UNION ZUR FÖRDERUNG VON OEL- UND PROTEINPFLANZEN E. V.

UFOP REPORT ON **GLOBAL MARKET SUPPLY 2023/2024**

European and world demand for biomass for the purpose of biofuel production in relation to supply in the food and feedstuff markets

Damocles sword of climate change

» Agriculture needs to be sustainably intensified to meet its role as supplier of food, feed and renewables

As the effects of climate change become ever more impactful, agriculture faces greater challenges than ever before in safeguarding reliable supplies of food and feed by exploiting production potentials and maintaining crop diversity in resilient crop rotations. Agriculture is, moreover, an important supplier of raw materials. It is also considered to play a major role in carbon capture and storage (carbon farming) which contributes to mitigating climate change. However, the decision on the final use of the commodities produced is not usually made in the farmer's field, but downstream in the trade chain. The current issue of the "UFOP Report on Global Market Supply 2023/24" once again confirms that supply of feedstock is basically sufficient to secure nutrition. However, this can only be said because yield losses have been offset to date by extra harvest volumes, some of which are based on expansions in agricultural land.

This clearly points to the necessity of sustainably increasing productivity by improving efficiency, and the risks of not doing so. These improvements include continuous innovation and the use of new breeding technologies (e.g. genome editing) to unlock genetically available yield potentials. The EU Commission's proposals made as part of the Green Deal aimed at making the European Union a global pioneer in sustainability. From the perspective of governments in regions facing the threat of famine, there is a huge contradiction between the warnings issued by the European Union about a threat to market supply - not least as a result of the war against Ukraine – and the promotion by many European politicians of a massive extensification of agricultural land in cultivation regions that have the highest per-hectare yields in a worldwide comparison. Farmers are, of course, also called upon to produce the commodities in the most ecologically sustainable way possible. The EU has a comprehensive legal framework in place for this, which is, however, leading to competitive distortions even today, for example in the use of certain plant protection products that may not be applied in the EU but are "imported" via third countries or "exported" by third countries to other regions.

The challenge is to bring ecologisation and sustainability in line with the required productivity. The UFOP is committed to a constructive dialogue and, within the scope of its possibilities, promotes not only the optimisation of the production of oil and protein crops, but also the utilization of rapeseed protein from the biodiesel production processing chain for human nutrition, the optimisation of rapeseed oil to substitute palm oil in the food sector and the use of grain legume protein in animal and human nutrition. Any agricultural or environmental policy and any farm-to-fork or farm-to-tank strategy deserving its name should aim at systematically developing regionally adapted crop rotation systems with high added value. For this reason, there is a need for incentives to expedite implementation in farms. The UFOP considers the assessment and monetary definition of the advantages to the ecosystem of diversified crop rotations to be an important approach. This is our idea of creating and implementing a national sustained arable farming strategy which can, at best, serve as a model.

The strategy of allocating feedstock potential based on its final use, as pursued by the National Biomass Strategy (NABIS), is the wrong approach, as this is determined by the market. In fact, one should bear in mind that EU legal sustainability and certification requirements for energy crop production already provide the pioneering framework for a level playing field for sustained farming, in the case of biofuels even in third countries. This is where we need to start and further develop the biomass strategy for agriculture as a motivational driver.

Detlef Kurreck
Chairman of the Union for the Promotion of Oil and Protein Crops e. V. (UFOP)

Quick information on UFOP e. V.:
The Union for the Promotion of Oil and Protein Crops e. V. (UFOP) represents the political interests of companies, associations and institutions involved in the production, processing and marketing of domestic oil and protein crops in national and international bodies. UFOP supports research to optimise agricultural production and for the development of new recycling opportunities in the food, non-food and feed sectors. UFOP public relations aim to promote the marketing of domestic oil and protein plant end products. (www.ufop.de/english/news)

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1 | Feedstock supply

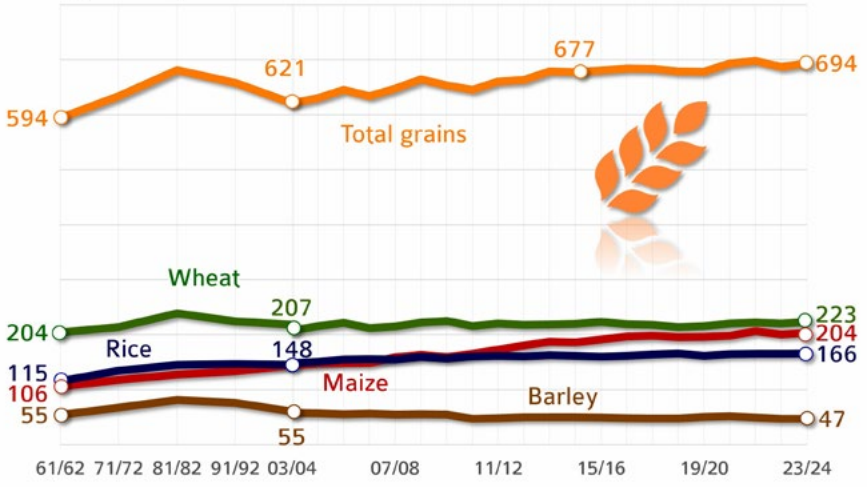
1.1 How much grain is produced on a global scale?

» 1.1.1 Global grain production

Following the decline in the previous year, global grain cultivation has recently expanded. **The record area of 698 million hectares in the 2021/22 marketing year will not be reached with the 694 million hectares of the current season. Especially the areas planted with wheat and maize were expanded. More specifically, the wheat area was expanded by 1.1 per cent to 223 million hectares and the maize area by 1.6 per cent to 204 million hectares.** The barley and rice areas remained virtually unchanged at 47 and 166 million hectares respectively. The world grain production has continuously increased over the past decades thanks to progress in plant breeding and improvement of agricultural production practices (fertiliser applications, pest and disease control, reduced losses at harvest and in storage). Since 1972/73 the output of maize almost quadrupled and that of wheat and rice more than doubled, although farmers in key producing countries of the northern hemisphere often had to cope with drought and extreme heat. Maize is in first place, which underlines its growing global importance for supplying the animal feed sector and for bioethanol production, especially in the USA. Barley, like maize, is mainly used to feed livestock. In contrast, rice and wheat are primarily used for human consumption.

Acreage for cereals above previous year

Acreage for grains, total and by major crops, worldwide, 2023/24, estimated, in million hectares



Total grains = maize, wheat, barley, rice, rye, oat, sorghum

1.1 How much grain is produced on a global scale?

» 1.1.2 Global stocks of grain

The ratio of supplies to consumption (also called the stock-to-use ratio) is a key figure in estimating supply and, consequently, potential price trends. The lower the ratio, the faster supplies are absorbed. Also, a low ratio leads to rising prices. In 2023/24, wheat production will decrease year-on-year, while consumption is expected to increase. In other words, global ending stocks and the stock-to-use ratio are shrinking. The ratio is set to decrease for the first time in four years. **The projected ending stocks 2023/24 would cover up to 40 per cent of calendar year demand, a slightly weaker result than a year earlier. In the case of coarse grains (amongst other maize), 2023/24 ending stocks are expected to raise due to a increase in production to 1,510.3 million tonnes. Consequently, the ratio increases to 23.7 per cent.**

Supply and demand estimate based on the stock-to-use-ratio

Stock-to-use-ratio of wheat and coarse grains, worldwide, 2023/24, estimated, in per cent

Coarse grains = maize, barley, rye, oat, sorghum

1.2 How much oilseed and vegetable oil is produced on a global scale?

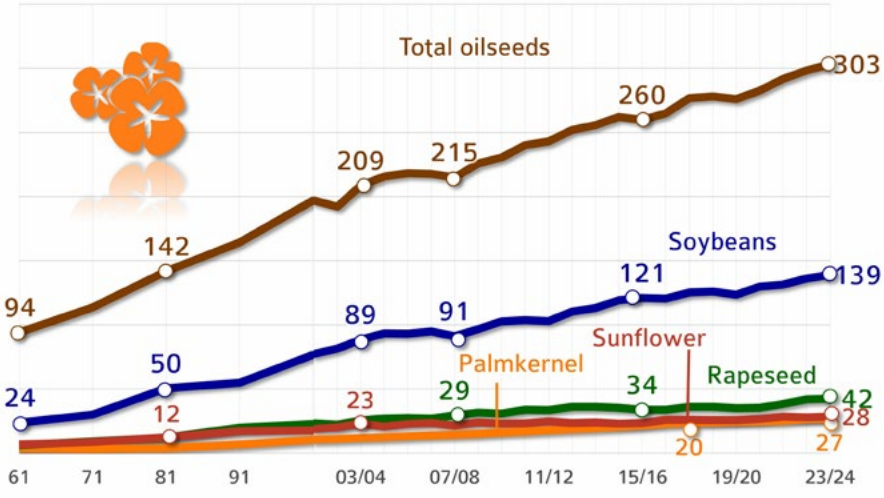
» 1.2.1 Global oilseed production

In the 2023/24 marketing year, around 303 million hectares will be planted with oilseeds. This translates to an increase of 2 per cent over the previous year. For years now, the increase in global demand for high-quality feed protein has led to an expansion in soybean area, especially in South America. On a global scale, soybean is the number one oilseed crop, accounting for just less than 46 per cent of world oilseed production, followed by rapeseed with 42 million hectares (+ 0.5 million hectares on the previous year). The expansion in soybean area is considered to be one of the contributors to growing deforestation in Brazil. The EU Commission's proposal for a regulation on deforestation-free products was approved in the trialogue proceedings at the beginning of December 2022 and had to be **implemented starting in 2022/23. The requirement of a dated proof of land use for the purpose of market access has been standard practice since 2008 for the sustainability certification of biofuels from cultivated biomass – including for deliveries from third countries. The new regulation sets 2020 as the cut-off year.**

Oilseed crops differ in oil and protein content as well as fatty acid composition and protein quality, along with their climate and soil requirements. These factors have a determining influence on the price of the oilseed crop in question. This especially applies to protein quality, because soybean is also the most valuable source of protein in terms of quality. **For this reason, rapeseed breeders are working intensively on improving the protein quality of rapeseed. The UFOP is supporting a number of different project proposals relating to the use of rapeseed protein in animal feed and the human diet to raise this added-value potential.** Some of the latest research results were presented during a UFOP conference: www.ufop.de/localheroes (in German).

Soybean acreage in first place worldwide

Acreage of oilseed crops, total and by major oilseed crop, worldwide, 2023/24, estimated, in million hectares



Total oilseeds = soybeans, rapeseed/canola, sunflower, oil palms, peanuts, coconut, cotton

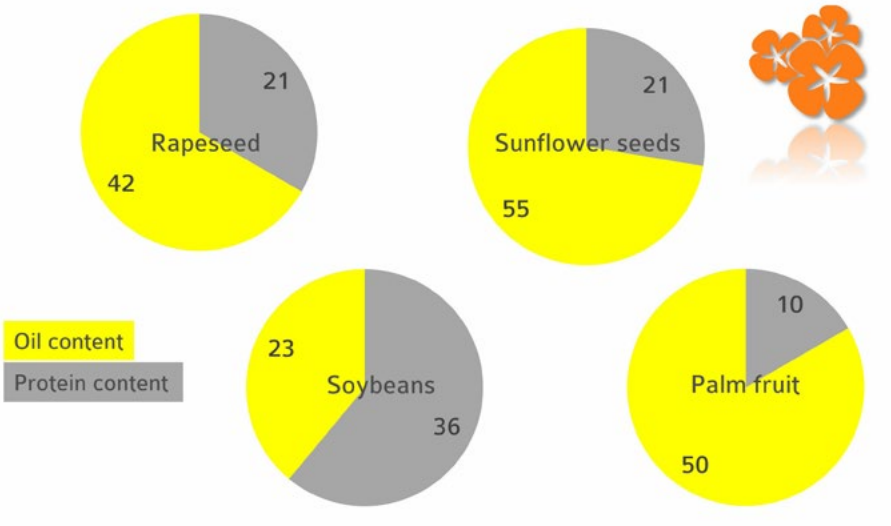
1.2 How much oilseed and vegetable oil is produced on a global scale?

» 1.2.1 Global oilseed production

↳ 1.2.1.1 Composition of the oilseeds

Sunflowers have the highest oil content

Proportion of pure protein and oil in different oilseed crops, in per cent



1.2 How much oilseed and vegetable oil is produced on a global scale?

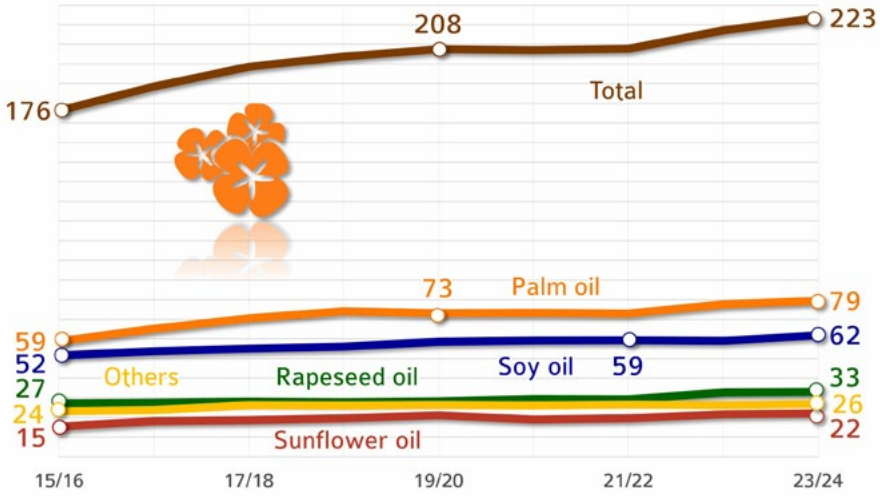
» 1.2.2 Global production of vegetable oil

Global production of vegetable oil is set to reach new record highs in 2023/24 with all oils increasing, according to information published by the US Department of Agriculture. At the time of going to print, global production in 2023/24 was estimated at less than 223.5 million tonnes, up just less than 6.3 million tonnes on 2022/23. **In other words, production will presumably fully cover demand of 218.9 million tonnes in the current crop year.** Palm and soybean oil account for 63 per cent of world vegetable oil production. Rapeseed oil occupies third place, accounting for almost 15 per cent, followed by sunflower oil with 10 per cent of world output. Global output of vegetable oil is set to exceed the level of 200 million tonnes for the sixth year running in the 2023/2024 marketing year.

Palm oil is set to remain the most important vegetable oil, accounting for just less than 36 per cent and with an output of approximately 79.5 million tonnes, a rise of 1.9 million tonnes compared to 2022/23. Indonesia remains the largest palm oil producer with an output of 47 million tonnes, followed by Malaysia with 19 million tonnes and Thailand with 3.5 million tonnes. Production of soybean oil is expected to rise to a new record high of 61.9 million tonnes based on bigger harvests. **China, the most important importer of soybeans in the world with a volume of 100 million tonnes, remains the primary soybean oil producer with production amounting to 17.6 million tonnes, whereas the US ranks second with 12.6 million tonnes.** Production of sunflower oil will probably increase 1.9 per cent to 22 million tonnes due to bigger harvests in Eastern Europe and the EU-27. On the other hand, global rapeseed oil production is seen to rise 0.9 per cent to 33.1 million tonnes despite the smaller global rapeseed supply.

Palm oil dominates the vegetable oil market

Production of vegetable oils, total and by major oilseed crop, worldwide, 2023/24, estimated, in million tonnes



Others= palm kernel oil, peanut oil, coconut oil, cotton oil, olive oil

1.2 How much oilseed and vegetable oil is produced on a global scale?

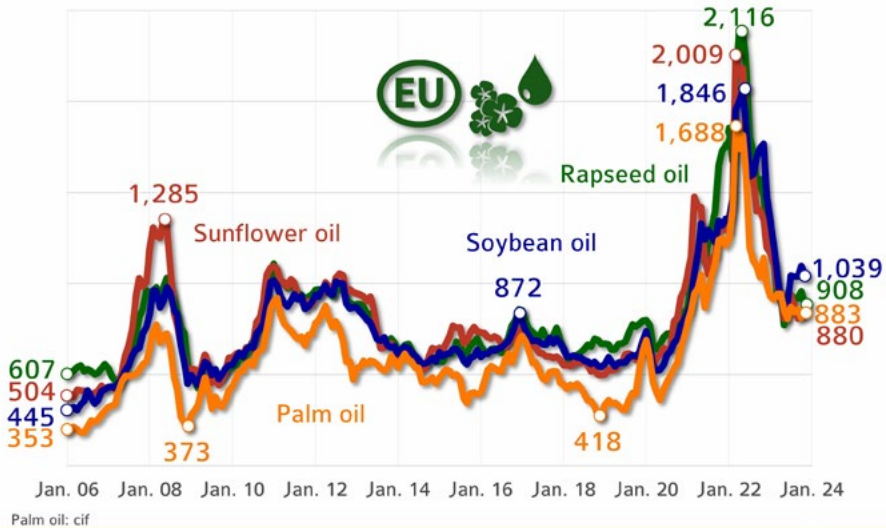
» 1.2.2 Global production of vegetable oil

↳ 1.2.2.1 Price development of vegetable oils

The situation on the vegetable oil market had already been tense in 2021, but worsened in the wake of Russia's invasion of Ukraine in 2022. The uncertainty about opportunities and volumes of exports of agricultural produce from Ukraine shook the market and led to unprecedented price increases. Sharply rising energy costs and issues in relation to logistics, especially in Germany as a consequence of low water levels in the major rivers that hampered water transports and drove costs up, added to the hike in prices. Consequently, vegetable oil prices climbed, but they did not maintain the high level. Falling commodity prices and subdued demand have recently put pressure on receivables. Only the prices of soybean oil have firmed since the summer due to the unfavourable growing conditions in South America. Nevertheless, vegetable oil prices are well above the previous year's level.

Prices for vegetable oils decline

Monthly wholesale prices, fob oil mill, in EUR per tonnes



Palm oil: cif

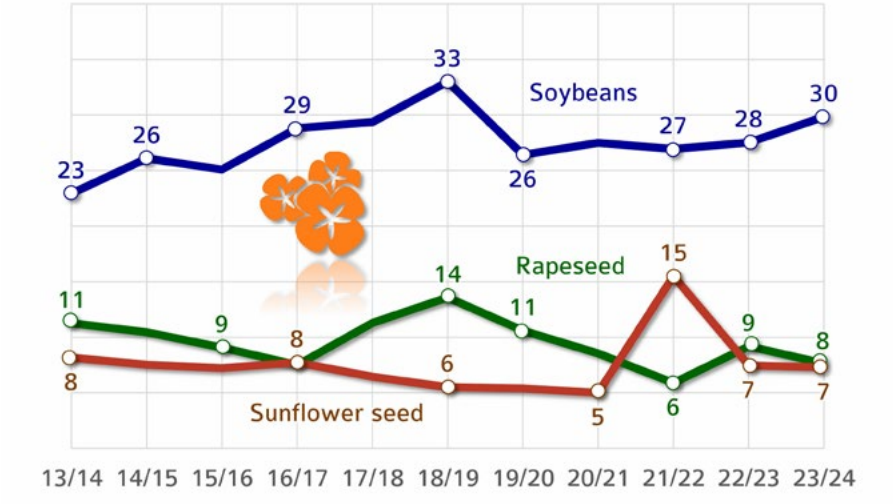
1.2 How much oilseed and vegetable oil is produced on a global scale?

» 1.2.3 Global oilseed supply

The ratio of supplies to consumption (also called the stock-to-use ratio) is a key figure in estimating supply and, consequently, potential price trends. The lower the ratio, the faster supplies are absorbed. Also, a low ratio leads to rising prices. In 2023/24, soybean production is set to increase year-on-year, exceeding projected consumption. Global stocks are seen to increase and the stock-to-use ratio is set to rise. The expected ending stocks in the current marketing year could cover up to 30 per cent of demand. The production of sunflowerseed is also increasing, as ist consumption. Accordingly, end-of-season stocks are likely to remain stable at 7 per cent. In contrast, the stock-to-use ratio for rapeseed is 8.9 per cent below the previous year's level. Although record soybean harvests are steadily increasing supply, demand for soybean protein for animal feed, particularly in China, is also rising sharply. Due to the steadily positive development of the economy and income in the world's most populous country, purchasing power is increasing and so is demand for meat and, consequently, oilseed meals to feed the growing numbers of livestock. For comparison: In 2023, almost 453 million pigs were kept in China and 134 million in the EU-27.

Supply and demand estimate based on the stock-to-use-ratio

Stock-to-use ratio of soybeans, rapeseed and sunflower seed, worldwide, 2023/24, estimated, in per cent



1.2 How much oilseed and vegetable oil is produced on a global scale?

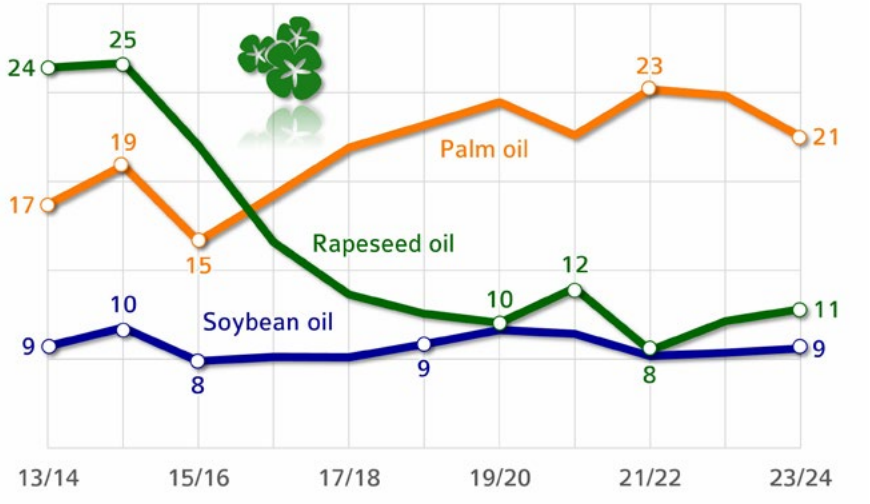
» 1.2.3 Global oilseed supply

↳ 1.2.3.1 Global vegetable oil supply

The stock-to-use ratio for palm oil is in decline for the second year in a row. It declined 2.3 per cent year-on-year. The picture is different for soybean and rapeseed oil. In the case of rapeseed oil, the ratio rose 0.7 per cent, whereas that for soybean oil exceeded the previous year's figure by 0.2 per cent.

Palm oil supply declines

Stock-to-use ratio of rapeseed oil, palm oil and soybean oil, worldwide, 2023/24, estimated, in per cent



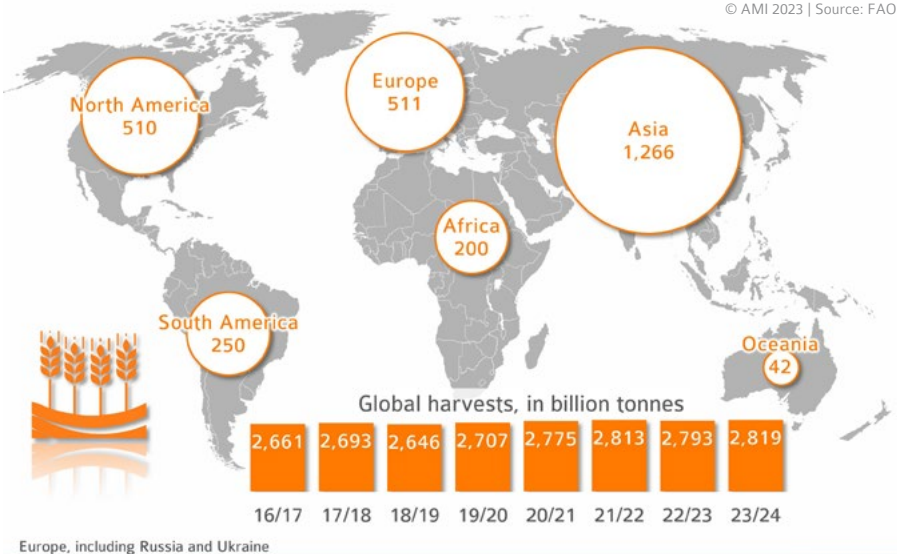
1.3 How much oilseed and grain does each continent produce?

» 1.3.1 Production of grain

Global production of grain including rice may even just exceed the record volume of 2021/22 in the current marketing year. In contrast to the 2022 harvest year, when dryness in the northern hemisphere limited yields, significantly higher yields were achieved thanks to favourable growing conditions. **The Food and Agriculture Organization (FAO) expects around 2,819 million tonnes of grain on a global scale.** The majority, around 45 per cent, is produced in Asia. The main reason is that Asia is the home of rice production. China is the main country of origin for grain and rice. Europe holds second position, accounting for 18 per cent. North America follows close behind with 510 million tonnes, headed by the US with more than 457 million tonnes. **Whereas marketing grain globally is vital for the economy of countries such as the US or Canada, China hardly offers any of its grain on the world market.** The country produces most of its agricultural commodities to cover domestic demand and also needs extensive imports.

Asia is the largest grain producer

Harvests of grains (including rice) by continent, 2023/24, estimated, in million tonnes



Europe, including Russia and Ukraine

1.3 How much oilseed and grain does each continent produce?

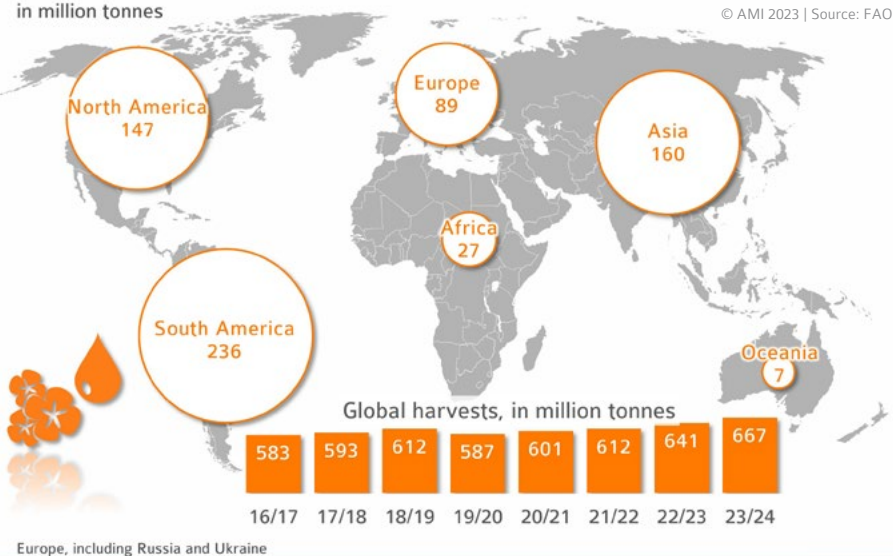
» 1.3.2 Production of oilseeds

The output of oilseeds is growing rapidly. The FAO estimates global production in 2023/24 at 667 million tonnes. This is up 4 per cent year-on-year and just over 30 per cent from ten years ago. **The increase is primarily based on growth of output in South America, Europe and Asia due to expansion of area planted. The world's most important oilseed and palm oil producing regions are more evenly distributed than grain-producing areas.** The difference is not so much in output as in crops grown whereas soybean is the most important oilseed crop in South America and the US, rapeseed prevails in Canada and the EU-27 due to climatic conditions. In eastern Europe sunflowers predominate. Asian countries such as China and India produce large amounts of both rapeseed and soybeans. On the other hand, oil palm is the primary oilseed crop in Malaysia and Indonesia. This geographical distribution also „buffers" regional yield fluctuations in the interests of security of supply, for example if the weather phenomenon „El Niño" leads to yield declines in Asia or „La Niña" in South America.

Brazil is set to be the world's largest producer of soybeans in 2023/24 with 163 million tonnes, ahead of the US with 112 million tonnes. Canada has lost its top position among rapeseed producing countries to the EU but moved back to second place ahead of China. Most sunflowers will probably be harvested in Russia in 2024, followed by Ukraine.

Oilseed harvests at all-time high

Harvests of oilseeds (including palm oil) by continent, 2023/24, estimated, in million tonnes



Europe, including Russia and Ukraine

1.4 What products are made from grain?

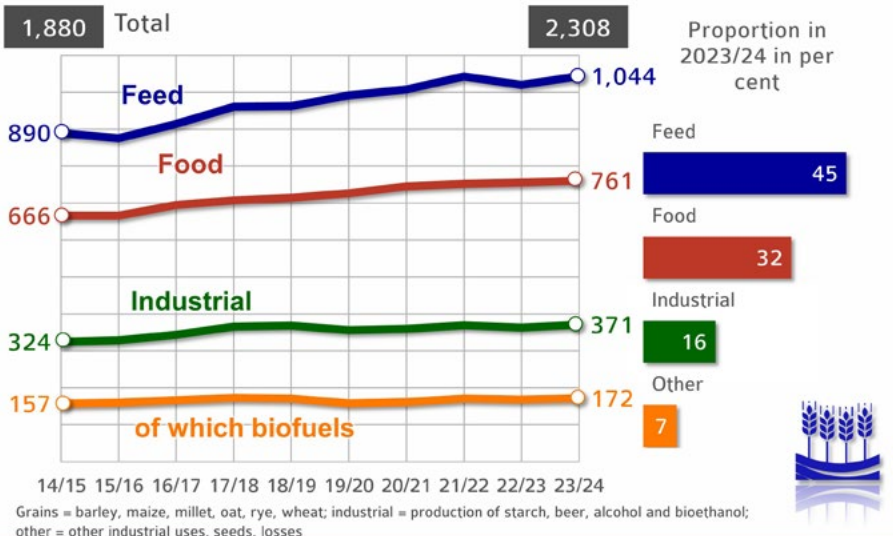
» 1.4.1 Global use of grain

Global production of grains, excluding rice, in the 2023/24 marketing year is set to amount to approximately 2.3 billion tonnes. The produce is intended for human consumption, but also used as a livestock feed and feedstock in bioethanol production. At 45 per cent, the largest part of the grain harvests goes into feeding troughs, showing a stable trend compared to the last years. According to the International Grains Council (IGC) the industrial uses are expected to rise again slightly in 2023/24, it will account for less than a tenth of total consumption. There is basically enough grain to meet the growing demand for food and feed.

In the US, bioethanol is mostly made from maize. The process generates Dried Distillers Grains with Solubles (DDGS), which is used as a protein feed. One tonne of wheat that is processed into bioethanol produces on average 295 kg of DDGS with a moisture content of 10 per cent. One tonne of maize yields 309 kg of DDGS. When grain prices are high, processing is the first activity to go down, before farmers begin to save on feed. **The high added-value potential in the food markets ensures that most of the grain goes into the production of food when grain prices are high. This means that the biofuels market serves as a „buffer" that ensures grain is constantly available for human consumption and feed.**

Grain is mainly used for feed production

Global grain consumption, 2023/24, estimated, in million tonnes



Grains = barley, maize, millet, oat, rye, wheat; industrial = production of starch, beer, alcohol and bioethanol; other = other industrial uses, seeds, losses

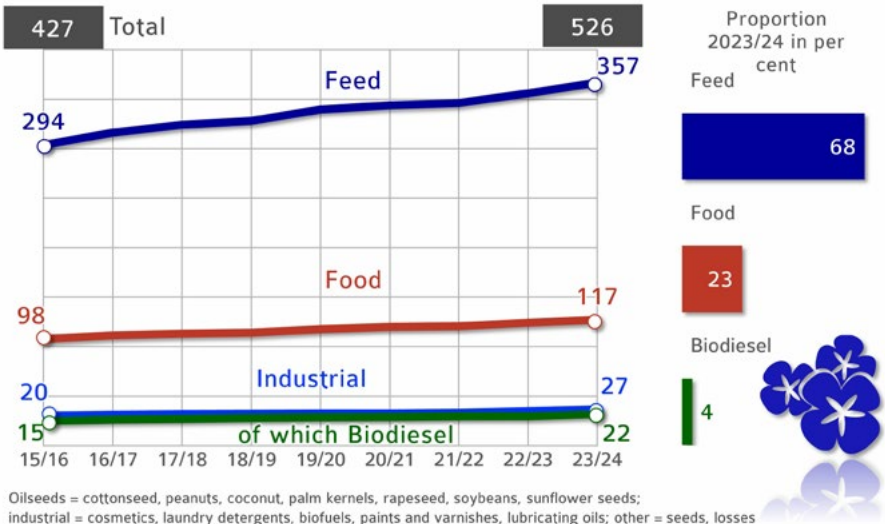
1.5 What products are made from oilseeds?

» 1.5.1 Global use of oilseeds

Oilseeds grown worldwide are obtained to make vegetable oils, extraction meal and oilseed cake. Vegetable oil can be obtained by different chemical and physical processes. Before being pressed, the feedstock is heated to increase oil yield. The meal that remains after pressing is used as a high-protein feed. Consequently, the largest part of the oilseeds – just over two thirds – goes into feeding troughs and the smaller proportion – around 22 per cent – into food production. Soybean meal is the number one oilseed-based feed, with global output amounting to 259 million tonnes. It is followed by rapeseed meal, which has a share of 48 million tonnes in global protein supply. **Farmers in the EU-27 only produce GM-free rapeseed. Consequently, rapeseed is by far the most important GM-free source of protein for animal feeding in the EU. Therefore, EU-rapeseed meal reduces the corresponding need for soybean imports and the acreage of land that would otherwise be required for soy cultivation. This fact has still not received the necessary recognition from the European Parliament and the EU Commission, for example with respect to incorporating the protein component in greenhouse gas accounting for rapeseed-based biodiesel (GHG-calculation RED III) or the "Farm to Fork" strategy.** The amount of sunflower meal, 23 million tonnes, is eleven times smaller than that of soybean meal. Production of oil is much more important with this crop. Any meal produced is also used as animal feed.

Majority of oilseed product go into feed

Global oilseed consumption, 2023/24, estimated, in million tonnes



Oilseeds = cottonseed, peanuts, coconut, palm kernels, rapeseed, soybeans, sunflower seeds; industrial = cosmetics, laundry detergents, biofuels, paints and varnishes, lubricating oils; other = seeds, losses

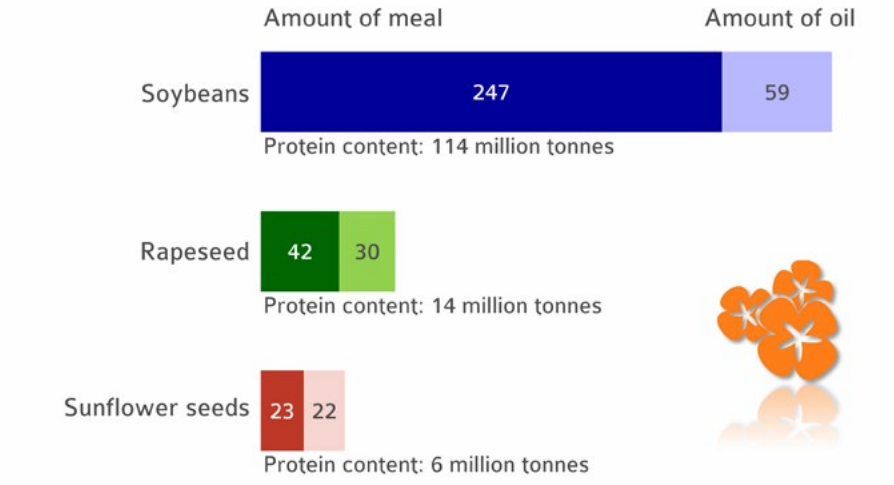
1.5 What products are made from oilseeds?

» 1.5.1 Global use of oilseeds

↳ 1.5.1.1 Global production of oils and meals

Practical dual use of oilseeds

Global output of joint products of oilseeds, 2022/23, estimated, in million tonnes



1.6 Production of pulses

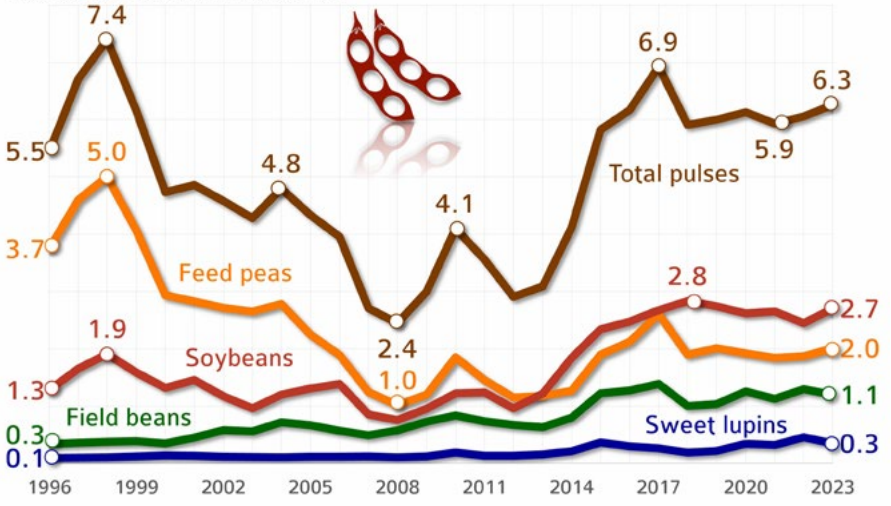
» 1.6.1 Production in the EU-27

The production of legumes is gaining importance in the EU-27 in terms of biodiversity (flowering plants), climate protection (no need for nitrogen applications) and as an alternative source of protein for innovative food products. According to estimates by th EU Commission, almost 6.3 million tonnes of pulses will be harvested in the Union in 2023, 3 per cent more than in the previous year. However, the record result of 6.9 million tonnes from 2017 will be clearly missed. In particular, dry peas and soybeans were harvested more extensively with 2.0 and 2.7 million tonnes and an increase of 8 per cent and 10 per cent respectively compared to the previous year. With a 43 per cent share of grain legume production, soybeans also remain the most important legume crop in the EU-27. In contrast, harvests of field beans and sweet lupins are down on the previous year due to lower yields.

Protein crops are an alternative to imported soybeans and soybean meal in livestock feed. Considering their protein quality, the latter are often lower priced, which makes them attractive for the production of compound feeds. Nevertheless, progress in the use of grain legumes is impressive. They are the basis for the national and European protein plant strategy. The UFOP is supporting project proposals (www.ufop.de/projekte) or directly involved in joint projects funded by the Federal Ministry of Agriculture (www.legunet.de/).

Production of pulses above previous year

Production of pulses, total and by major crops, in the EU-27, 2023/24 estimated, in million tonnes



Total pulses = feed peas, field beans, soybeans, sweet lupins

1.6 Production of pulses

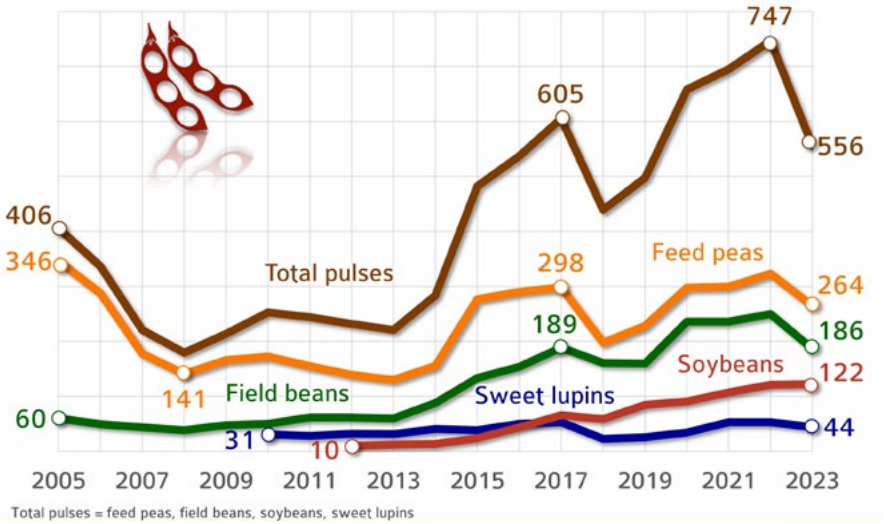
» 1.6.2 Production in Germany

Due to the smaller area and lower yields, the legume harvest in Germany in 2023 was nowhere near the previous year's result. At 556,000 tons, around 26% less legumes were harvested in Germany in 2023 than in the previous year. **Soybeans are becoming increasingly attractive, albeit regionally and still at a low level.** At 263,700 tons (-18%), feed peas are the most important grain legumes, followed by field beans at 186,000 tons (-25%). The production of sweet lupins fell by 17 % to 43,800 tons. Only soybeans recorded a marginal increase of 1% to 122,100 tons.

However, soybean production was at a low scale compared to other legume crops. The reason is a poor competitive position compared to imported soybean meal and soybeans respectively. **As flowering plants, legumes are indispensable crops to expand crop rotations and improve biodiversity and soil fertility. What makes them so special is that, aided by bacteria that cling to their roots, they convert atmospheric nitrogen into organic nitrogen which encourages plant growth.** The importance of pulses for the associated ecosystem services (including the reduction of soy imports) is insufficiently recognized in public promotion (of breeding, cultivation and utilization) from the point of view of UFOP. Legumes have the potential to establish themselves in the trade as an alternative source of protein. This is a result from the UFOP conference titled „Local Heroes". The presentations given at the conference are available (in German only) using the following link: www.ufop.de/localheroes.

Production of pulses declining

Production of pulses, total and by major crops, in Germany, 2023 forecast, in 1,000 tonnes



Total pulses = feed peas, field beans, soybeans, sweet lupins

2 | Production of biofuels

2.1 Which countries promote biofuels?

» 2.1.1 Global output of bioethanol

Worldwide, a new record high of 129.393 million m3 of bioethanol was produced in 2022. The aim is to reduce the use of fossil energy sources, thus making a contribution towards climate protection and securing energy supply, and support feedstock prices to ensure adequate incomes from farming. Blending quotas (relating to energy, volume or greenhouse gas reduction) have become globally accepted as a flexible instrument to achieve this aim. Policy therefore has a direct influence on the scale of bioethanol production and trade in biofuels.

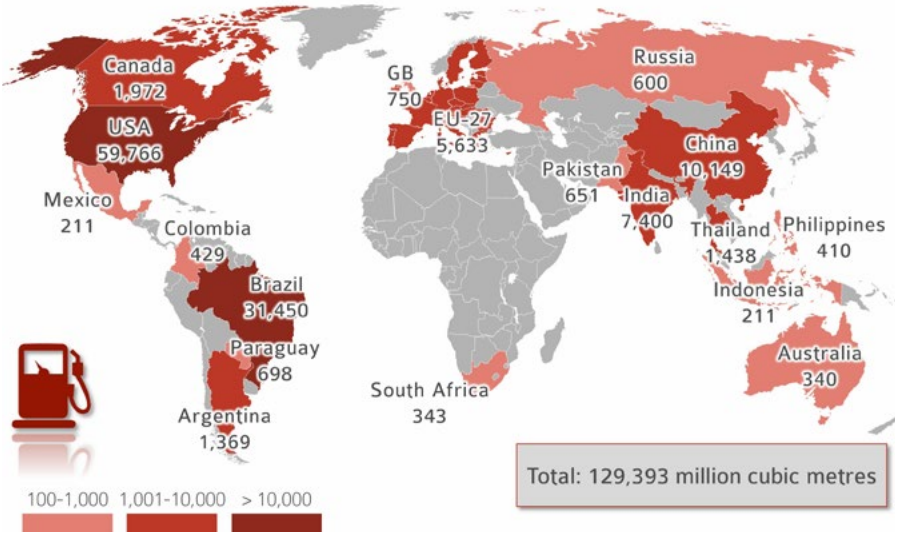
Global use of grain to produce bioethanol is expected to increase. The use of grain (especially maize) as a feedstock is expected to increase 1.8 per cent to 171.7 million tonnes in 2023/24. According to information published by the International Grains Council (IGC), global cereal production (including rice) increase by 1.1 per cent to 2.3 billion tonnes at the same time. **The share of grain on global production of bioethanol is around 7.5 per cent.**

At the top of the list of bioethanol-producing countries is the US, with 59.8 million m3 and an 2 per cent increase compared to the previous year. About 99 per cent of US bioethanol was based on maize. The second largest bioethanol-producing country is Brazil with an output of 31.5 million m3, of which 91 per cent is based on sugar from sugar cane. In the EU-27, bioethanol production in 2022 amounted to around 5.6 million m3, mainly based on maize, wheat and sugar made from sugar beet.

Bioethanol production continues to grow

Bioethanol production in key countries, in 2022, in 1,000 cubic metres

Source: OECD

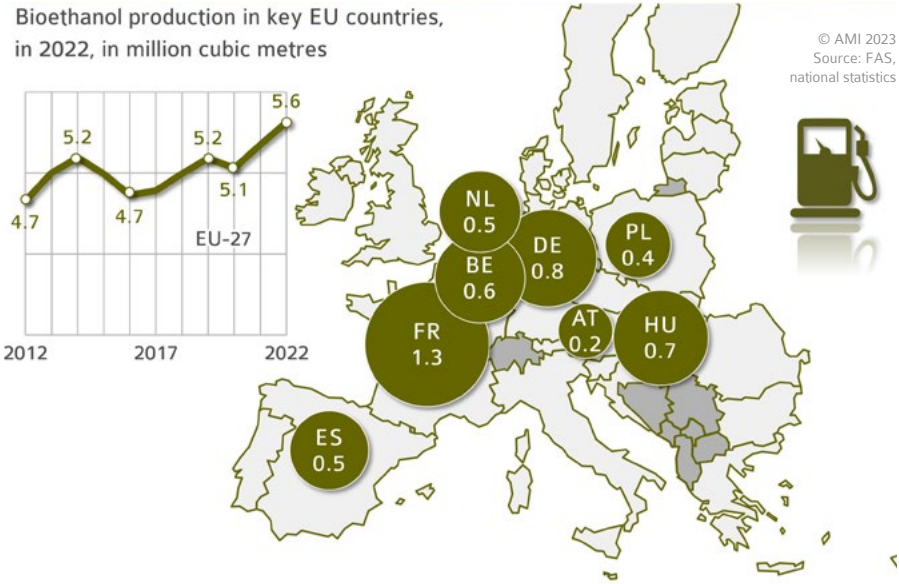


2.1 Which countries promote biofuels?

» 2.1.1 Global output of bioethanol

↳ 2.1.1.1 Major bioethanol producers in the EU-27

Production of bioethanol in the EU-27 increases



2.1 Which countries promote biofuels?

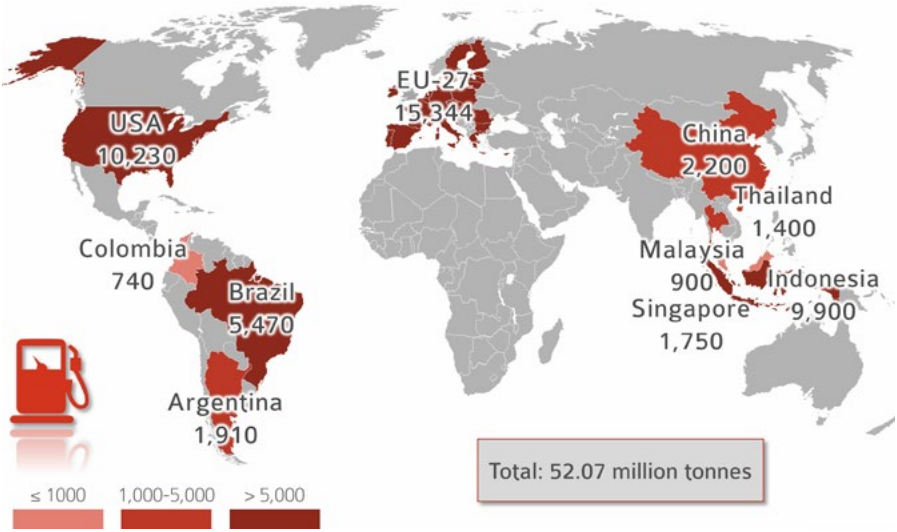
» 2.1.2 Global output of biodiesel

The European Union is the single most important biodiesel producer worldwide, accounting for just under 29 per cent of global output or just over 15.3 million tonnes in 2022. The term "biodiesel" is used to refer to biodiesel (FAME = fatty acid methyl ester), hydrogenated vegetable oil (HVO) and biofuels made by co-processing vegetable oils in petroleum refineries. In Europe, biodiesel is mainly based on rapeseed oil. On the American continent, it is primarily based on soybean oil, which is a by-product of soybean processing and accounts for about 20 per cent of the bean (rapeseed oil > 42 per cent of the seed) and **is increasingly used in biodiesel production as a result of steadily increasing harvest volumes, especially in Brazil**.

Biodiesel production is concentrated in the EU-27, the US, Indonesia and Brazil. Indonesia has gained increasing importance as one of the top palm oil producing countries. **The Indonesian government pushed ahead with the quota policy in response to supply surpluses and the associated price pressure on the vegetable oil markets. The increase in biofuel blending quotas caused output to rise to 9.9 million tonnes.** Contrary to the EU, by raising the national blending quota requirements (B30/B40) the Indonesian government wants to make an active, i.e. politically intended contribution towards stabilising producer prices and cutting foreign exchange spending on imports of mineral oil. By contrast, biodiesel production in Malaysia was reduced for the second time in a row.

USA expands biodiesel production

Biodiesel production in key countries, in 2022, in 1,000 tonnes



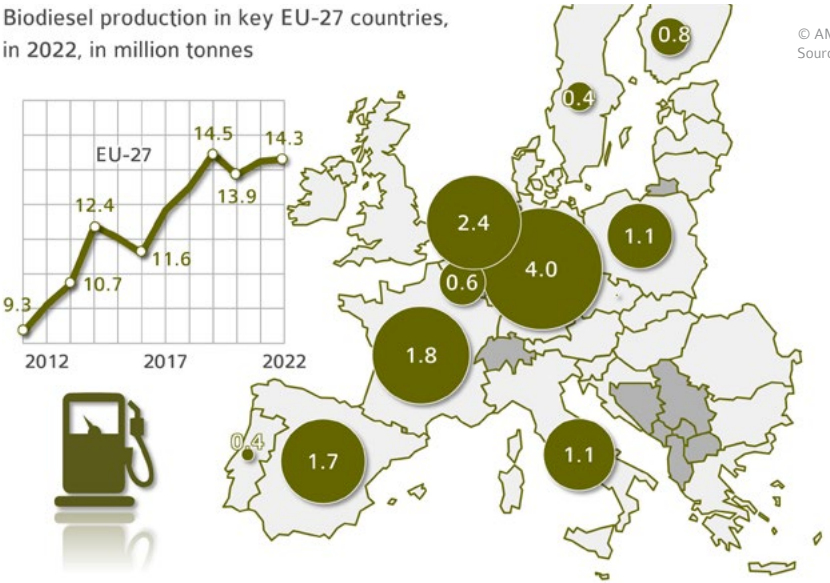
2.1 Which countries promote biofuels?

» 2.1.2 Global output of biodiesel

↳ 2.1.2.1 Major biodiesel producers in the EU-27

Germany remains the largest biodiesel producer in the EU

Biodiesel production in key EU-27 countries, in 2022, in million tonnes



Source: FAS

2.2 What feedstocks are used in world biofuels production?

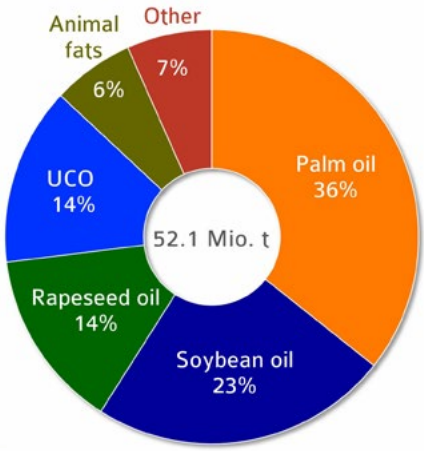
» 2.2.1 Global resource bases for biodiesel

Production of biodiesel has slightly increased all over the world and, as a result, so has demand for feedstock, the use of which rose just under 8 per cent from 2021 to 2022. **The ranking of feedstocks has remained unchanged: palm oil accounts for 36 per cent, whereas soybean oil makes up 23 per cent, rapeseed oil accounts for 14 per cent and animal fats for 6 per cent. The share of used cooking oil (UCO) is at 14 per cent, that of „other oils" at 7 per cent.** Their shares will most probably continue to increase, because they also include effluent from palm oil mills (POME). North and South America as well as Southeast Asia are expected to see a further increase in biodiesel production from soybean and palm oil. In the EU-27, the proportion of biodiesel from rapeseed oil and waste oils and fats is expected to climb, especially at the expense of palm oil.

In Germany as of January 1, 2023, biofuels from palm oil can no longer be credited towards quota obligations – as is already the case in other EU member states (among other France, Sweden, Austria, Belgium, Denmark). It remains to be seen whether rapeseed oil will have a part in covering this shortfall, because member states are allowed to adjust the mandates for biofuels from cultivated biomass and promote other options (e.g. e-mobility) for fulfilling the climate protection commitment. However, due to the genetic fatty acid structure of rapeseed oil, rapeseed oil-based biodiesel has the advantage of providing better quality for winter diesel fuel. This is why rapeseed oil is the required raw material in the period from November to March when biodiesel (FAME) is produced for blending. RME is also blended with UCOME to meet the fuel quality standard for biodiesel EN 14124.

More palm oil, less soybean oil

Feedstock use in biodiesel production, worldwide, in 2022, in per cent



UCO = used cooking oil

2.3 What feedstocks are used in European biodiesel fuel production?

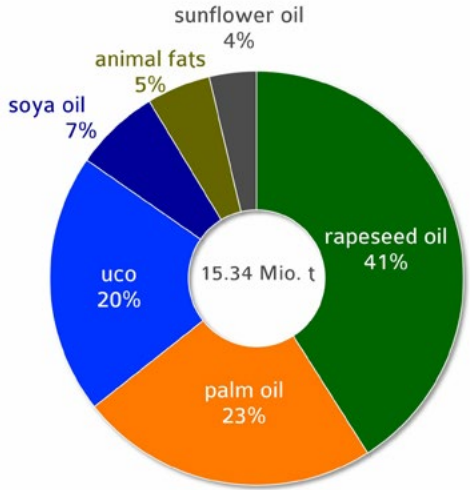
» 2.3.1 Resource bases for biodiesel in the EU-27

Availability and selling prices of vegetable and animal oils and fats have a determining influence on the use in biodiesel fuel production. **Rapeseed oil remains the primary feedstock source for biodiesel production in the EU, accounting for 41 per cent.** As a consequence of higher prices and tight supply of used cooking oil in the wake of the coronavirus shutdown of the food service industry (which also had implications for imports from China), demand for rapeseed oil increased in 2023 by 2 per cent compared to the previous year. **Consequently, the proportion of used cooking oil is only 20 per cent.** At the EU level, policymakers have been promoting the use of UCO, e.g. by introducing quota requirements for biokerosene (not in Germany). However, at the same time a cap of 1.7 per cent (Germany cap of 1.9 per cent) of final energy consumption in road and rail transport applies throughout the EU. **With the exception of Germany, biofuels from waste oils and fats are credited double towards national quota obligations (energy-related).** This will increase with the resolution to amend the Renewable Energy Directive (RED III) from 2024: the member states have the choice of reducing greenhouse gas emissions intensity **by 14.5% by 2030 (Germany: 25%)** or achieving a renewable energy share of **at least 29%**.

However, it must be noted that the statistical basis for the share of feedstock is very different depending on the "source" and cannot be adopted uncritically. The reporting and documentation requirements will be tightened under the revised Renewable Energy Directive (2018/2001/EU, Red II). A Europe-wide database (UDB) will be introduced in the EU on 01.01.2024 (for liquid biofuels) analogous to the German database „Nabisy". The concrete basic statistical information necessary to measure the "iLUC effect" remains lacking to date.

Rapeseed oil share continues to rise

Feedstock use in biodiesel production in the EU-27, in 2022, in per cent

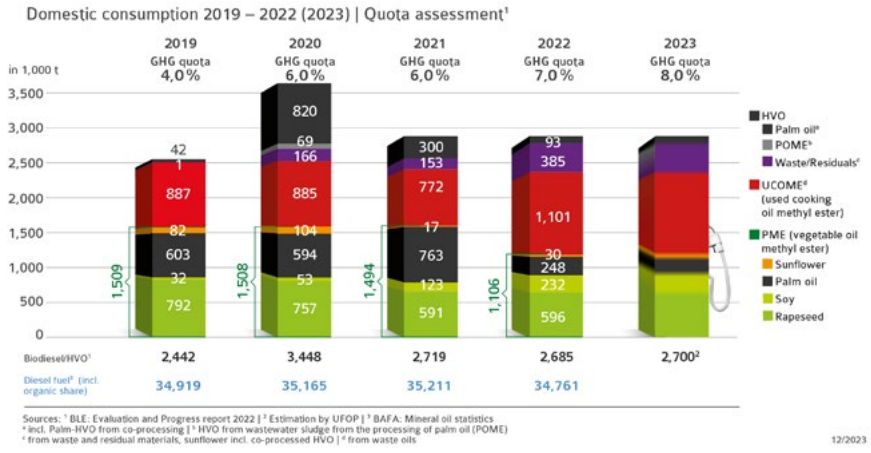


2.4 What feedstocks go into the production of biodiesel used in Germany?

» 2.4.1 Shares of feedstock in biodiesel consumption

According to data published by the Federal Office for Agriculture and Food (BLE), **a total of nearly 4,.0 million tonnes of biofuels were produced for the German market in 2022.** These included approximately 3.0 million tonnes of biofuels (biodiesel, HVO etc.) that replaced fossil diesel. **Used cooking oils and fats are the most important raw material with a total of 1.101 million tonnes,** followed by rapeseed oil with approx. 0.6 million tonnes. Compared to the quota year 2021, the share of **palm oil-based HVO decreased by 0.2 million tonnes to 0.09 million tonnes**. This is due to the diesel fuel standard, which provides for a maximum biodiesel incorporation rate of 7 per cent by volume; above this level, HVO is used for blending. The increase in the total amount in 2020 is due to the fact that the 6 per cent cap on greenhouse gas emissions had to be met exclusively through the physical use of biofuels that year. The option to carry over GHG quotas was re-introduced in 2021, maintaining the same quota level. **For the 2023 quota year, a total requirement of approx. 2.7 million tonnes of biodiesel and HVO is expected with a GHG quota that has risen to 8 %.** In the 2022 quota year, the proportion of biofuels from palm oil to be counted amounted to around 0.9 per cent of final energy consumption in road transport. Since 2023, such crediting is no longer possible in Germany.

Sales development and feedstock composition for biodiesel/HVO



Sources: [1] BLE: Evaluation and Progress report 2022 | [2] Estimation by UFOP | [3] BAFA: Mineral oil statistics
[a] incl. Palm-HVO from co-processing | [b] HVO from wastewater sludge from the processing of palm oil (POME)
[c] from waste and residual materials, sunflower incl. co-processed HVO | [d] from waste oils

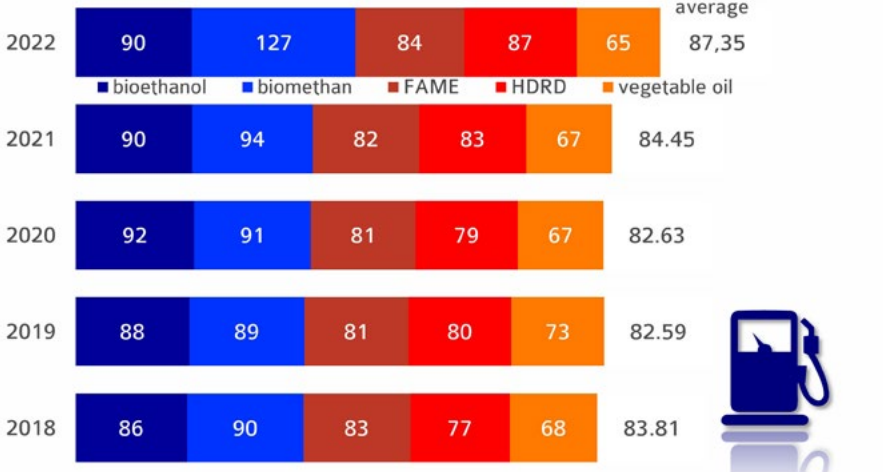
12/2023

2.4 What feedstocks go into the production of biodiesel used in Germany?

» 2.4.2 Emission saving

Greenhouse gas savings from biomethane are increasing

Emissions reduction due to biofuels (bioethanol, biomethane, FAME, HDRD, vegetable oil) weighted against fossil comparison value, in percent, by crediting year



2.5 Where do the feedstocks for biodiesel at German petrol stations come from?

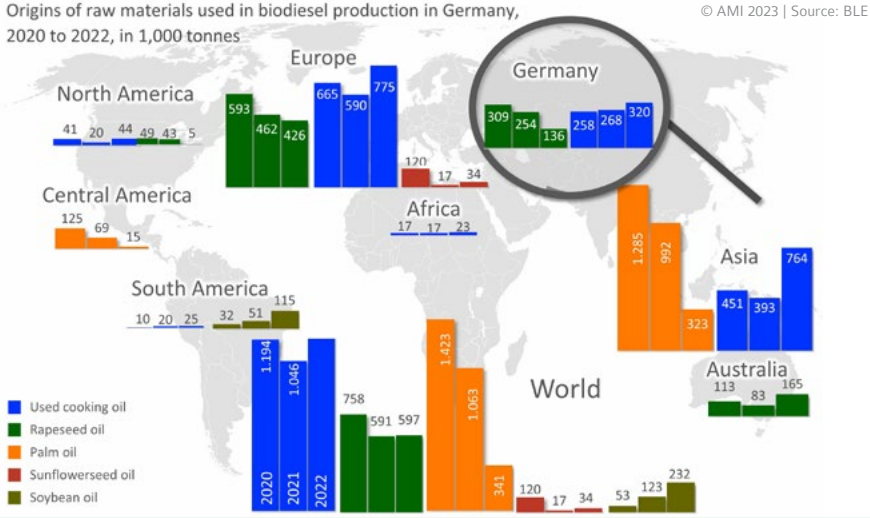
» 2.5.1 Origins of feedstocks for biodiesel used in Germany

A total of 2.9 million tonnes of biofuels were placed on the market in 2022 to count towards the GHG quota obligation in the diesel market. About the same amount of vegetable oils and waste oils and fats were used for their production. In the case of biodiesel from rapeseed oil, however, it should be noted that the processing of the original raw material at the beginning of the processing chain - the rapeseed - also produces rapeseed meal, an important protein feed for animal nutrition, in addition to rapeseed oil. **Just under 44%** of the required raw materials (rapeseed oil and waste oils) come from Europe. **The share of rapeseed oil from Germany fell to 32% of the total demand for biofuel production in 2022. A total of 597,000 tonnes of rapeseed oil were used. The EU share decreased further to 426,000 tonnes,** while the share of rapeseed oil of Australian origin increased to 165,000 tonnes. Rapeseed oil from Canada has so far played a subordinate role. **The enormous decline in biofuel from palm oil (minus 77%) to just 341,000 tonnes (2021: 1.063 million tonnes) is offset by the increase in biofuels from waste oils and fats by 0.6 million tonnes to 1.656 million tonnes. At 232,000 tonnes, the share of biofuels from soya oil rose by 53% to 232,000 tonnes. However, their share is only just under 8% of the total biofuel volume in 2022.**

In Germany, the biomass used for biofuel production as well as waste and residues are systematically recorded in the "Nabisy" database in high documentation quality and published annually in a report by the Federal Office for Agriculture and Food (BLE). This exemplary traceability system records the quantities placed on the market for fuel utilisation and as fuel (CHP). The European Commission is planning to launch the Union Database (UDB) at the beginning of 2024, in which – unlike Nabisy – the agricultural trade and all stages of the processing chain must also register.

Third-country imports predominate

Origins of raw materials used in biodiesel production in Germany, 2020 to 2022, in 1,000 tonnes



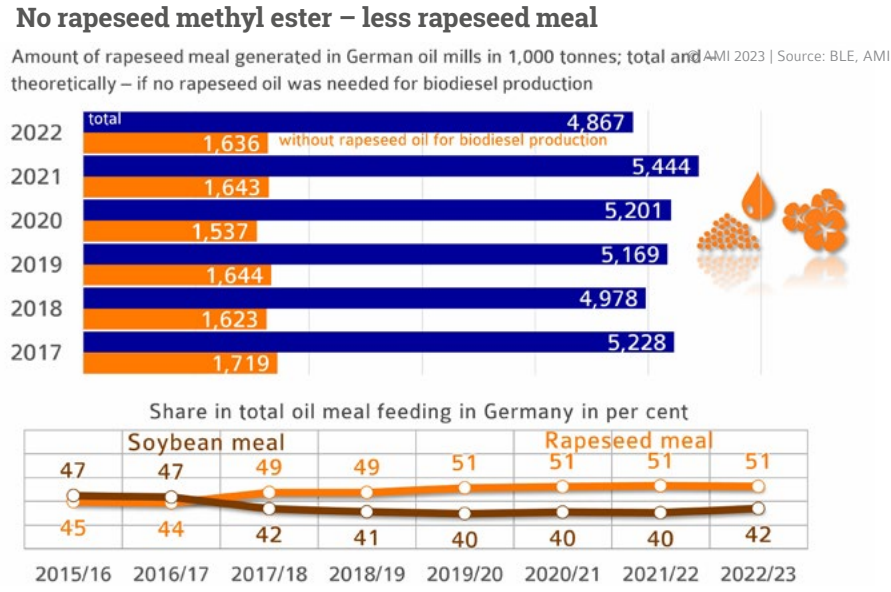
3 | Food security

3.1 What do biofuels have to do with feedstuff?

» 3.1.1 Output of rapeseed meal with and without biodiesel fuel production

The feed market is one of the main beneficiaries of biodiesel production, because rapeseed meal is generated as a by-product of rapeseed oil production in oil mills. In 2022, German oil mills processed around 8.6 million tonnes of rapeseed. The production generated 3.7 million tonnes of rapeseed oil and 4.9 million tonnes of rapeseed meal. **Since rapeseed is produced in Europe without using genetic manipulation (GM), its by-product, rapeseed meal, is also classified as GMO-free. This classification promotes the use of rapeseed meal mainly in dairy feeding, where it can fully replace soybean meal and the corresponding imports from overseas.** The key factor is demand for dairy products that qualify as "without GM". **The corresponding demand thus also supports the regional production and processing of rapeseed. At the same time, it reduces the dependence on imports of soy and soy meal.**

Of the 3.7 million tonnes of rapeseed oil, just about one third was used for human consumption, whereas 66 per cent was used for technical purposes or to produce energy. If demand for rapeseed oil for use in biodiesel production were to shrink in the future, if biodiesel is no longer seen as a contribution towards decarbonising the transport sector, two thirds of rapeseed meal production would no longer be available. This would have been as much as 3 million tonnes in 2022. **Annual soybean meal imports would have to be boosted by nearly 2.6 million tonnes to fill this gap. This volume translates to a soybean area of 1 million hectares.** These imports would therefore reverse the trend of promoting domestic GM-free protein sources. **Since 2012, rapeseed meal accounts for half of the meal fed to animals in Germany.**



3.2 Why is demand for oilseeds increasing?

» 3.2.1 Global consumption of meat by continent

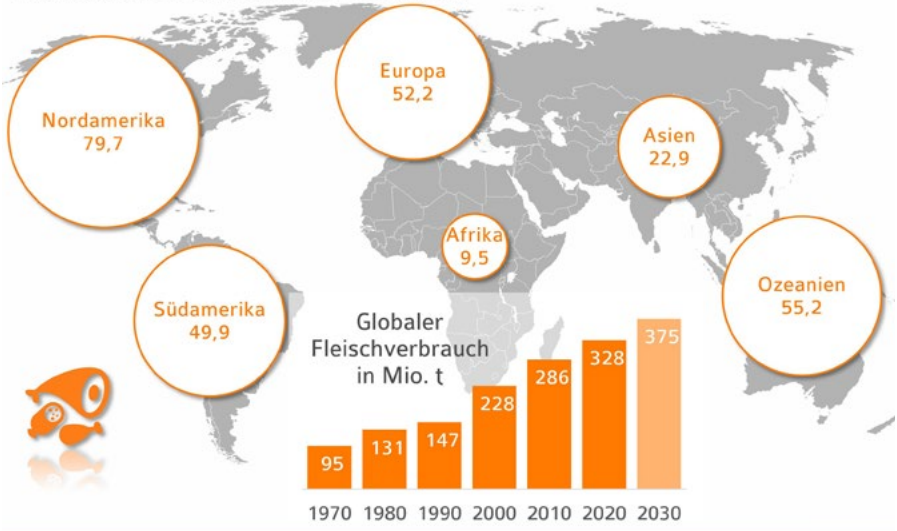
World meat consumption multiplied over the past 50 years to more than 375 million tonnes and is set to increase further in the years to come. The increase is not just driven by the growth in world population, but also depends on standard of living, eating habits and consumer price levels. Compared to other raw materials, meat involves high production costs and is therefore relatively expensive compared to other staple foods.

More and more feed must be produced for the growing number of livestock. Alongside grains, soybeans and rapeseed are the main sources of protein used in feeds. Both soybeans and rapeseed are used to make protein feed meal. On a global scale, most soybeans are grown from genetically modified (GM) seed, as is rapeseed in Canada. Because of the global surge in meat consumption, demand for feed protein from oilseeds is set to rise further in future. The EU exclusively grows GM-free oilseeds like rapeseed, sunflowers and soybeans. **Since demand for produce declared as "without GM" is growing, production of GM-free products is increasingly based on national or European oilseeds. This aspect is going to gain importance because, as part of the „Farm to Fork" strategy, EU climate change legislation is increasingly geared to sustainability and reduction of greenhouse gas emissions.**

Meat consumption grow until 2030

Source: FAO, UNO

Pro-Kopf-Verbrauch von Fleisch nach Kontinent 2022 in kg/Kopf und Entwicklung des Verbrauches 1970-2030 in Mio. t



3.2 Why is demand for oilseeds increasing?

» 3.2.2 Blending quotas for biodiesel

All round the world biofuels are promoted through statutory blending requirements. The motivation of the various countries differs greatly. **Whereas US and Brazilian interests focus on security of supply in the energy sector and reduction of fuel imports, the EU places great importance on climate protection and an increase in the overall proportion of renewable energy generated.** The goals in Asian countries, such as Malaysia, Indonesia or China, but also in Argentina, are different again. In these countries, the main objective is to reduce vegetable oil surplus in an effort to stabilise market prices. These countries' national mandates for shares of volume or energy in fossil-energy diesel fuel range from 1 to 30 per cent.

The obligation to reduce greenhouse gas (GHG) emissions was imposed on petroleum companies in Germany in 2015 and was incorporated as an option in the EU Commission's proposal to revise the Renewable Energy Directive (2018/2001/EG) - Red III. Distributors, that is the petroleum companies, must comply with these requirements. Globally, bioethanol plays the most important role in the majority of countries that have introduced quota requirements. Again, its use is driven by (sometimes temporary) oversupply in the grain and sugar markets. **These biofuels not only go a long way towards the protection of climate and natural resources, but also help reduce pressure on the market and, consequently, stabilise prices for agricultural producers. Because of this, blending requirements are subject to change if overall conditions in the market change.**

Blending Quotas promote use of biofuels

Quotas for ethanol and biodiesel by country

Source: Biofuels Digest, FAS, country reports

E=Ethanol, B=Biodiesel
Germany: GHG-quota – 2024: reduction 9.25 % (until 2030: 25 %)
EU-27: THG-reduction (target: 55 % until 2030)
United Kingdom: 14.22 %, thereof 3.5 % cultivated biomass
Norway: 17 %, thereof 12.5 % advanced biofuels (Part A and B Annex IX RED II)
Canada: E5-E-10, B2-B4, depending on state
USA – blending quantity: 21.54 billion gallons 2024 / 22.33 billion gallons 2025 (diesel and gasoline market)
Argentinia: E12, B5
Brazil: E27, B12 (target: B15 until 2026)
Columbia: E4-E5, depending on region, B10
Mexico: E5, plans for E10

E=Ethanol, B=Biodiesel
Peru: E7,8,
South Africa: E2, B5
Nigeria: 10 % blending until 2030 (gasoline/diesel)
India: E20/B5 target 2030
Indonesia: B35, target B40, E5, target E15 2030
China: E10 in 11 provinces (target: 15)
Philippines: E10, B5
Malaysia: B10/20, target B30 until 2025
South Korea: B3,5 – target 2030: 5 %
Thailand: B7, B10 aimed

3.3 What is the amount of grain/vegetable oil per person?

» 3.3.1 Supply per capita

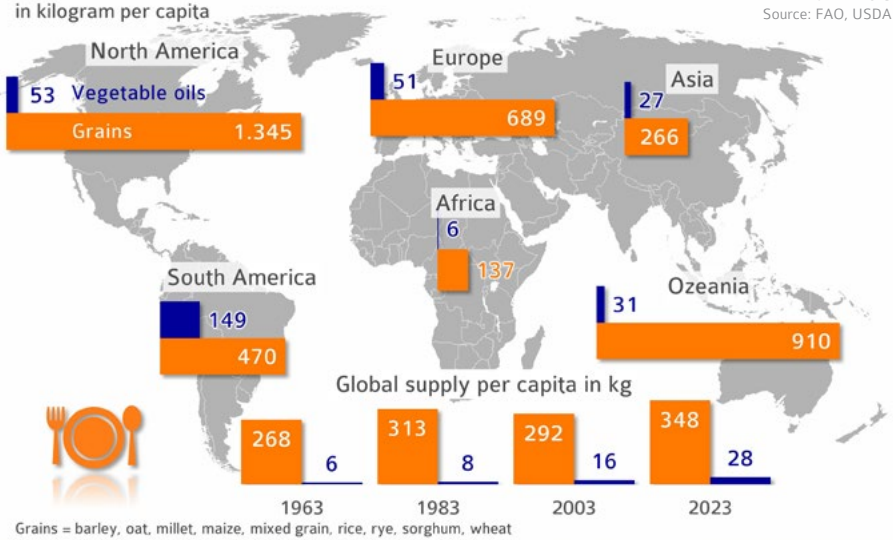
While the average per capita supply of cereals and vegetable oils has fluctuated over the past 60 years as overall world population has increased, it has shown an upward trend. The estimates for the 2023/24 marketing year are 392 kg of grain and 28 kg of vegetable oil per capita. This is much higher than 20 years ago. The main reason for this is the abundant global supply, especially of maize. This can more than compensate for the decline in wheat production. This figure includes the consumption of grains and vegetable oils for feed production purposes, transport fuel blending and other industrial purposes. **Conversely, the amount of feedstock used in biofuels serves as supply buffer that can be diverted to food use for human consumption as needed. This puts a question mark on the EU Commission's extensification policy resulting from the Green Deal, which stipulates blanket reduction targets for fertilising and crop protection products.** The expected decline in output would deprive the market of commodity volumes for food supply and other application options in the bioeconomy.

In purely arithmetic terms, food supply is sufficient to feed the world's population. However, there are still huge differences between regions in the availability of agricultural feedstock. **The differences go back mainly to distribution issues rather than competing use of raw materials for transport fuels or animal feedstuff.** Moreover, there are substantial differences in purchasing power in the different countries. Per-capita income, cost of living and rate of inflation in the different countries should also be taken into account. However, we need a comparison between different shopping baskets and habits of consumption (e.g. cassava, millet in Africa) that would allow us to draw conclusions on per capita purchasing power.

Less grain available for Africa

Supply of grain and vegetable oils, in 2023/24, estimated by continent, in kilogram per capita

Source: FAO, USDA



Grains = barley, oat, millet, maize, mixed grain, rice, rye, sorghum, wheat
Vegetable oils = cotton, coconut, olive, palm, palm kernel, peanut, rapeseed, soybean and sunflower oil

3.4 Is there enough food?

» 3.4.1 The issue of distribution

People in many parts of the world starve or are malnourished although in terms of figures there is adequate supply of the most important staple foods. Along with climate change, natural disasters and poor transport and storage logistics, wars and forced migration are the main factors stoking hunger in the world. On top of this, international terrorism has become an increasing risk to people's lives and safety in a growing number of countries. It is sadly true that to this day more money is spent on maintaining and spreading violence than on peace.

All these factors prevent economies from booming, farmers from farming in a cost-efficient manner and countries from establishing democratic structures without maladministration or corruption. Countries having no structures for a functioning social system run a much higher risk of famine and malnutrition. **Where an appropriate framework is in place, it could be used as a base on which to intensify locally adapted cultivation systems in a sustained manner and, by so doing, create the foundation for supply with food that is equally sustained.**

The currency used to measure purchasing power is the international dollar, which is based on the US dollar. The World Bank put the per capita purchasing power in Germany in 2022 at around 53.390 US dollars. In contrast, the purchasing power in Burundi was only 240 US dollars. Thus, despite an adequate supply of agricultural products, the available resources in countries with low purchasing power are not sufficient to buy the necessary amount of food. **Famine is often also caused by a lack of purchasing power. The production of feedstock for biofuel production basically enlarges this supply.** The lack of solidarity of the rich industrial nations with those affected is the reason why the means required to provide comprehensive emergency aid are not made available. **A food-or-fuel debate distracts from where the responsibility actually lies.**

Distribution issue just one of multiple reasons

Largest producers of wheat, rye, millet, rice und edible oils in 2022/23, in million tonnes, and 2022 per capita income in US dollars

Country	Food production	Per capita income	Country	Food production	Per capita income
World	1.526	12.803	Japan	10	42.440
China	311	12.850	Ethiopia	7	1.020
India	259	2.380	Uzbekistan	7	2.190
EU-28	152	39.967	Mexico	6	10.410
Russia	102	12.830	Republic of Korea	4	35.990
Indonesia	81	4.140	Tanzania	3	1.200
USA	63	70.430	Azerbaijan	2	5.630
Australia	41	4.120	Guatemala	1	5.350
Bangladesh	38	1.500	Gambia	0,1	810
Pakistan	33	2.620	Namibia	0,01	4.880
Ukraine	28	56.760	Singapore	<0,01	67.200
Argentina	21	11.620	Qatar	<0,00001	70.500

Gross national income (GNI) per capita at purchasing power parity

 Source: World Bank, USDA

3.4 Is there enough food?

» 3.4.2 Food availability and climate change

The causes and consequences of climate change are manifold and their impact on agricultural production differs between the various regions of the northern and southern hemispheres.

The conversion of primeval forests into farmland and plantations is seen as one of the reasons for the increase in greenhouse gas emissions. The Amazon region and the tropical forests in Asia and Africa are extremely important for the stability of the global climate. They act as carbon reservoirs and buffers for the tropical precipitation prevalent in these regions. Global environmental policy and legal regulations such as the EU sustainability requirements on biofuels from cultivated biomass or, from 2024 onwards, the EU regulation on deforestation-free products focus on the protection of these regions.

As the expansion of arable land around the globe reaches its limits, technical progress based on sustainable intensification and the transition to resilient crop rotations needs to achieve significant increases in per-area yield. This includes new breeding technologies, such as the CRISPR/Cas tool, the genetic scissors, which will help reduce the time required to develop adapted varieties. At the same time, small family farms in particular should be given access to innovative varieties, technologies and plant cultivation measures, as well as receiving better education and training that provide a basis for boosting adaptation to a changing climate.

The impact of climate change is making itself felt in many parts of the world. In fact, countries in the northern latitudes are even expected to record increases in yield. There are, however, differences between the different EU regions. In 2023, the south of Europe experienced a heat wave accompanied by torrential regional rain, whereas weather conditions north of the Alps largely matched seasonal requirements.

Differences in access to markets and technologies within and between countries can enhance the impacts of climate change, potentially causing the gulf between industrial and developing countries to widen further.

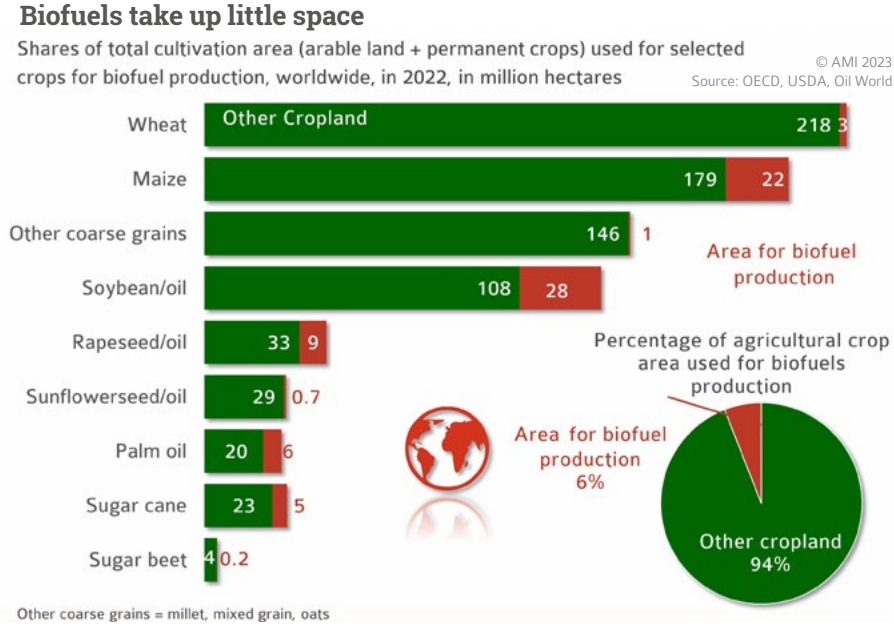



4 | Land use

4.1 Does growing energy crops create a lack of land for food crops?

» 4.1.1 Shares of land used for biofuels production

Crop plants were grown on more than 1.2 billion hectares worldwide in 2022. These include grain, oilseeds, protein, sugar and fibre plants, fruits, vegetables, nuts and others. Most of these crops were used directly or indirectly, via livestock feeds, for human nutrition. **Only around 6 per cent of the area was used in biofuels production.** Biofuel production is mostly located in countries where there is already a surplus of feedstock (especially maize, palm- and soybeanoil). Without the option of biofuel production, it would have to be placed on the global market, where it would weigh heavily on already low feedstock prices. **The conversion of agricultural feedstock to biofuels reduces the production overhang, generates extra value added and reduces the need for foreign currency for imports of crude oil or fossil fuels. The latter is primarily a problem in poorer countries. Another advantage of biofuel production is that it also yields high-quality protein feedstuffs, which are in high demand.** The share and quality of these protein feeds have a strong influence on feedstock prices and consequently on the size of the area planted. This holds true especially for soybeans. Biofuels are by no means the price drivers in the commodities markets. **If necessary, the raw materials required for biofuel production are also available for the food supply** (see Ukraine crisis rapeseed/sunflower oil). If arable farming were to be extensified for political reasons – an aim the EU Commission is pursuing with the reduction strategy for fertilisers and plant protection products under the "Green Deal" – this option of „buffering" food demand would no longer be available.



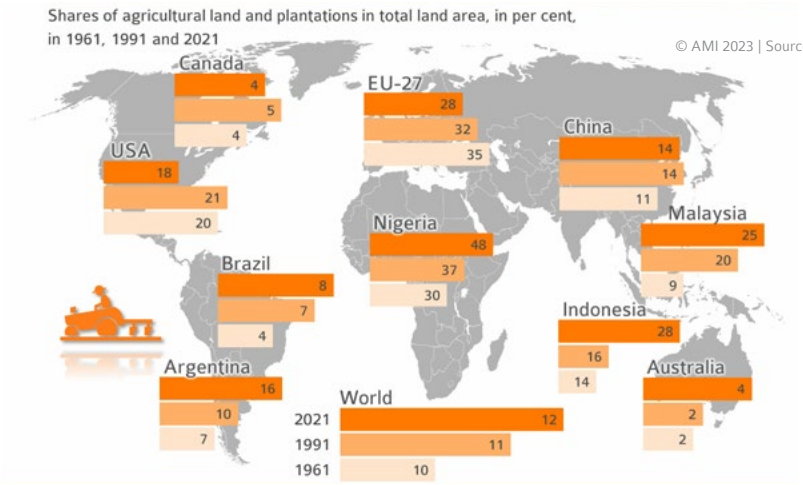
4.1 Does growing energy crops create a lack of land for food crops?

» 4.1.2 Development of cropland

The primary purpose of agriculture has always been to feed a growing world population, taking into account the changes in eating habits due to higher incomes. This purpose requires a sustainable intensification and growth of agricultural production. Around 10 per cent of the globe's land was used for arable farming some 60 years ago; that figure had risen to 12 per cent as of 2021. In the southern hemisphere, these increases are first and foremost based on expansions of area planted, along with progress in production methods (seed, fertilisers, crop protection, agricultural engineering). In the northern hemisphere, on the other hand, cropland is decreasing. Sustainable increases in productivity primarily result from research and innovation at universities and companies from the chemical and plant breeding industries. However, the trend in the EU to promote extensification through political regulations gives rise to concern.

The conversion of primeval forest and other land required to protect the environment and climate is the subject of growing controversy. Binding sustainability requirements should be created for all production regions **to certify the production of biomass – irrespective of its final use –**

Less land in agricultural use in the northern, increasingly more in the southern hemisphere



and trace back the origins of the feedstocks. The EU's biofuels policy, more specifically the revision of the Renewable Energy Directive (RED II), tightens documentation and greenhouse gas reduction requirements, which for the first time also apply to solid biomass. The aim is to create a level playing field for global fair competition without any environmental or social dumping. **As part of the sustainability certification for biofuels, it must be documented that the respective cultivation area was already used as arable land or a plantation before 01/2008. The EU regulation on Deforestation-free Products provides for similar proof, but only from 2020. Biofuel certification in accordance with the Renewable Energy Directive, RED II (2018/2001), is therefore a model for the EU deforestation regulation.**

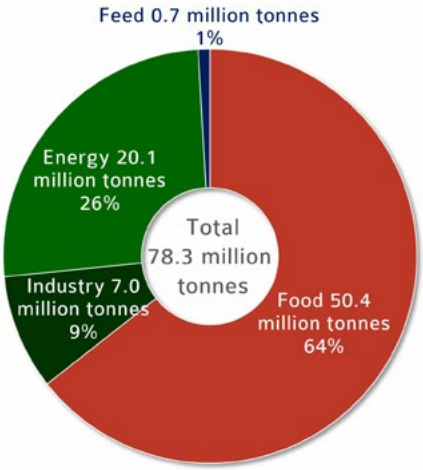
4.2 Is there a limit to the use of palm oil?

» 4.2.1 Global use of palm oil

Oil palm is the single most important oleaginous fruit crop in Southeast Asia, but is also grown to a considerable extent in Colombia and Nigeria. With a production of almost 80 million tons, palm oil is the most important vegetable oil in the world. Like other vegetable oils, it is ideal for a wide range of uses in food (67 per cent), oleochemical items (just less than 7 per cent) or as a feedstock for biofuel (just less than 18 per cent). Global palm oil consumption in 2023 is estimated at 78,3 million tonnes. The majority is used as edible oil in Southeast Asia. **Global palm oil production is increasing due to the expansion in area by clearing primeval forest legally and illegally and replanting with high-yielding hybrid varieties.** However, the growth in global demand with purchasing power is lagging behind. This has the result that more and more palm oil surplus is processed into biodiesel in the main palm oil producing countries and governments are raising blending quota requirements step by step. In Indonesia, the quota is already at 30 per cent. The EU is reducing the use of palm oil for biofuel production. The Renewable Energy Directive (Red II) stipulates that the use of palm oil-based biofuels will no longer be eligible for credits to meet quota obligations or climate goals by 2030 at the latest. **In France, Austria, Belgium and other EU member states, crediting is no longer permitted even now. In Germany, crediting will not be possible since the beginning of 2023 onwards.** Nevertheless, world consumption of palm oil will probably pick up, especially for food uses.

Palm oil is primarily food

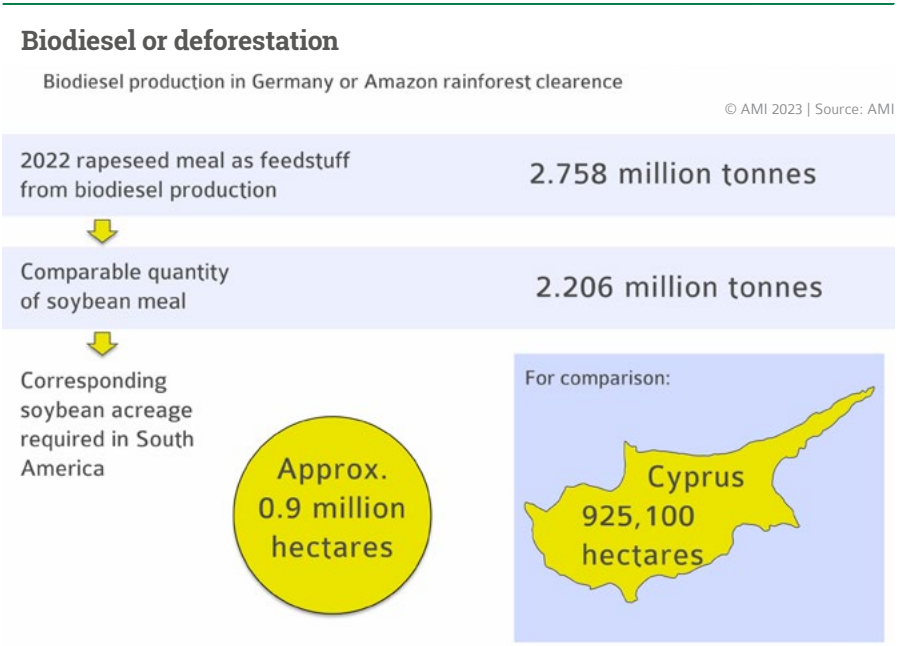
Shares of various uses of palm oil, worldwide, in 2023, estimated, in million tonnes and per cent



4.3 What would protein feed supply be like if there was no biodiesel?

» 4.3.1 Land required for soybeans if German biodiesel production did not exist

Rapeseed meal, which is produced "GMO-free" in Europe, is of particular importance in the demand for increasing self-sufficiency in protein animal feed. Today, it has practically replaced soya meal in cattle feed (milk production). In terms of feed value, it is also attractively priced. Rapeseed meal is produced at 13 different locations (oil mills) in Germany and is therefore characterised by comparatively short transport routes. **Should the demand for rapeseed oil for biofuel production fall because the use of cultivated biomass for biofuels is politically curtailed, the supply of rapeseed meal from domestic production would also be reduced as a result.** However, rapeseed meal is urgently needed, as the annual demand for oilseed meal in Germany is 7.5 to 8 million tonnes. Without the demand for rapeseed oil for biodiesel production, around 2.8 million tonnes of rapeseed meal would be lost, which would have to be compensated for by soya. **Expressed in soya meal equivalent, this would be around 2.2 million tonnes. This quantity corresponds to a cultivation area of 850,000 hectares.** For comparison: this area is roughly the size of the island of Cyprus. The pressure on land for exports would continue in South America and thus with deforestation. This development is to be countered by the EU regulation for deforestation-free products from 2024. The regulation confirms the pressure to act to prevent further destruction of biotopes.



5 | Development of prices

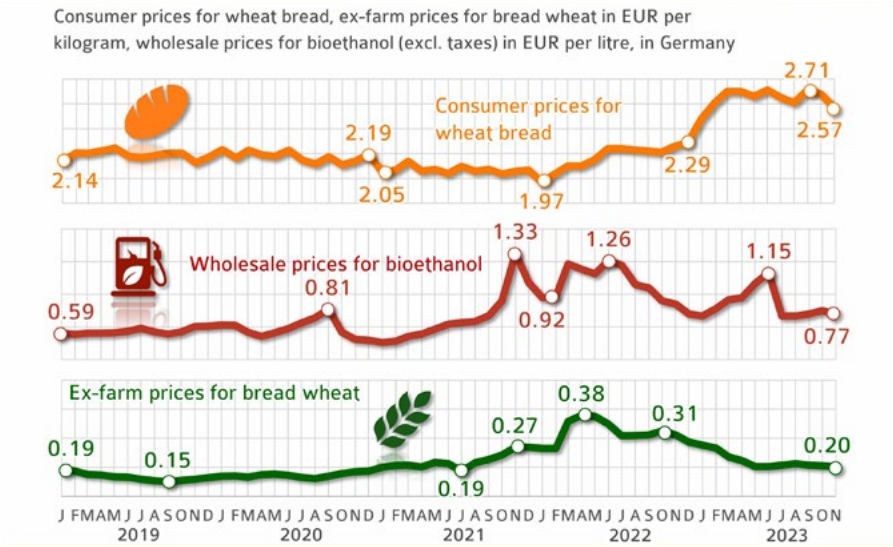
5.1 Do biofuels push food prices up?

» 5.1.1 Comparison of prices of bread, bioethanol and grain

Wheat is used for both food production and bioethanol production. **Many people argue that production of biofuels causes a shortage in this feedstock for food production and drives wheat prices. A look at wheat-rye bread prices disproves this thesis!** Feedstock supply and prices at the producer level barely have an impact on bread prices. This becomes quite evident in connection with the Ukraine war. As prices of energy and feedstocks and energy-intensive items have risen sharply, consumers have indeed had to pay more for wheat-rye bread since June 2022. But he main reason for this price hike is higher energy prices.

The explosion of prices for agricultural commodities and staple foods all over the world in 2008 and the accompanying volatility of prices have moved the issue of global food to the fore. **Continuing famine and poverty since then have also been associated with changes in international prices for agricultural feedstock. There is often a correlation drawn with the biofuels market when discussing the reasons for the high price levels, but there is none.** Grain production in 2023/24 is less comfortable than it was in previous years. However, competition on the global market is huge and demand is reticent. This has in fact recently driven prices down. The same holds true for biofuels prices, which have fallen due to pressure from falling feedstock costs.

Price comparison of bread, bioethanol and grain



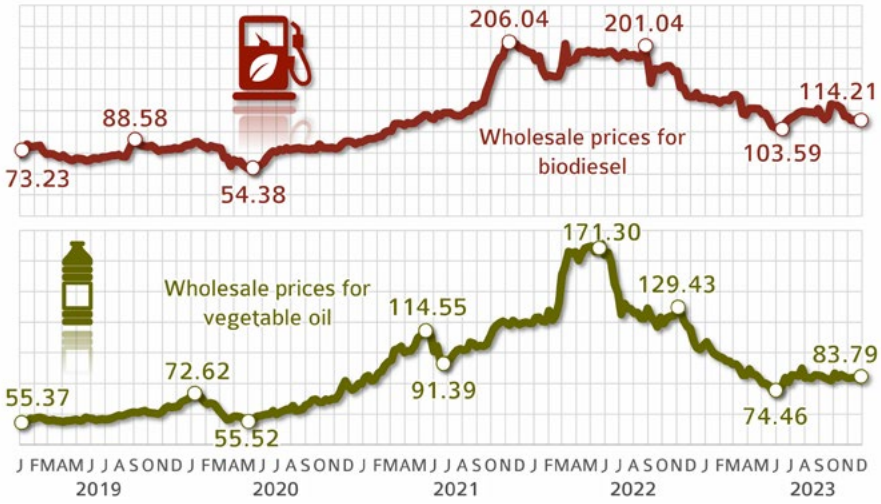
5.1 Do biofuels push food prices up?

» 5.1.2 Comparison of prices of biodiesel and vegetable oil

After already experiencing a sharp rise in 2021, prices for biofuels rocketed in February 2022 in the wake of the Ukraine war. Since then, they have fallen from that exceptionally high level, both because feedstocks and competing fossil-energy fuels have gone down in price. Bids for biodiesel have been on a steady decline at wholesale level since August 2022. Although prices improved somewhat over the summer months of 2023, they remained far below the previous record level. The main reasons for the price hike were rising prices for feedstock and unusually brisk demand over the summer months. The focus of the 2023 biodiesel market included substantial imports from China of biodiesel made from used vegetable oils (UCOME), which led to a supply surplus on the domestic market. However, the composition of these batches is questionable. It is assumed that pure palm oil was re-declared as used cooking oil to be counted double towards GHG quota obligations. However, a decision on what measures to take against this practice is still pending.

Price comparison vegetable oil and biodiesel

Wholesale prices for biodiesel and vegetable oil (as mean values of rapeseed, soybean, palm and sunflower oil prices), excl. taxes, ex works, in cent/l, in Germany



The Renewable Energy Directive (RED II) introduced a cap on biofuels from cultivated biomass in the EU. The cap was set at 7 per cent maximum of final energy consumption in road traffic; in Germany the limit is 4.4 per cent. The higher the level of e-mobility, the greater the efficiencies of motor technologies, and the more people that move from their cars to public transport, the sharper overall energy consumption will decline. The share of biofuels from cultivated biomass will drop correspondingly. As a matter of principle, these biofuels should therefore be regarded as a "bridging solution".

6 | Ukraine

6.1 Why the Ukraine war has such a big impact on the market

» 6.1.1 War slows down processing but boosts exports

Ukraine – the most important supplier of sunflower oil on the global market – experienced a sharp slump in its oilseed market at the start of the war. While the 2021 harvest was above average, processing suffered because of the Russian attack from February 2022; sunflower seeds in particular were hardly pressed domestically. This led to a build-up of raw material stocks in the Ukraine, which supplemented the supply from the below-average harvest in the following marketing year and thus contributed to record exports. Although processing in the Ukraine increased somewhat, it remained well below potential capacity. Ukraine exported large quantities of sunflower seeds both in the second half of the 2021/22 marketing year and in the second half of the 2022/23 marketing year, primarily to the EU. This led to a sharp reduction in stocks. However, they have not yet returned to the average level of the pre-war years. The same applies to processing capacities. In addition, the cultivation of oilseeds, especially rapeseed, was expanded, while the cultivation of cereals has lost ground in recent years. As a result, an above-average oilseed harvest was achieved in 2023.

Processing collapses with the start of the war

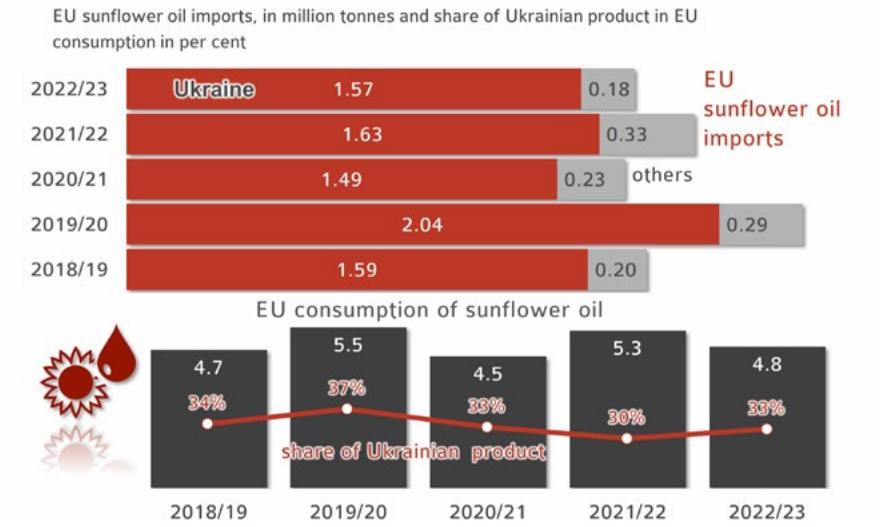
6.1 Why the Ukraine war has such a big impact on the market

» 6.1.2 A lot of Ukrainian sunflower oil in the EU

In light of the initial absence of shipments from the Black Sea region, the implications of the war in Eastern Europe for supply within the EU-27 quickly became evident. Ukraine is the largest supplier of sunflower oil to the EU. Imports in the marketing year 2022/23 totalled around 1.75 million tonnes, of which 1.6 million tonnes, around 89 per cent, came from Ukraine. Based on an estimated EU consumption of 4.8 million tonnes of sunflower oil, Ukrainian imports, in purely arithmetic terms, accounted for 33 per cent. In Germany, there was a phase of „panic buying" by consumers of vegetable oil. **However, vegetable oil was never in short supply.** The supply chains are geared to cover the usual volumes of demand. If consumers buy three bottles instead of one or two, shelves will naturally be quickly emptied. **As an alternative, consumers could always have bought rapeseed oil instead of sunflower oil.**

The discussion on the importance of Ukraine in supplying the global markets related particularly to wheat supplies to African countries. The supply problems and the associated price increases are solely a result of Russia's war of aggression against Ukraine. In order to avoid supply bottlenecks and ensure emergency supplies, **it would have to be examined in principle whether, as with mineral oil products and natural gas, appropriate storage facilities should also be kept available for international emergency supplies of wheat.**

90 per cent from Ukraine



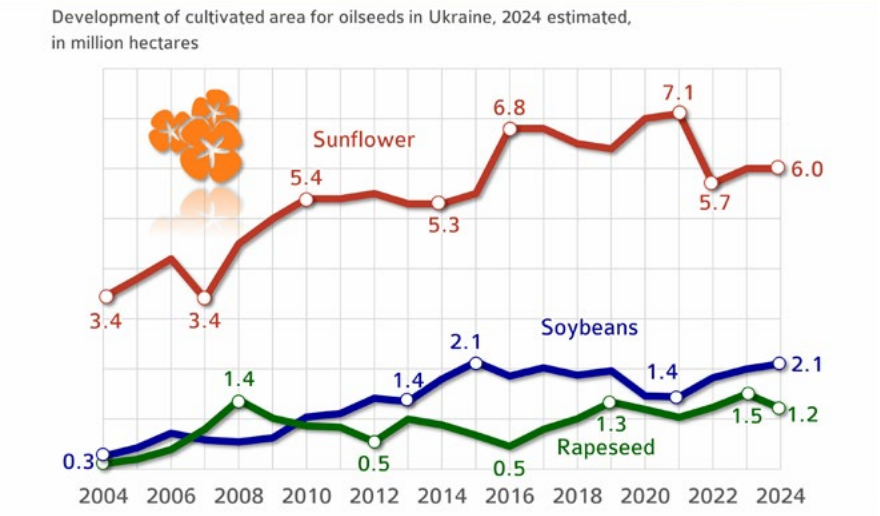
6.1 Why the Ukraine war has such a big impact on the market

» 6.1.3 Future plantings very uncertain

The agricultural situation in Ukraine remains difficult. Due to the war, the supply of seeds, fertilizers, pesticides, and fuel is insufficient and expensive. There is also a shortage of workers to operate agricultural machinery. At the same time, producer prices for grain and oilseeds have decreased significantly. This is also due to export problems. The grain corridor through the Black Sea remains risky, transportation by rail is expensive and some neighbouring countries have closed their borders to agricultural products. **Due to the poor financial situation, many small and medium-sized farms have given up in 2023.** Some of the area has been purchased by larger farms and is not yet back in production. This complicates the cultivation forecast for oilseeds, pulses, and grains.

Rapeseed acreage is currently expected to be lower than the previous year. On one hand, producer prices are significantly lower than last year, with little upside. On the other hand, a lack of rainfall has made sowing more difficult. Things look more positive for the cultivation of sunflowers and soybeans. Profitability is likely to be better than for rapeseed. This is due to lower input costs, especially for seed, and better revenue opportunities. Given the constant demand from Ukrainian oil crushing facilities, sunflower acreage is expected to remain at least stable. For soybeans, there could even be a slight increase. How much rapeseed, sunflowers and soybeans and their processed products are available for exports depends on several factors and cannot be estimated with certainty.

More soybeans, less rapeseed



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