies of Chinese Taipei, Hong Kong (China) and Macau (China) are included in the Asia aggregate.

3. Excludes Iceland and Costa Rica but includes all current European Union member countries.

4. Least-squares growth rate (see glossary).

Source : OECD/FAO (2023), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database).

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