

Types of crop plants

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Agenda

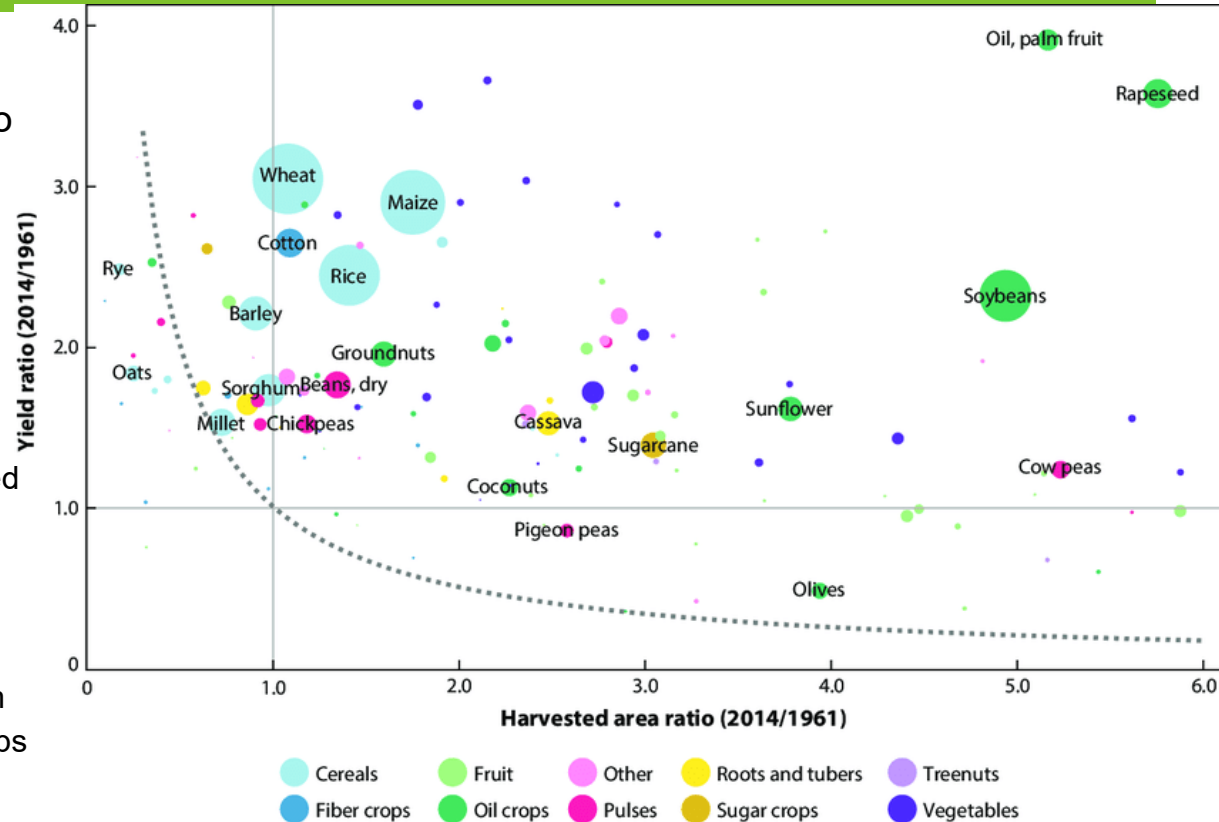
Types of crop plants

1. Crops
 1. Cereals
 2. Legumes (+ N-fixation)
 3. Root and tuber crops
 4. Oil seeds
 5. Fiber crops
 6. Forage crops
 7. Vegetables
 8. Fruits
2. Growth cycles
3. Cultivation systems

Crops

Trends in global harvested area and yields from 1961 to 2014 using data from the Food and Agriculture Organization Corporate Statistical Database (FAOSTAT)

Vertical axis shows the 2014/1961 yield ratio, and the horizontal axis shows the 2014/1961 harvested area ratio. In cases where crops were absent in 1961, the ratios were calculated using the earliest year with nonzero values. Size of the circle represents crop harvested area in 2014, and color represents major crop groups. Crops above the dotted curve experienced increases in total production from 1961 to 2014, and production declined for crops below the curve.



Cereals (Family Poaceae)

→ 50% of global caloric intake

Examples:

- Wheat (*Triticum aestivum*): most cultivated crop globally. Flour + bread, pasta, starch, Bioethanol
- Maize (*Zea mays*): C4 plant, high water-use efficiency. Animal feed, Starch, Bioethanol, silage
- Barley (*Hordeum vulgare*): best malting grain for beer. Malting + brewing, animal feed, food
- Oats (*Avena sativa*): “Gesundungsfrucht”(healthy fruit). Health food, oat milk, horse feed
- Rice (*Oryza sativa*): Feeds more people than any other crop. Human food, rice starch, rice wine

Rice



https://en.wikipedia.org/wiki/Oryza_sativa

Legumes (Family Fabaceae)

→ N-fixing, protein rich

Examples:

- Soybean (*Glycine max*): most important protein crop globally. Vegetable oil, animal feed, tofu + soy foods
- Pea (*Pisum sativum*): Human food, animal feed, green manure
- Faba bean (*Vicia faba*): Animal feed, human food, green manure
- Lupine (*Lupinus* spp.): Protein food, animal feed, coffee substitute
- Lentil (*Lens culinaris*): drought tolerant. Human food, soup + dal, flour
- Peanut (*Arachis hypogaea*): a high-fat fruit. Peanut butter, snacks, cosmetics

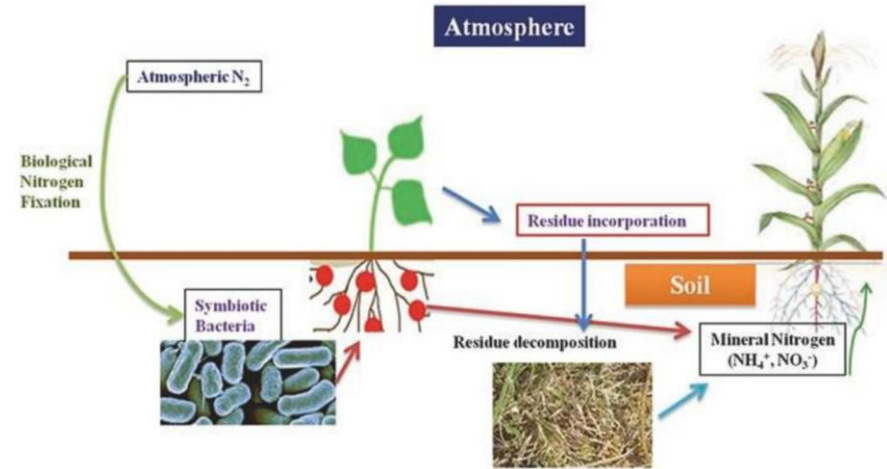
Peanut



<https://www.mein-schoener-garten.de/pflanzen/obst/erdnuss>

Legumes – N-fixation

Legumes form a symbiotic relationship with nodule bacteria living in the soil. The bacteria attach themselves to the roots and receive nutrients from the plant; in return, they convert atmospheric nitrogen into a form that the plants can utilise.



<https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2021.767998/full>

Root and tuber crops

→ Starch and sugar storage organs

Examples:

- Potato (*Solanum tuberosum*): propagated by tuber pieces (not seeds). Human food, Starch industry, spirits, animal feed
- Sugar beet (*Beta vulgaris*): EU's primary sugar crop. Sugar extraction, bioethanol, feed
- Carrot (*Daucus carota*): rich in beta carotene. Fresh vegetable, juice + puree, baby food
- Cassava (*Manihot esculenta*): extremely drought tolerant
- Yams (*Dioscorea*): poisonous when eaten raw. Food and medicinal plant
- Sweet potato (*Ipomoea batatas*): perennial. Edible for human consumption; leaves are edible

Potato field



<https://www.adama.com/deutschland/de/kulturen/kartoffel>

Oil seeds

→ High fat content, press residues used as animal feed

Examples:

- Rapeseed (*Brassica napus*): most important oil seed in Europe. Cooking oil, Biodiesel, feed
- Sunflower (*Helianthus annuus*): cooking oil, margarine, snack seeds
- Linseed (*Linum usitatissimum*): omega 3 food oil, technical drying oil, paint + varnish
- Palm oil (*Elaeis guineensis*): highest oil yield/ha of all crops. Cooking oil, margarine, cosmetics, Biodiesel
- Sesam (*Sesamum indicum*): human food, cosmetics

Flowering rapeseed



<https://de.wikipedia.org/wiki/Raps>

Fiber crops

→ Cellulose fibers for industry

Examples:

- Fiber Flax (*Linum usitatissimum*): cool climate. Linen textiles, technical fibres, insulation materials
- Hemp (*Cannabis sativa*): low water and pesticide needs. Textiles + rope, insulation, paper
- Sisal agave (*Agave sisalana*): ropes, twine, carpets
- Cotton (*Gossypium*): very high water consumption. Cotton textiles

Cotton field



Gemeinfrei, <https://commons.wikimedia.org/w/index.php?curid=26972>

Forage crops

→ Forage crops are cut, some of which are fed fresh or preserved (by drying or ensiling)

- Clover (*Trifolium* spp.): Legume. Silage, Hay, Pasture grazing, green manure
- Alfalfa (*Medicago sativa*): very deep roots → drought tolerant. Hay, Silage, Pellets, Pasture

Hay



<https://www.bluehendesoesterreich.at/bauernlexikon/heu>

Vegetables

→ High value, labour intensive, short growing seasons

Examples:

- Tomato (*Solanum lycopersicum*): botanically a fruit, culinarily a vegetable. Fresh consumption, ketchup and sauces, juice and puree
- Onion (*Allium cepa*): fresh consumption, dried/powdered
- Cabbage (*Brassica oleracea*): many cultivars (kale, kohlrabi, broccoli, cauliflower). Fresh vegetable, fermented as Sauerkraut

Tomato



https://www.richardjacksonsgarden.co.uk/wp-content/uploads/2021/04/AdobeStock_554658202_1200px-990x660.jpg

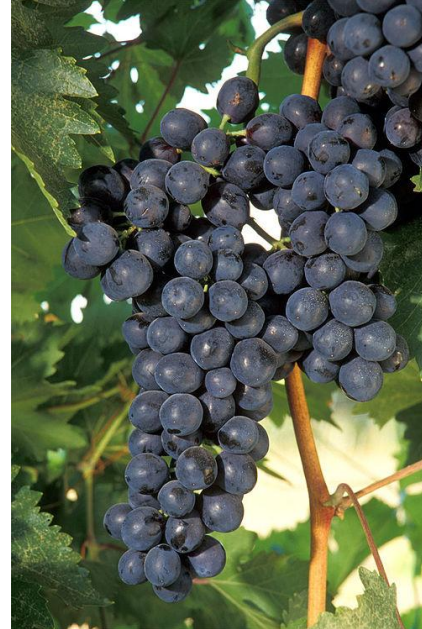
Fruits

--> Mostly perennial woody plants/shrubs

Examples:

- Apple (*Malus domestica*): most important fruit in temperate zones. Fresh fruit, juice + cider, drying
- Grape (*Vitis vinifera*): perennial permanent culture. Wine, table grapes, juice
- Mango (*Mangifera indica*): grows on trees. Fresh, oil, medicinal plant
- Banana (*Musa*): many different varieties, sugary, energy-rich fruit, fibre bananas

Grapes



<https://de.wikipedia.org/wiki/Weintraube>

Growth cycles

Annual:

- Life cycle in 1 season
- Examples: wheat, maize, soybean, sunflower, most vegetables

Biennial:

- Life cycle over 2 years
- 1st year: vegetative growth
- 2nd year: flower + seed set
- Examples: sugar beet (seed production), carrot (seed production)

Perennial:

- Live for many years
- Perennial, often woody or persistently herbaceous, with a lifespan of 3–30+ years; the climate zone determines the yield cycle (seasonal vs. continuous)
- Examples: fruit trees, vines, alfalfa, asparagus, hops

Cultivation systems

Seeding

Seeds sown directly in field, lower labour cost, Risk of failure due to heat/dryness

Examples: cereals, maize, rapeseed, carrot, millet



<https://www.horsch.com/produkte/saemaschinen/3-punkt-saemaschinen/versa-kr>

Cultivation systems

Planting

Seedling raised in nursery first

Time efficiency, Time advantage, labour-intensive

Examples: tomato, cabbage, lettuce, Tabak, paddy rice



<https://www.pflanzenforschung.de/de/pflanzenwissen/journal/zeit-gewinnen-um-ernten-zu-sichern-wie-wissenschaftler-10340>

Cultivation systems

Open field cultivation

Large areas possible, weather dependent, natural pest pressure, Weather-related risks, seasonal constraints, pest pressure

Greenhouse cultivation

Climate fully controlled, high energy and capital cost, mainly vegetables and herbs, year-round production

Thank you very much for your interest!

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Please feel free to use the **Moodle course forum** if you have any questions!