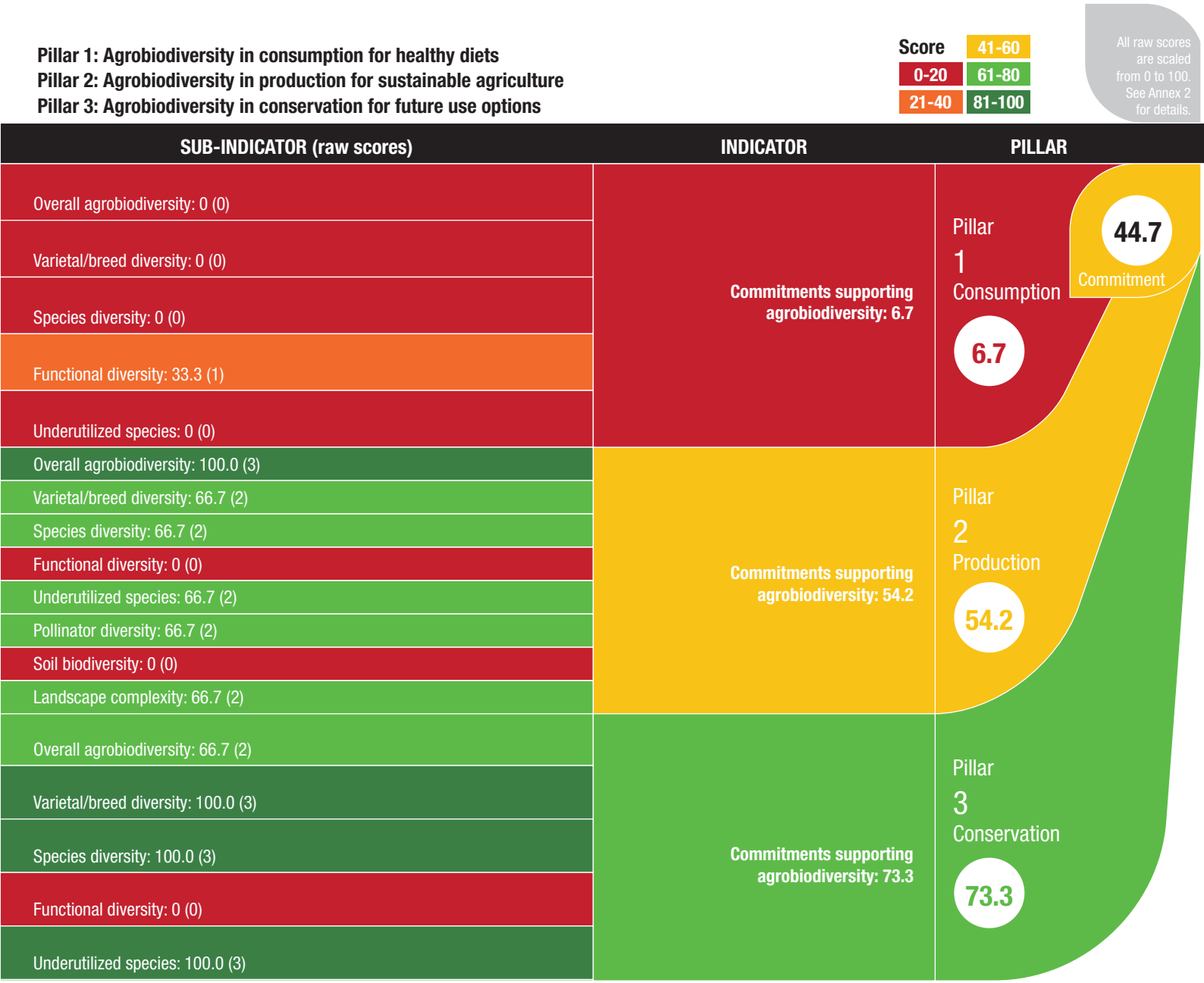
Tunisia

Country profile

AGROBIODIVERSITY INDEX

Key messages

- Tunisia has an Agrobiodiversity Index score of 50, reflecting a moderate integration of agrobiodiversity into the food system.
- In consumption, food species diversity could be improved to help ensure that all children in Tunisia have adequate diet diversity. Nonetheless diets are quite well balanced, including above average intakes of fruits, vegetables, legumes, and nuts.
- The production system is characterized by moderate crop species and livestock breed diversity, and very low freshwater fish richness, indicating diversity in production could be much enhanced. Soil biodiversity is very low, highlighting the potential for integrated crop–livestock farming systems and plant nutrient management to boost soil health. Tunisia has low levels of tree cover and landscape complexity meaning natural vegetation could be better integrated in and around croplands to support biodiversity and boost ecosystem services to and from agriculture.
- A moderate diversity of Tunisia's plant species and crop varieties are conserved in genebanks compared to other Mediterranean countries, and useful wild species are well represented in *in situ* conservation. However, the proportion of useful wild species conserved in genebanks is very low.



PILLAR	INDICATOR	SUB-INDICATOR (raw scores)
Action 46.2		
Pillar 1 Consumption 50.0	Management practices supporting agrobiodiversity: 50.0	Published diet guidelines (Yes/No): 0.0 (0.0)
		Published food composition tables (Yes/No): 100.0 (1.0)
Pillar 2 Production 27.4	Diversity-based practices: 15.3	Crop-livestock integration (% agricultural land with cropland and pasture): 30.6 (30.6)
		Integrated landscape initiatives (count): 0.0 (0.0)
	Management practices supporting agrobiodiversity: 39.4	Nitrogen use efficiency (kg N output per kg N input): 56.7 (0.6)
		(Inverted) Sustainable Nitrogen Management Index (Index 0 to infinity): 69.4 (24.3)
		Organic agriculture (%): 3.2 (3.2)
		Tree cover on agricultural land (%): 7.1 (2.1)
		(Avoided) pesticide use (kg per ha): 99.4 (0.2)
		Conservation agriculture (%): 0.3 (0.3)
Pillar 3 Conservation 61.3	Management practices supporting agrobiodiversity: 61.3	Indicators reported to the World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture (%): 61.3 (61.3)

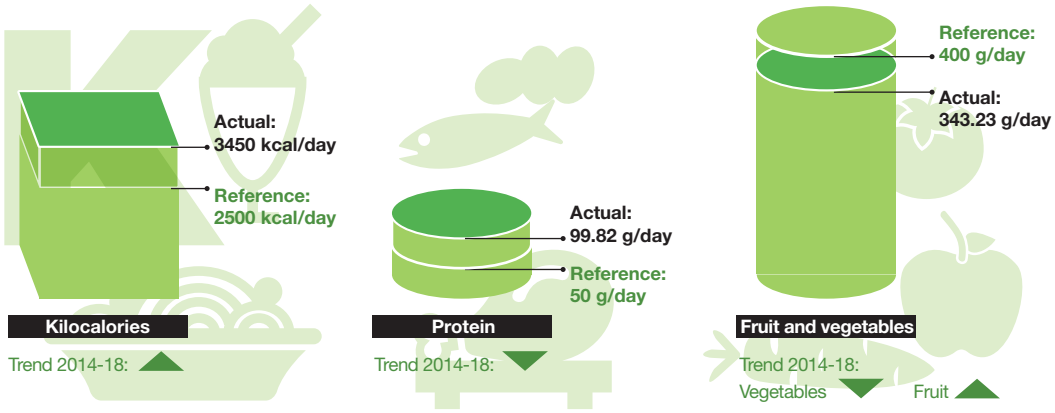
Context

Tunisia is a lower middle-income country. In 2019, Tunisian annual GDP was valued at US$38.79 billion while its GDP per capita was US$3,318.[1] Tunisia's surface area covers over 163,610 km^2.[2] In 2019, its total population was estimated at over 11 million people[3] with 74 inhabitants per km^2 in 2018.[4] Sixty-nine percent of Tunisian people live in urban areas.[5] Most recent poverty estimates, from 2015, showed that 0.2% of the Tunisian population were living below the poverty line[6] and in 2018, its multidimensional poverty index was 0.003.[7,8]

Consumption for healthy diets

In Tunisia, a diet is typically rich in wholemeal and barley flour, couscous, and rice in terms of carbohydrates. Animal-sourced products, such as cheese and buttermilk, chicken and lamb meat, are eaten frequently. Consumption of vegetables, such as tomatoes, pumpkin and potatoes, pulses (particularly chickpeas) and fruits (especially dates), is common[9] (Figure 1). Olive oil is moderately consumed, and garlic is much used in cooking.[10] The overall life expectancy of an average healthy Tunisian is 77 years.[11] Three percent of the population was undernourished in 2018,[12] while 9.1% and 20% of the population were estimated to be suffering from severe or moderate food insecurity between 2017 and 2019.[13] The prevalence of stunting and wasting for Tunisian children under the age of five were reported as 8.4% and 2.1% respectively in 2018.[14,15] Around 31% of women aged between 15 and 49 are anemic[16] and 8.5% of the population between 20 and 79 are diabetic.[17] An estimated 34.3% of adult women (aged 18 years and over) and 19.1% of adult men are living with obesity.[18]

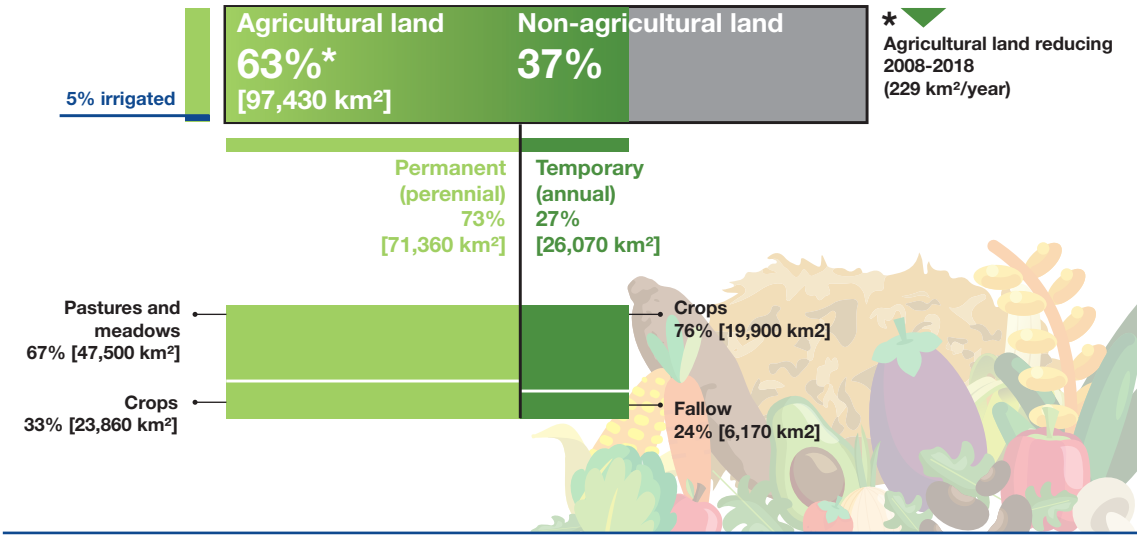
Figure 1: Kilocalorie, protein, fruit and vegetable supply



Production for sustainable agriculture

About 63% of the land area in Tunisia (97,430 km^2) is under agricultural activities, with nearly 27% accounting for arable land (76.3% temporary crops and 23.7% temporary fallow) (Figure 2).[19,20] In 2018, agriculture, forestry, and fishing contributed to 10.4% of Tunisia's GDP.[21] The latest figures, from 2020, report that 13% of the Tunisian population is employed in the agricultural sector, of whom 9% are women.[22,23] In 2016, fish capture production and aquaculture production were estimated at 115,064 tonnes and 16,166 tonnes respectively.[24,25] Eggs, milk, and meat are the three main animal-sourced food produced in Tunisia, with an annual livestock production of approximately 4 million tonnes.[26]

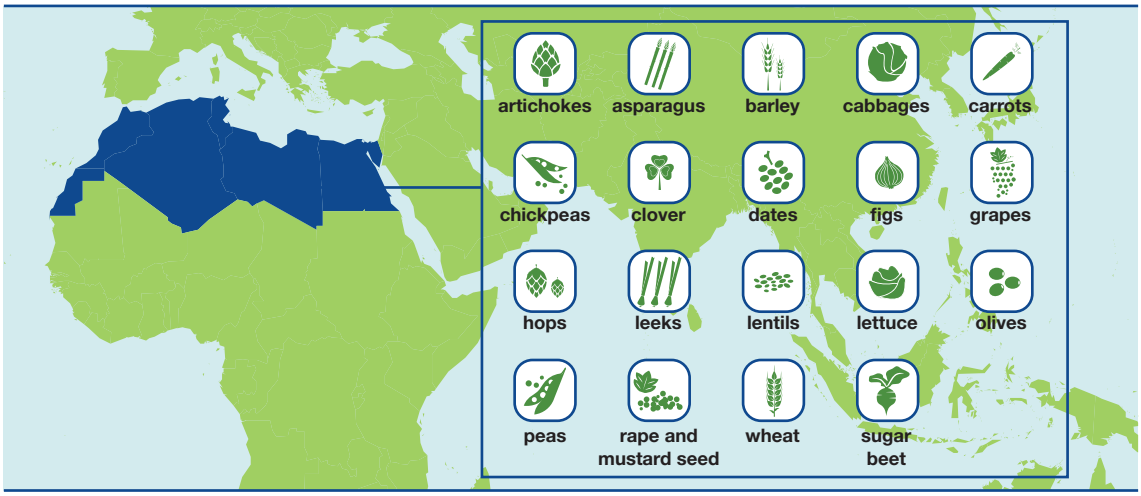
Figure 2: Land used for agriculture



Conservation for future use options

In Tunisia, 12,286 km² of total land and 100,661 km² of its marine area are protected.[27] Nearly 7% of Tunisia's land area (10,512 km²) is forested. The net tree cover loss from 2001 to 2019 was 269 km², showing a decrease in tree cover of 12% since 2000.[28] To date, 346 plant species have been assessed by the International Union for the Conservation of Nature's 'Red List', which assess the risk of extinction. It found 12 of them are threatened, while for animals, of the 1,107 species assessed, 15 mammals and 11 birds are considered threatened.[29] Tunisia is a centre of diversity for many crops, such as wheat, barley, beans, watermelon, chili, apricot, almond, pomegranate, date palm, figs, and many forage species, and it also harbours many wild relatives of crops, such as olives, figs, pears, pistachio, grapes, barley and others[30] (Figure 3). Nearly 7% of Tunisia's land area (10,512 km²) is forested.

Figure 3: Crops originating from South and East Mediterranenan



Agrobiodiversity Index score

Tunisia has an Agrobiodiversity Index status score of 50.0.

Status: What's driving the Agrobiodiversity Index score?

For Tunisia, we see that scores are highest in consumption (69.1), followed by conservation (47.6), and production (33.2). 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 Tunisia's food system.

Consumption

Species diversity: Food species diversity in Tunisia is moderate relative to other countries in the world and low compared to other Mediterranean countries. An estimated 63% of children under five have adequate diet diversity. The amount of fruits, vegetables, legumes, and nuts consumed are slightly above the global average.[18]

Functional diversity: The functional diversity score of 70.9 reflects a high number of avoided Disability Adjusted Life Years attributable to dietary risk factors, indicating that diets are quite balanced in terms of human health needs. Consumption of whole grains, however, is particularly low, while consumption of fruits, vegetables, legumes, and nuts can be further increased to reduce dietary health risk.[18]

Underutilized species: 51% of energy in Tunisian diets is obtained from sources other than major cereals, roots, and tubers, explaining the 85 score for underutilized species in this category (with 60% from non-staples as the recommended threshold). This indicates that diets are not overly dependent on major staples.

There were no data available on varietal diversity in consumption.

Production

Varietal diversity: The diversity of livestock breeds maintained in production in Tunisia is moderate compared to other countries in the world. Tunisia has seven breeds of horse in production, six of sheep, three of cattle, and one breed of two other species, namely the Maghrebi dromedary and Arbi goat. Keeping multiple breeds in production should help farmers maintain livelihoods in times of pest and disease outbreaks or other production challenges, because different breeds have different resistance to pests and diseases.

Species diversity: With 72 distinct commodities in production, crop species richness is moderate relative to the global maximum of 123 species (in China) and average across the ten Mediterranean countries. Cropped landscapes have a moderate diversity relative to other countries in the world and compared to other Mediterranean countries. A moderate percentage (57%) of agricultural land contains a high diversity of crop species at 10x10 km scales. This means that crop diversity has not reached its maximum potential, so seeking ways to enhance crop diversity at field, farm, and landscape levels is recommended to enhance natural pest and disease control, yield stability, biodiversity, and other ecosystem services.[31] With just six freshwater fish species recorded, fish richness is very low relative to other countries in the world and compared to the nine other Mediterranean countries. Livestock species diversity in production is high compared to other countries in the world and above average compared to the nine other Mediterranean countries. Maintaining livestock richness helps ensure farmers in all regions rely on a wide species base, helping shield them against pests and diseases and other production challenges.

Soil biodiversity: Soil biodiversity is very low for most of the country, averaging 0.3 on a 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: 22% of Tunisia's cropped landscapes have at least 100ha of natural vegetation at 1x1 km scales, which is well below the 100% recommended in the Index, and below average compared to the nine other 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. Establishing at least 10% natural habitat at local (1x1 km) and landscape (10x10 km) levels could be achieved on farm through 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 functional diversity, underutilized species, or pollinator diversity in production.

Conservation

Varietal diversity: Tunisia has a moderate score for varietal diversity (49.7), relative to the globally best performing country (France) indicating that a significant number of samples of Tunisian crop varieties are conserved in genebanks.

Species diversity: The species diversity score is moderate (54.6), indicating that a moderate proportion of Tunisian cultivated and wild food species are conserved in genebanks and a moderate number of known crop wild relatives have been found in country, relative to other countries in the world.

Underutilized species: Tunisia has a low score (38.4) for conservation of wild useful species. While 74.6% of known wild useful species are conserved *in situ*, their representativeness in *ex situ* repositories is very low (2.2%).

There were no data available for functional diversity of genetic resources in conservation.

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

Consumption: Tunisia has compiled food composition tables for local products, but has no available national food-based dietary guidelines.

Production: Action scores are low (27.4) for agrobiodiversity in production. This score reflects very low adoption of diversity-based practices together with low adoption of agrobiodiversity-supportive management practices.

- **Diversity-based practices:** Available data indicate that there is low potential for integrated farming in Tunisia, with only 31% of agricultural landscapes (10x10 km areas) containing both cropland and pasture, thus facilitating crop–livestock integration. This is well below the average for Mediterranean countries (48%).
- **Production management practices supporting agrobiodiversity:** The environmental efficiency of production in Tunisia is high relative to other countries in the world, based on the Sustainable Nitrogen Management Index (SNMI) score. A moderate nitrogen use efficiency score suggests that the overall environmental impact of production can be reduced by improving nitrogen use efficiency rather than improving yields. Tunisia has very low levels of pesticide use relative to other countries in the world, estimated at 0.2kg per hectare, which is far below the highest global user (28.0 kg per ha in Mauritius) and below the Mediterranean average. The avoided use of pesticides will be having a positive impact on soil biodiversity, pollinators, and natural enemies of pests, with benefits for agriculture and biodiversity. Trees are integrated into 2.1% of agricultural land in Tunisia, which is extremely low relative to other countries in the world and likely reflects the difficulty in sustaining plants that need a lot of water, such as trees, in extreme arid climates. Setting aside small areas of farmland for planting functionally and nutritionally diverse trees can provide multiple benefits for farmers in arid climates.[32] Drought-resistant and native tree varieties can be prioritized to minimize water consumption while providing other benefits. Organic agriculture is practiced on 3.2% of agricultural land and conservation agriculture on 0.3% of arable land, which is very low relative to other countries globally and in the Mediterranean. However, the very low use of pesticides indicates *de facto* organic agriculture may be more widespread than suggested by official records.

Conservation: Tunisia has reported on 61.3% of the indicators for monitoring progress on the implementation of the Second Global Plan of Action for Plant Genetic Resources for Food and

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Agriculture.[33] It has undertaken a fair number of *in situ* surveys of plant genetic resources for food and agriculture and targeted the collection of plant materials for long-term conservation in genebanks. However, not much has been done to survey its crop wild relatives *in situ*. Tunisia has also studied much of its crop genetic resources, evaluating them, and characterizing them so that other users can know what is available and how it might be useful. These have been published. Tunisia has shared some of its crop genetic diversity with national agricultural centers, farmers, and some foreign stakeholders, though none has been shared with the private sector. The country has conducted some activities on pre-breeding, which is the isolation of genetic traits that breeders can use to breed new varieties.

Tunisia has no national documentation system for plant genetic resources for food and agriculture either for *ex situ* or for *in situ* and there is no national system to systematically monitor and safeguard genetic diversity. This undermines efforts to effectively conserve and use genetic resources and reduce genetic erosion in the country.

Commitments: How supportive of agrobiodiversity are national policies?

The commitments analysis for Tunisia was based on their *National Biodiversity Strategy and Action Plan for 2018–2030 (NBSAP).*[34]

Consumption: In the National Strategy, the country recognizes the role of agrobiodiversity in consumption and acknowledges gendered preferences of using, consuming, and producing agrobiodiversity. For example, women consider cooking time, nutritional quality, taste, ease of collection, processing, and storage, while men favor commercial objectives. Nonetheless, the NBSAP lacks clear strategies or targets for guaranteeing agrobiodiversity on the plates and in the diets of Tunisians.

Production: Agricultural expansion and pressure on remnant natural ecosystems are leading to overexploitation of natural resources (water, fisheries, grasslands), a trend that has been worsening since independence, following the colonial period. The country's strategies include managing agroecosystems (including oases) sustainably to protect and maintain agrobiodiversity (e.g. pollinators, wild relatives), while increasing the number of cultivated species and varieties. Similarly, the country will support, integrate, and value local and traditional knowledge related to biodiversity.

Tunisia scored their actions in achieving each of the Convention on Biological Diversity targets (2011–2020) (known as the Aichi Targets) showing progress in 11 of the 19 targets. Similarly, the country has put forward multiple indicators to measure progress towards the Aichi Targets between 2018 and 2030. For example, the country is measuring forest, birds, bees, pollinators, cultivated varieties and livestock breeds, marine and endemic species diversity and abundance.

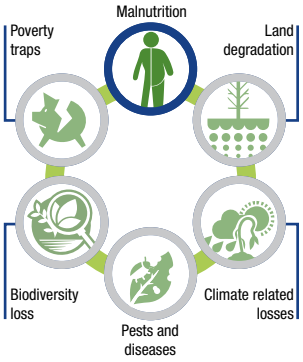
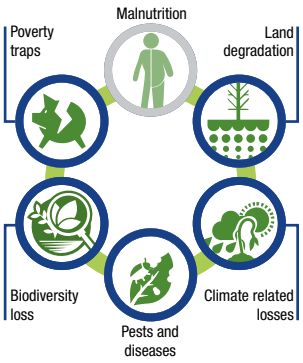
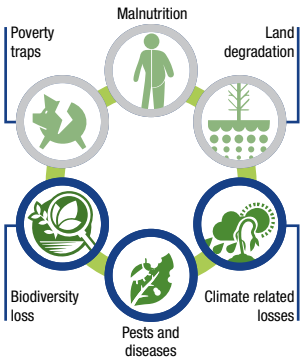
Tunisia has adopted a landscape approach for protecting biodiversity and the economic and ecological viability of agricultural systems in their NBSAP. Some practices promoted under this approach include conservation agriculture, organic agriculture, integrated pest management, agroforestry, crop species diversity, and varietal diversification. Some indicators used in these landscape approaches to track change include hedgerows, grasslands, woodland areas, organic or conservation farming areas, water-efficient techniques, nitrogen-use efficiency, and pesticide and chemical fertilizer use. The country identifies and protects agricultural systems through adhering to the 'Globally Important Agricultural Heritage Systems' program approach (See agrobiodiversity highlight below for an example). One clear target was to manage agriculture, silviculture, and aquaculture areas sustainably by 2020 to guarantee the conservation of biological diversity.

Conservation: The country aims to strengthen genetic improvement and conservation programs for traditional and local crop varieties and domestic animal breeds. Some of the indicators to measure agrobiodiversity conservation progress include number of collections of indigenous genetic resources in genebanks and seedbanks, the number of protected cultivated and domesticated plant and animal breeds, the number of new plant varieties registered, and the surface area dedicated to conservation of local plant species. Additionally, the country put in place programs to select crop varieties and livestock breeds adapted to new climate change conditions. One clear target by 2020 was to preserve the genetic diversity of crops, livestock, domestic animals, and their wild relatives, including other species of socio-economic or cultural value, while strategies to minimize genetic erosion and safeguard their genetic diversity were developed and implemented.

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

		Contributing to:	
Food system pillar in the Agrobiodiversity Index	**Recommendations**	**Risk and resilience**	**Global policy**
Consumption for healthy diets	Develop food-based dietary guidelines to support diet diversification and traditional diets. Promote and enable consumption of whole grains versus highly processed grains.		SDG2 Zero Hunger SDG12 Responsible Consumption and Production WHO Decade of nutrition – reducing overweight, obesity and anemia
Production for sustainable agriculture	Introduce policies to support the production of diverse crops, fish, and livestock, favoring native and locally adapted varieties and breeds. Increase the integration of natural habitat into cropped areas to improve agricultural landscape complexity. Encourage better fertilizer management including reduced chemical inputs and implementation of integrated plant nutrient management and other agroecological practices to improve soil health.		Post-2020 CBD Goal 1[i] No Net Loss SDG 2 Zero Hunger
Conservation for future use options	Carry out an inventory of crop wild relatives and take measures to actively conserve them in protected areas. Set up a national information-sharing mechanism for monitoring the status of conservation and use of agrobiodiversity.		Post-2020 CBD Goal 3 Genetic Diversity Post-2020 CBD Goal 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

A unique agroforestry system balancing integrated farming

Perched on the heights of Mount el Gorrâa, the gardens of Djebba el Olia form a unique agroforestry system. At an altitude of 600m, the communities have been able to shape this mountainous landscape to their advantage by integrating agriculture on terraces derived from natural geological formations or by building them out of dry stone.

Backed by an efficient irrigation system, the hanging gardens of Djebba El Olia offer many food resources to their owners. Based on the practices of agroforestry and agroecology, fig tree cultivation is the mainstay of a varied and resilient polycultural system supported by extensive livestock farming.

The farmers of Djebba El Olia have a fine knowledge of the interactions and synergies between their crops and with the local fauna and flora. A long tradition of knowledge and practices related to food processing and preservation feeds the fascination for these farmers. Attached to their land, Djebba El Olia is a small oasis suspended in the mountains that bears witness to the ingenuity of its inhabitants.

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End notes

I. 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.

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