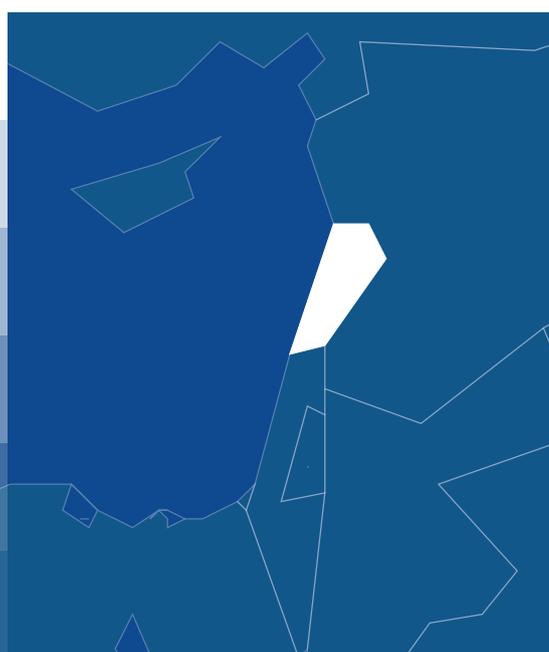


Lebanon

Country profile



Key messages

- Lebanon has an Agrobiodiversity Index status score of 54.8 reflecting a moderate integration of agrobiodiversity into the food system.
- In consumption, food species diversity is high but a shift towards more high-sugar, high-fat dietary patterns contributes to dietary risks and moderate functional diversity.
- In production, fish species diversity is high in Lebanon compared to other countries worldwide and in the Mediterranean region. Crop species richness is moderate, and there is potential to increase the diversity of farming systems and improve soil biodiversity. Natural habitat in cropped landscapes is above average but it is important to further manage and increase this.
- In conservation, *ex situ* conservation of a diversity of plant species is very high compared to countries around the world. While there is well documented use and *in situ* conservation of a broad range of useful wild plants, their representation in genebanks is very low.
- While there is a recognition of the importance of agrobiodiversity in national policies and reporting, there is potential for more explicit policies and actions to support agrobiodiversity across the whole food system.

Pillar 1: Agrobiodiversity in consumption for healthy diets
Pillar 2: Agrobiodiversity in production for sustainable agriculture
Pillar 3: Agrobiodiversity in conservation for future use options

Score	41-60
0-20	61-80
21-40	81-100

All raw scores are scaled from 0 to 100. See Annex 2 for details.

SUB-INDICATOR (raw scores)	INDICATOR	PILLAR
Overall agrobiodiversity: 33.3 (1)	Commitments supporting agrobiodiversity: 6.7	Pillar 1 Consumption 28.1 6.7 Commitment
Varietal/breed diversity: 0 (0)		
Species diversity: 0 (0)		
Functional diversity: 0 (0)		
Underutilized species: 0 (0)		
Overall agrobiodiversity: 33.3 (1)	Commitments supporting agrobiodiversity: 25	Pillar 2 Production 37.5
Varietal/breed diversity: 33.3 (1)		
Species diversity: 33.3 (1)		
Functional diversity: 0 (0)		
Underutilized species: 33.3 (1)		
Pollinator diversity: 33.3 (1)		
Soil biodiversity: 33.3 (1)	Commitments supporting agrobiodiversity: 40	Pillar 3 Conservation 40.0
Landscape complexity: 100.0 (3)		
Overall agrobiodiversity: 100.0 (3)		
Varietal/breed diversity: 0 (0)		
Species diversity: 0 (0)		
Functional diversity: 0 (0)		
Underutilized species: 100.0 (3)		



PILLAR	INDICATOR	SUB-INDICATOR (raw scores)
Pillar 1 Consumption 59.2 Action	Management practices supporting agrobiodiversity: 50.0	Published diet guidelines (Yes/No): 100.0 (1.0)
		Published food composition tables (Yes/No): 0.0 (0.0)
Pillar 2 Production 60.1	Diversity-based practices: 89.8	Crop-livestock integration (% agricultural land with cropland and pasture): 89.9 (89.9)
	Management practices supporting agrobiodiversity: 30.2	Nitrogen use efficiency (kg N output per kg N input): 32.5 (0.4)
		(Inverted) Sustainable Nitrogen Management Index (Index 0 to infinity): 57.1 (34.1)
		Organic agriculture (%): 0.2 (0.2)
		Tree cover on agricultural land (%): 11.3 (3.4)
		(Avoided) pesticide use (kg per ha): 79.4 (7.0)
Conservation agriculture (%): 0.9 (0.9)		
Pillar 3 Conservation 67.5	Management practices supporting agrobiodiversity: 67.5	Indicators reported to the World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (%): 67.5 (67.5)

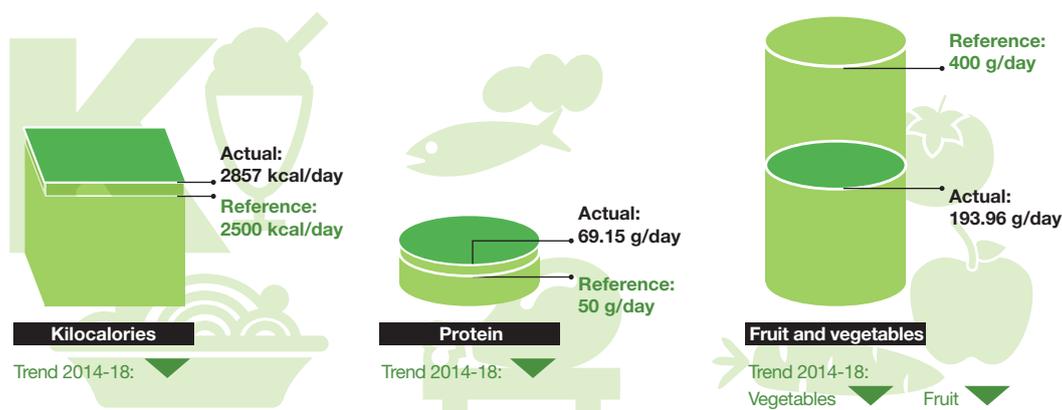
Context

Lebanon is an upper middle-income country, covering an area of 10,400 km² with a current GDP of about US\$52 billion² and a population of approximately 6.8 million.³ The population density is estimated at 669 inhabitants per km² and the population is largely urban (89%).^{4,5} The most recent figures, from 2012, report that 27.4% of Lebanon's population live below the poverty line,⁶ while there are no data available to assess multidimensional poverty.⁷ In the last decade, Lebanon's population has increased rapidly due to an influx of Syrian refugees.

Consumption for healthy diets

Lebanon's traditional cuisine typically comprises minimally processed vegetarian recipes rich in fruit, vegetables, cereals, legumes, and nuts, including wild edible plants, lemon, garlic and mint.⁸ Olive oil is the main fat used; fish, poultry and red meat are consumed in low amounts; and wine is consumed in low to moderate quantities (Figure 1). Modern Lebanese consumers' tastes and demands have slightly shifted toward an increased intake of fat, milk, and animal protein and a decreased intake of whole wheat bread and cereals.⁹ Although the current Lebanese dietary habit has retained many of its Mediterranean features, the diet appears to be adopting a pattern high in saturated fat, sugar, and refined foods and low in fiber.¹⁰ In Lebanon, a healthy person may live up to an average of 79 years.¹¹ The prevalence of undernourishment in the Lebanese population was 6% in 2018¹² but no data were recorded on the percentage of the population suffering from moderate to severe food insecurity.¹³ Around 31% of Lebanese women of reproductive age are anemic¹⁴ and 11% of the population suffer from diabetes.¹⁵ Data for children under five dates to 2004, when the prevalence of wasting and stunting was 6.6% and 16.5% respectively.^{16,17} An estimated 37% of adult women (aged 18 years and over) and 27.4% of adult men are living with obesity.¹⁸

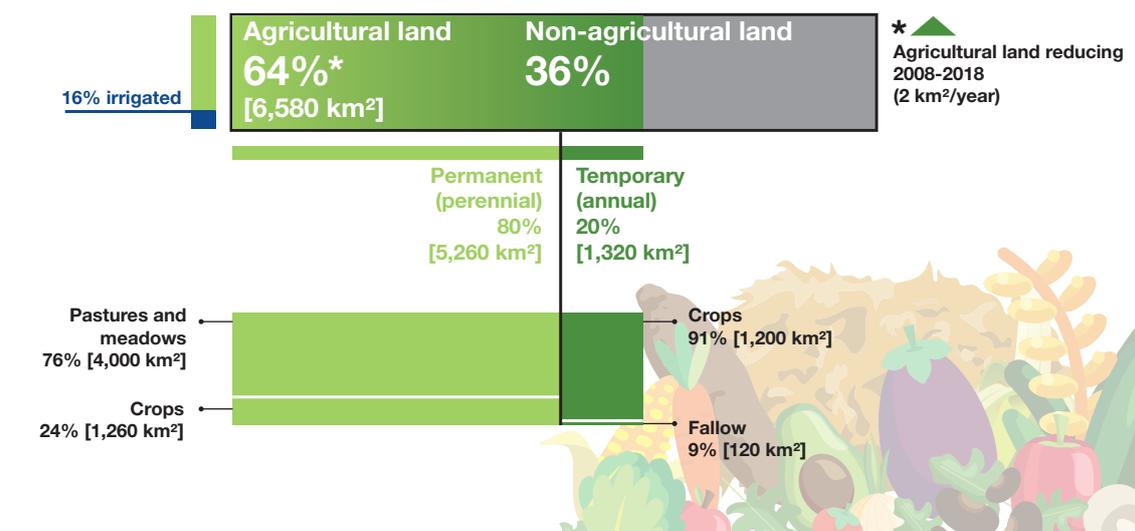
Figure 1: Kilocalorie, protein, fruit and vegetable supply



Production for sustainable agriculture

In Lebanon, agriculture, forestry, and fishing play a minor role in the economy and contribute 5.3% of annual GDP.¹⁹ Despite being a water-stressed country, around 64% of Lebanon's land (6,580 km²) is dedicated to agriculture,²⁰ of which nearly 20% is arable land (1,320 km²), divided into temporary crops (90.9%) and temporary fallows (9.1%) (Figure 2).²¹ Currently, the agricultural sector employs 13.4% of the Lebanese population, 14% of whom are women, with a general decrease of 5.3% over the past two decades (2000–2020).^{22,23} The top three crops in terms of economic value contributing to GDP (in % of total contribution from agriculture) are tomatoes (0.4%), potatoes (0.4%) and olives (0.4%).²⁴ In 2016, fish production in Lebanon was 5,306 tonnes, with 80% from capture fisheries and 20% aquaculture.^{25,26} Climate projection models predict that by 2040 temperatures will increase by around 1°C on the coast to 2°C in the mainland, and by 2090 they will be 3.5°C to 5°C higher than today. Precipitation on the other hand will decrease by 10%–20% by 2040 and by 25%–45% by the year 2090, compared to the current trend. This will result in significantly warmer and less wet conditions, causing longer periods of drought in Lebanon.²⁷ The predicted increase in temperatures will exacerbate the desertification rate of Lebanese soils, which are highly vulnerable to erosion processes.²⁸ These will have significant consequences on crop geographic distributions and yields.²⁹

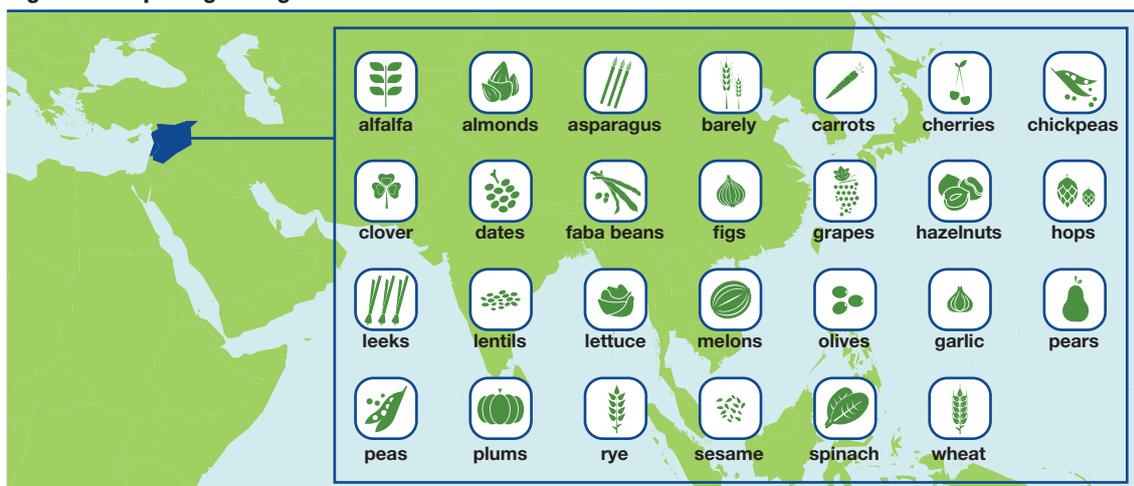
Figure 2: Land used for agriculture



Conservation for future use options

Lebanon hosts a rich faunal and floral diversity despite its small land area, with 2,612 vascular plants (108 endemic),³⁰ 390 bird species, 900 fish species and 1,300 insect and butterfly species.³¹ More than 80 plant species are cultivated for food and agriculture (Figure 3). In addition, Lebanon is rich in wild plant species and wild harvested plants include leafy vegetables and aromatic plants.³² The Mediterranean Red List, compiled by the International Union for the Conservation of Nature (IUCN) to assess threat levels¹, indicates that 356 (7%) of terrestrial plants growing in Lebanon are considered threatened.³⁰ Lebanese flora is facing rapid genetic erosion because of human-induced pressures like lack of awareness, adoption of new high-yielding varieties, land reclamation, climate change, and overgrazing.³¹ Lebanon has been increasingly working towards *in situ* and on-farm conservation of genetic resources in recent years. The country has established 14 nature reserves, with the largest one covering about 2% of Lebanese land and containing 26 key biodiversity areas.³⁰ In response to on-farm surveys showing a major decline in the use of farmer varieties due to changing food demands and markets, local nurseries and seed-cleaning units have been established to support production and use of local crop varieties.³³

Figure 3: Crops originating from West Asia



Agrobiodiversity Index score

Lebanon has an Agrobiodiversity Index status score of 54.8.

Status: What's driving the Agrobiodiversity Index score?

For Lebanon, we see that scores are highest in consumption (78.1), followed by conservation (52.9), and production (33.4). This indicates that agrobiodiversity is relatively effectively used in consumption for healthy diets and conserved for current and future use options, while there is potential for much better use of agrobiodiversity in production for sustainable agriculture. We can take a closer look at the indicator scores to understand what underlies the differences in status of agrobiodiversity across the pillars of Lebanon's food system.

Consumption

Species diversity: Food species diversity is high in Lebanon relative to other countries in the world and also compared to other Mediterranean countries.

Functional diversity: The functional diversity score of 71 reflects a moderate number of Disability Adjusted Life Years attributable to dietary risk factors. Recent studies on food consumption patterns of young Lebanese people show a shift in diets toward increased intake of fat, milk, and animal protein and decreased intake of wholewheat bread and cereals.³⁴ It seems that the Lebanese Mediterranean diet may be converging with a pattern high in saturated fat, sugar, and refined foods and low in fiber, associated with an increased risk of non-communicable diseases such as obesity, cardiovascular disease, diabetes, and hypertension.

Underutilized species: Almost 60% of energy in Lebanese diets is obtained from sources other than major cereals, roots, and tubers, explaining the score of 92 for underutilized species in this category and indicating that diets are not overly dependent on staples. This does not mean that the potential of underutilized and local species is at its maximum but that the diet is not overly dependent on major staples.

There were no data available on varietal diversity in consumption.

Production

Species diversity: With 63 distinct commodities in production, crop species richness is moderate relative to the global maximum of 123 species (in China) and below average compared to the nine other Mediterranean countries. Olives, wheat, potatoes, barley, apples, grapes, tobacco, almonds, cherries, and oranges constitute the top ten crops by harvested area and together account for 72% of the 0.2 million ha harvested cropland. Cropped landscapes have a moderate crop species diversity relative to other countries in the world, and just below average compared to the other nine Mediterranean countries. There is a very high percentage (96%) of agricultural land that contains a high diversity of crop species at 10x10 km scales.³⁵ With 53 recorded freshwater fish species, fish richness is high relative to other countries in the world and above average compared to the nine other Mediterranean countries. Livestock species diversity in production is moderate compared to other countries in the world and average compared to the nine other Mediterranean countries.

Soil biodiversity: Soil biodiversity is low for most of the country, averaging 0.4 on scale of 0.11 to 1.35 (representing the minimum and maximum global extremes). Integrated plant nutrient management can help maintain and restore soil health, such as through increased use of cover crops, application of mulch and animal manure, and intercropping with legumes.

Landscape complexity: 41.6% of Lebanon’s cropped landscapes have at least 10ha of natural vegetation at 1x1 km scales, which is well below the 100% recommendation, but above average for Mediterranean countries. Maintaining natural vegetation in and around cropland helps maintain habitat connectivity and ecosystem functioning to sustain nature’s contributions to agriculture, including reducing the risk of pest and disease outbreaks, maintaining pollinators, and safeguarding crop wild relatives. Retaining at least 10% natural habitat at local (1x1 km) and landscape (10x10 km) scales could be achieved through on-farm practices such as live fences (trees, hedgerows), woodlots, flower strips and set aside, and off farm by safeguarding portions of natural or semi-natural forests, wetlands and grasslands around cultivated areas.

There were no data on varietal diversity, functional diversity, underutilized species, or pollinator diversity in production.

Conservation

Varietal diversity: Lebanon has a moderate score for varietal diversity (51.4), relative to the globally best performing country (France) indicating that there are a fair number of crop samples of Lebanese crop varieties conserved in genebanks.

Species diversity: The species diversity score is very high (74.2), making it second highest among the ten Mediterranean countries. This reflects that a high proportion of Lebanon’s cultivated and wild crop species are conserved in genebanks, and a high diversity of crop wild relatives have been identified growing in country, relative to other countries in the world.

Underutilized species: Lebanon has a low score (33.2) for conservation of underutilized species (useful wild species). While 61.6% of known useful wild species are conserved *in situ*, their representativeness in *ex situ* repositories is very low (4.7%).

There were no data available for functional diversity, so this sub-indicator was not assessed.



Credit: ©IFAD/Jon Spaul

Actions: What actions are being taken to maintain and increase agrobiodiversity?

Consumption: Lebanon has food-based dietary guidelines in place, but national food composition tables, which could support the use of local species and varieties in diversifying diets, are not yet available.

Production: Action scores are high (60.1) for agrobiodiversity use in production. This score reflects widespread adoption of diversity-based practices together with low adoption of agrobiodiversity-supportive management practices.

- **Diversity-based practices:** Available data indicate that integrated farming approaches are widespread in Lebanon, with 89.8% of its agricultural landscapes (10x10 km areas) containing both cropland and pasture, thus facilitating crop–livestock integration.
- **Production management practices supporting agrobiodiversity:** Current data indicate nitrogen use efficiency is low relative to other countries in the world, at 0.4kg nitrogen output per kg nitrogen input. The environmental efficiency of production is moderate relative to other countries in the world, based on the Sustainable Nitrogen Management Index (SNMI) score, which combines data on both nitrogen use efficiency and land use efficiency (crop yields). These scores together suggest that there is an overuse of nitrogen, e.g. on soils which already have sufficient nitrogen quantities to support reasonable crop yields, and more targeted applications could reduce costs and environmental externalities while still providing good harvests. Lebanon has low levels of pesticide use relative to other countries in the world, estimated at 7kg per hectare, far below the highest global user (28kg per ha in Mauritius). Efforts to further reduce chemical pesticides, for example through integrated pest management, would have a positive impact on soil biodiversity, pollinators, and natural enemies of pests, with benefits for agriculture and biodiversity.



Credit: ©IFAD/Jon Spaul

Based on national statistics, organic agriculture is practiced on 0.2% of agricultural land in Lebanon, well below the 4.2% average for the ten Mediterranean countries. Conservation agriculture adoption is very low at 0.9% of agricultural land. Trees are integrated into 3.4% of agricultural land in Lebanon, which is very low relative to other countries in the world and compared to other Mediterranean countries. Evidence suggests tree coverage on farm can be increased to up to 30% with limited impacts on yield,³⁶ while providing valuable carbon sequestration services and helping maintain tree, soil, and animal biodiversity in agricultural landscapes. Drought-resistant and native tree varieties could be prioritized to minimize water consumption while providing other benefits to farmers.

Conservation: Lebanon has reported on 67.5% of the indicators for monitoring progress on the implementation of the FAO second Global Plan of Action on Plant Genetic Resources for Food and Agriculture. The indicators reported reveal that Lebanon has undertaken reasonable actions to survey, inventory, and collect plant genetic resources for food and agriculture for long-term conservation, and has supported on-farm conservation of local varieties involving a large number of farmers. Some activities have been conducted to support the *in situ* conservation of crop wild relatives, although more efforts are needed to embed their conservation into protected area management plans.

The national genebank has distributed germplasm to farmers and to foreign stakeholders, but no distribution has been reported to private sector or national breeders.

While the documentation and monitoring of plant genetic resources for food and agriculture in *ex situ* repositories is well covered, the documentation of crop wild relatives and local farmer varieties remains very limited in the country. There is no national system to systematically monitor and safeguard genetic diversity, which undermines efforts to effectively conserve and use these genetic resources and to reduce genetic erosion in the country.

Commitments: How supportive of agrobiodiversity are national policies?

The commitments analysis for Lebanon was based on their *National Biodiversity Strategy and Action Plan for 2016*.³⁷

Consumption: While Lebanon's National Biodiversity Strategy and Action Plan (NBSAP) is one of the few to refer to food diversity in markets as well as crop and edible plant diversity, indicating an awareness of agrobiodiversity's importance for markets and consumption, there are no specific strategies or targets to make better use of agrobiodiversity for healthy diets.

Production: Lebanon has a low score (37.5) for commitments to enhancing agrobiodiversity in production relative to other countries in the world, but above average compared to other Mediterranean countries. Lebanon has made strong commitments to landscape complexity, focusing on safeguarding and restoring natural habitat and planting native trees to boost biodiversity and ecosystem functioning. For example, Lebanon aims, by 2030, to ensure that all biodiversity is valued and sustainably managed to safeguard species, and ensure Lebanese citizens equal access to ecosystem goods and services. However, the NBSAP lacks strategies or targets to promote on-farm agrobiodiversity, such as crop varietal or species diversity, livestock breeds, or soil biodiversity.

Conservation: Lebanon has a moderate score (40) for commitments to conserving agrobiodiversity relative to other countries in the world, but below average compared to other Mediterranean countries. A national strategy for conservation and management of plant genetic resources for food and agriculture in Lebanon (2015–2035) has been developed under the coordination of the Ministry of Agriculture. Lebanon has objectives for promoting *in situ* conservation of crop wild relatives and monitoring and early warning systems for the loss of plant genetic resources for food and agriculture.³⁸ For example, the country commits to protecting by 2030 at least 50% of its native fauna and flora, including crop wild relatives, through *in situ* and *ex situ* conservation efforts. Stronger commitments could be made to conserving Lebanon's native varietal, species and functional diversity particularly *ex situ* (in genebanks).

Recommendations

This section suggests concrete actions that can be taken to improve the use and conservation of agrobiodiversity for more sustainable food systems (Table 1). The list of actions is by no means exhaustive or prescriptive. It is intended for review, discussion, and improvement by in-country policy specialists.

Table 1: Recommended actions to enhance agrobiodiversity in the national food system

Food system pillar in the Agrobiodiversity Index	Recommendations	Contributing to:	
		Risk and resilience	Global policy
Consumption for healthy diets	Promote the traditional Lebanese diet and leverage the potential of local or regional species and varieties (e.g. by developing related food composition tables) to maintain and increase dietary diversity.		SDG2 Zero Hunger SDG12 Responsible Consumption and Production WHO Decade of nutrition – reducing overweight, obesity and anemia
Production for sustainable agriculture	Continue and extend the 40 Million Trees Program to support planting of functionally useful native trees on and around farmland to support biodiversity and increase farm resilience to climate change by providing temperature regulation services for crops and livestock and improving water infiltration and storage in soils. Support farmer adoption of agroecological practices to maintain and reduce agrochemical inputs and enhance natural pest control and pollinators.		Convention on Biological Diversity (CBD) Post-2020 Goal 1 ⁱⁱ No Net Loss SDG 1 No Poverty SDG2 Zero Hunger SDG14 Life Below Water SDG15 Life on Land
Conservation for future use options	Make the conservation of agrobiodiversity a national priority. Develop legislation, regulations, policies to support conservation and use of agrobiodiversity. Develop a properly resourced national agrobiodiversity program. Establish a national monitoring system for local crop diversity (farmer varieties and crop wild relatives) and domestic animal genetic resources. Promote the conservation and use of underutilized species.		CBD Post-2020 Goal 3 Genetic Diversity 4 Nature's Benefits SDG 15 Life on Land FAO second Global Plan of Action on Plant Genetic Resources for Food and Agriculture

Agrobiodiversity highlight

Wild species for food

Lebanese people generally make good usage of wild edible plants, in their food systems and lifestyles, for example through fishing, hunting, honey-making, charcoal, recreation and eco-tourism.

Despite its small size, the country is home to a remarkable number of wild species still regularly used by people for food. As a result of traditional food consumption habits and the local ethno-botanical heritage, about 212 species in Lebanon have an economic value and are considered as medicinal plant species or wild edible crops. Rural communities, including poor farmers with low incomes, rely on wild food they harvest directly for food and nutrition security and some benefit through selling the collected products to urban communities.

These species are now all under threat, however, from urbanization, pressure from refugees from the war in Syria, and overharvesting. Loss of wild food species seriously affects the diet, food basket and income of local people.

Lebanon is taking action to save its rich range of wild food species. Traditional knowledge about wild food species is being documented through leaflets, booklets or articles and healthy diets based on wild species are being promoted by some dieticians and NGOs.

The genetic diversity of Lebanon's plant species is being preserved *ex situ* in the Lebanese Agricultural Research Institute (LARI) national genebank which has 1,380 seed collections representing 881 different Lebanese wild species stored under long-term conditions, with duplications held at Kew's Millennium Seed Bank of the Royal Botanic Gardens. More than 1,969 samples of wild wheat relatives and forage from Bekaa valley have been collected for long-term storage in genebanks in collaboration with the International Center for Agricultural Research in the Dry Areas (ICARDA). Wheat and barley farmer varieties, as well as improved varieties of wheat, barley, lentil, chickpea, and vetch are also conserved as *ex situ* collections at LARI and are regularly regenerated every five years.

Sources: ³³



Credit: ©IFAD/Jon Spaul

References

1. World Bank. Land area (sq. km). (2020).
2. World Bank. GDP (current US\$). (2020).
3. World Bank. Population, total. (2020).
4. World Bank. Population density (people per sq. km of land area). (2020).
5. World Bank. Urban population (% of total population). (2020).
6. World Bank. Poverty headcount ratio at \$1.90 a day (2011 PPP) (% of population). (2020).
7. UNDP & OPHI. *Global Multidimensional Poverty Index 2020. Charting pathways out of multidimensional poverty: Achieving the SDGs.* (2020).
8. Batal, M. & Hunter, E. Traditional Lebanese recipes based on wild plants: An answer to diet simplification? *Food and Nutrition Bulletin* 28, (2007).
9. Farhat, A. G., Jaalouk, D. & Francis, S. Adherence to the Mediterranean diet in a Lebanese sample. *Nutrition and Food Science* 46, 272–281 (2016).
10. Hwalla, N. & El Houry, D. T. D. Lebanese traditional diets and health effects. in *Wild-Type Food in Health Promotion and Disease Prevention: The Columbus Concept* 493–498 (Humana Press, 2008). doi:10.1007/978-1-59745-330-1_34.
11. World Bank. Life expectancy at birth, total (years). (2020).
12. World Bank. Prevalence of undernourishment (% of population). (2020).
13. FAO, IFAD, UNICEF, WFP & WHO. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets.* (2020).
14. World Bank. Prevalence of anemia among women of reproductive age (% of women ages 15–49). (2020).
15. World Bank. Diabetes prevalence (% of population ages 20 to 79). (2020).
16. World Bank. Prevalence of wasting, weight for height (% of children under 5). (2020).
17. World Bank. Prevalence of stunting, height for age (% of children under 5). (2020).
18. Global Nutrition Report Lebanon country profile 2020. (2020).
19. World Bank. Agriculture, forestry, and fishing, value added (% of GDP). (2020).
20. World Bank. Agricultural land (sq. km). (2020).
21. World Bank. Agricultural land counted as arable land in km² (2018). (2020).
22. World Bank. Employment in agriculture (% of total employment) (modeled ILO estimate) (2020).
23. World Bank. Employment in agriculture, female (% of female employment) (modeled ILO estimate) (2020).
24. FAO. Value of Agricultural Production. <http://www.fao.org/faostat/en/#data/QV> (2018).
25. World Bank. Capture fisheries production (metric tons). <https://data.worldbank.org/indicator/ER.FSH.CAPT.MT> (2020).
26. FAO. *FAO Yearbook. Fishery and Aquaculture Statistics 2018/FAO annuaire. Statistiques des pêches et de l'aquaculture 2018/FAO anuario. Estadísticas de pesca y acuicultura 2018.* (2020).
27. Haddad, E. A., Farajalla, N., Camargo, M., Lopes, R. L. & Vieira, F. V. *Climate change in Lebanon: Higher-order regional impacts from agriculture **. *European Regional Science Association (ERSA) vol. 1* (2014).
28. Hamze, M. *et al.* Assessment of ecosystem sensitivity and adaptation strategies to desertification and climate change in Lebanon in *Global climate change and its impact on food and energy security in the drylands, Proceedings of the Eleventh International Dryland Development Conference, 18–21 March 2013, Beijing, China* 264–277 (2013).
29. Verner, D., Lee, D., Ashwill, M. & Wilby, R. *Increasing Resilience to Climate Change in the Agricultural Sector of the Middle East* (The World Bank, 2013). doi:10.1596/978-0-8213-9844-9.
30. Valderrábano, M., Gil, T., Heywood, V. & de Montmollin, B. *Conserving wild plants in the south and east Mediterranean region.* (2018).
31. Chalak, L. *Proposed Regulations on Access and Benefit-sharing for Biological and Genetic Resources of Lebanon.* *fao.org* (2018).
32. Baydoun, S. *et al.* Ethnobotanical and Economic Importance of Wild Plant Species of Jabal Moussa Bioserve, Lebanon. *Journal of Ecosystem and Ecography* 7, 245 (2017).

33. FAO. *Lebanon: Second report on the state of plant genetic resources for food and agriculture*. (2007).
34. Hwalla, N. & El Khoury, D. T. D. Lebanese traditional diets and health effects. in *Wild-Type Food in Health Promotion and Disease Prevention: The Columbus Concept* 493–498 (Humana Press, 2008). doi:10.1007/978-1-59745-330-1_34.
35. Tamburini, G. *et al.* Agricultural diversification promotes multiple ecosystem services without compromising yield. *Science advances* 6, eaba1715 (2020).
36. Blaser, W. J. *et al.* Climate-smart sustainable agriculture in low-to-intermediate shade agroforests. *Nature Sustainability* 1, 234–239 (2018).
37. Khoury, R., Antoun, N. & Abou Habib, N. Lebanon's National Biodiversity Strategy and Action Plan. (2016).
38. FAO. *Country Report on the implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGREFA): Lebanon*. (2017).

End notes

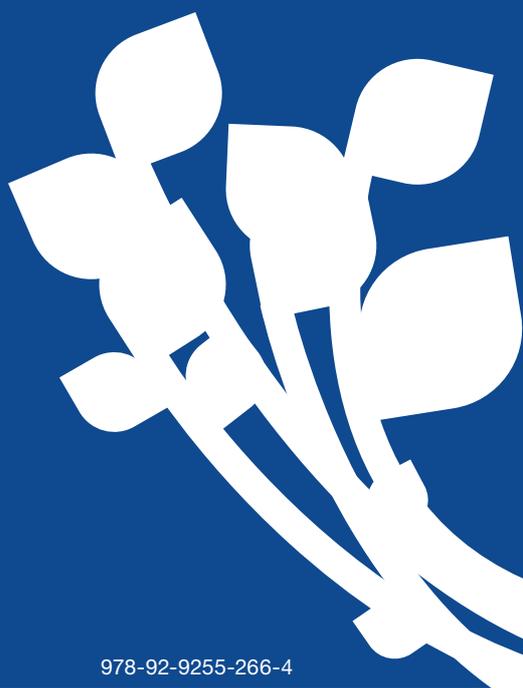
- I. The International Union for the Conservation of Nature (IUCN) ranks species according to how threatened they are. Rankings range from 'extinct', through 'critically endangered', 'endangered' and 'vulnerable', to 'near threatened' and 'least concern'.
- II. The Convention on Biological Diversity is an international treaty for the sustainable use and conservation of biological diversity. In 2010 it launched a strategic plan, running from 2011 to 2020, with 20 ambitious targets known as the Aichi Targets from the city in which they were signed. The international community has developed new targets, but their signature has been delayed due to the COVID-19 crisis.



Credit: ©IFAD/Jon Spaul

THIS COUNTRY PROFILE IS A CHAPTER OF THE “AGROBIODIVERSITY INDEX REPORT 2021: ASSESSING MEDITERRANEAN FOOD SYSTEMS”, DOWNLOADABLE HERE: <https://cgspace.cgiar.org/handle/10568/118471>

Alianza



The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) delivers research-based solutions that harness agricultural biodiversity and sustainably transform food systems to improve people's lives.

Bioversity International and CIAT are CGIAR Research Centres.

<https://alliancebioversityciat.org>

978-92-9255-266-4

<https://alliancebioversityciat.org/tools-innovations/agrobiodiversity-index>