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Organic fruit and vegetables: From market trends to sustainability assessment and reporting

Michael Curran, Helga Willer, Jan Travnicek, Bernhard Schlatter, Moritz Egger

Research Institute of Organic Agriculture, Dept. of Food System Science

Biofruit Congress at Fruit Attraction, Madrid, October 3, 2023

This presentation

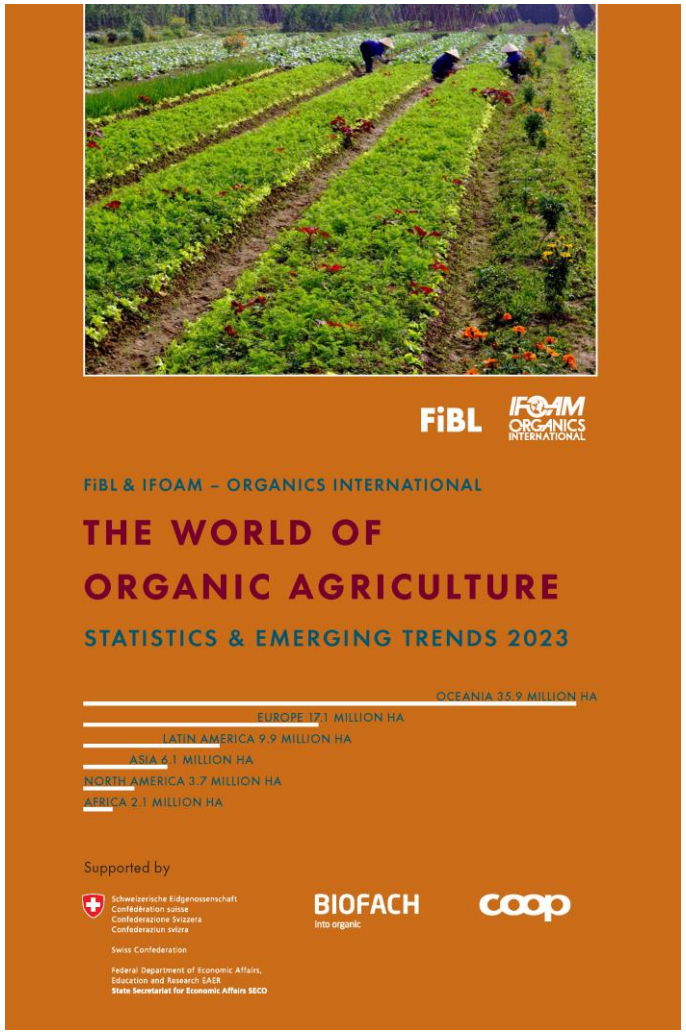
- About FiBL
- Organic agriculture worldwide 2021, organic market 2022: First data
- Organic fruit and vegetables
  - Production
  - Consumption
  - Organic fruit and vegetables
- Conclusions on market data
- Sustainability assessment and reporting
  - The SMART-Farm tool
  - Case studies of sustainability assessment in practice
- Resources

FiBL Switzerland

- Founded in 1973, private foundation
- 190 staff members
- 70 interns, BSc/MSc/PhD students, apprentices
- Research on over 200 Swiss organic farms

The World of Organic Agriculture 2023

- The 24th edition of «The World of Organic Agriculture», was published by FiBL and IFOAM – Organics International in February 2023.
- Data tables
- Country and continent reports
- Markets, standards, policy support
- The book can be ordered or downloaded at (item number 1254): https://www.fibl.org/en/shop-en

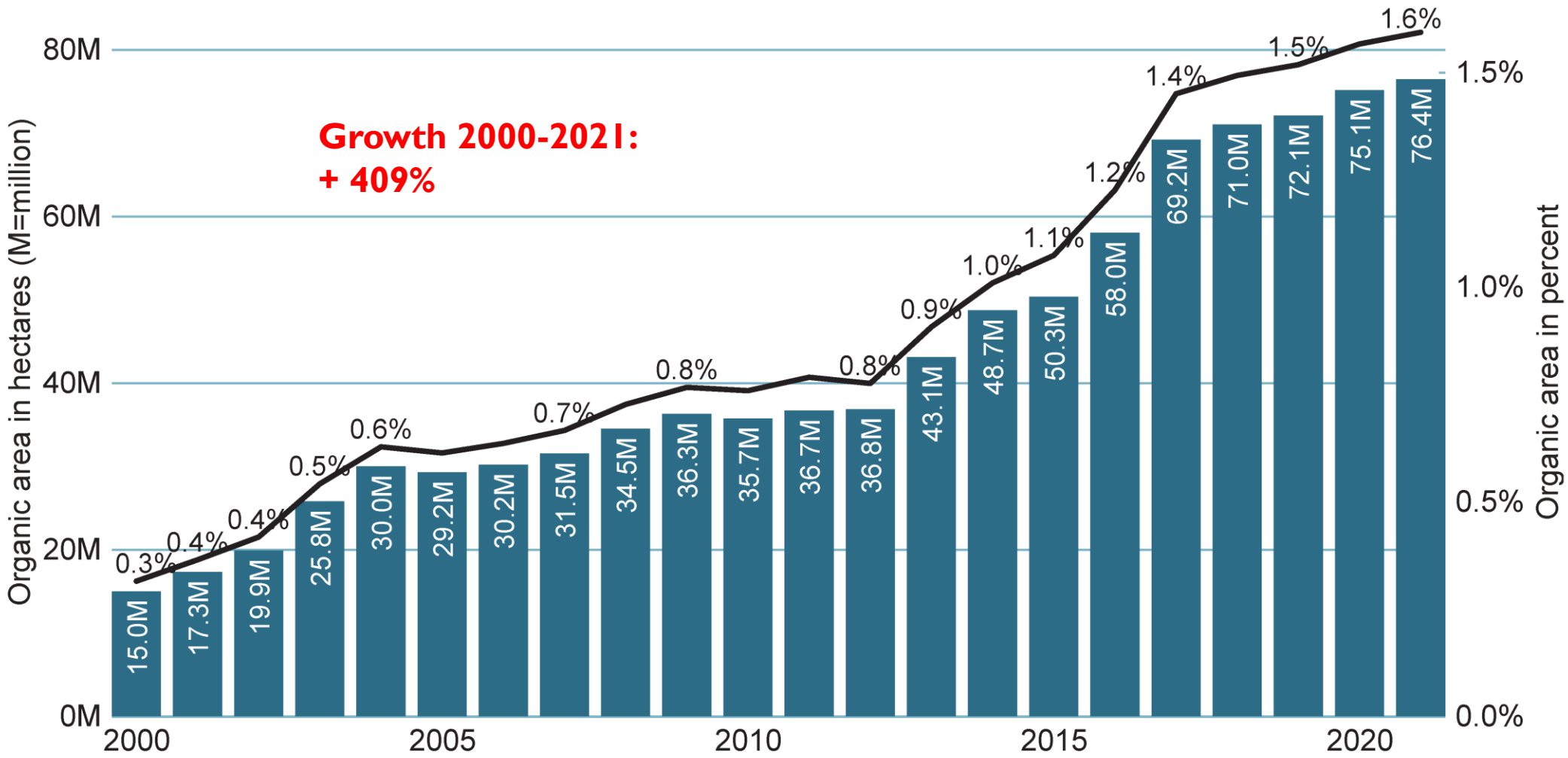


- www.organic-world.net
- https://statistics.fibl.org

Organic Agriculture Worldwide 2021: Production

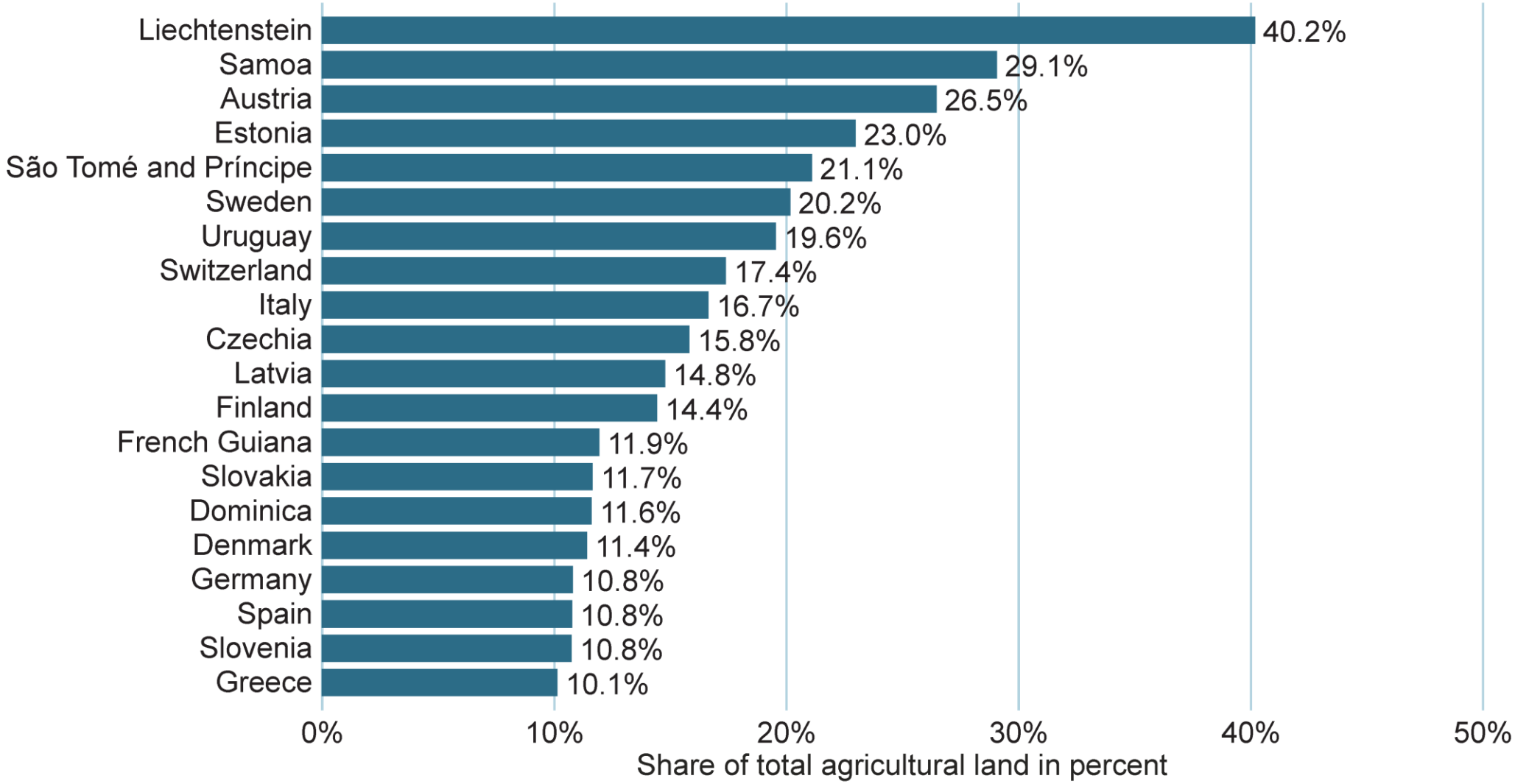
World: Growth of organic agricultural land and organic share 2000 - 2021

Source: FiBL-IFOAM-SOEL surveys 2001-2023



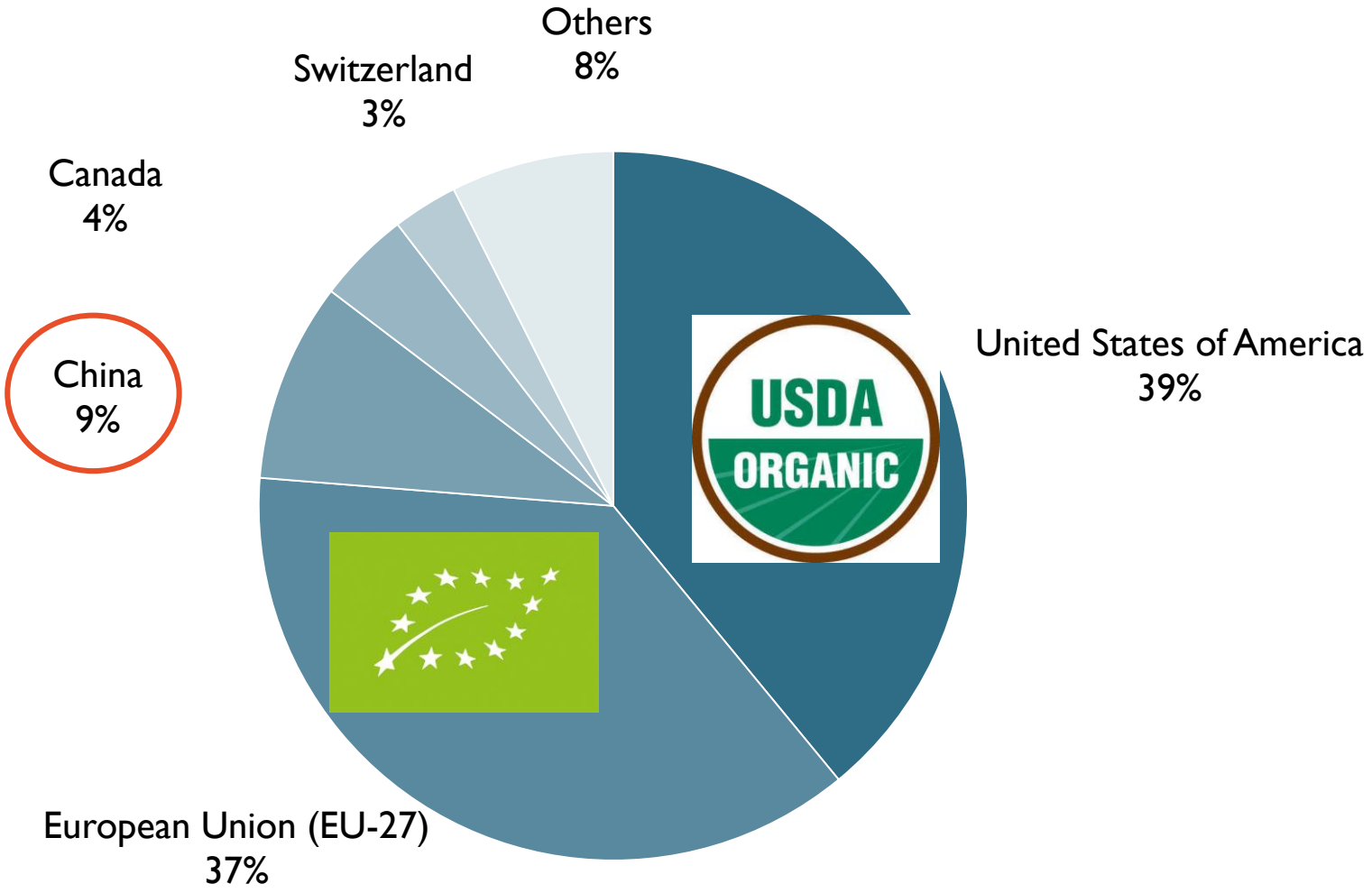
World: Countries with an organic share of the total agricultural land of at least 10 percent 2021

Source: FiBL survey 2023



Organic Agriculture Worldwide 2021: Consumption

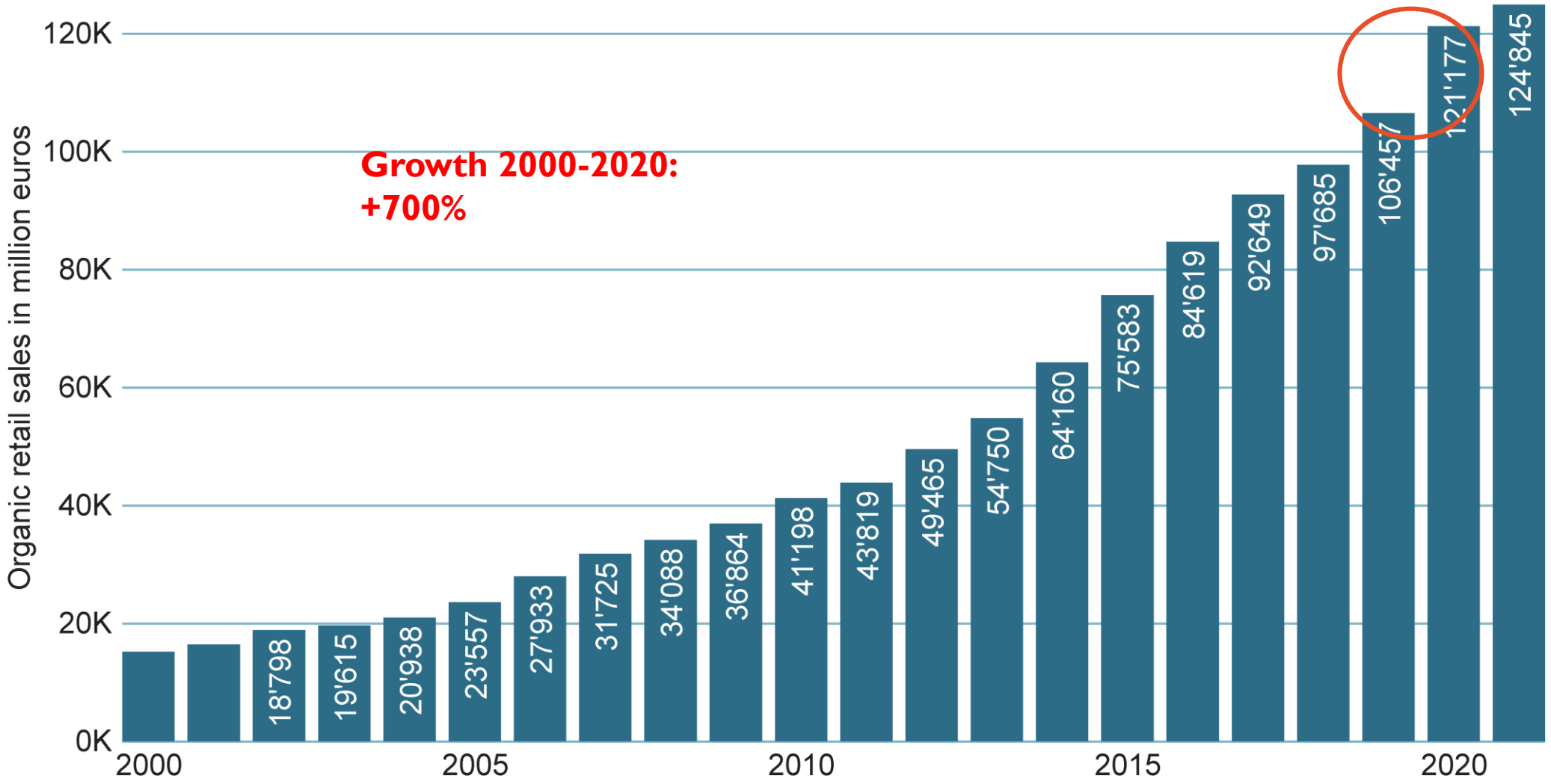
World: Distribution of retail sales by single market 2021
(Total: 126 billion euros)
Source: FiBL-AMI survey 2022



Distribution of retail sales

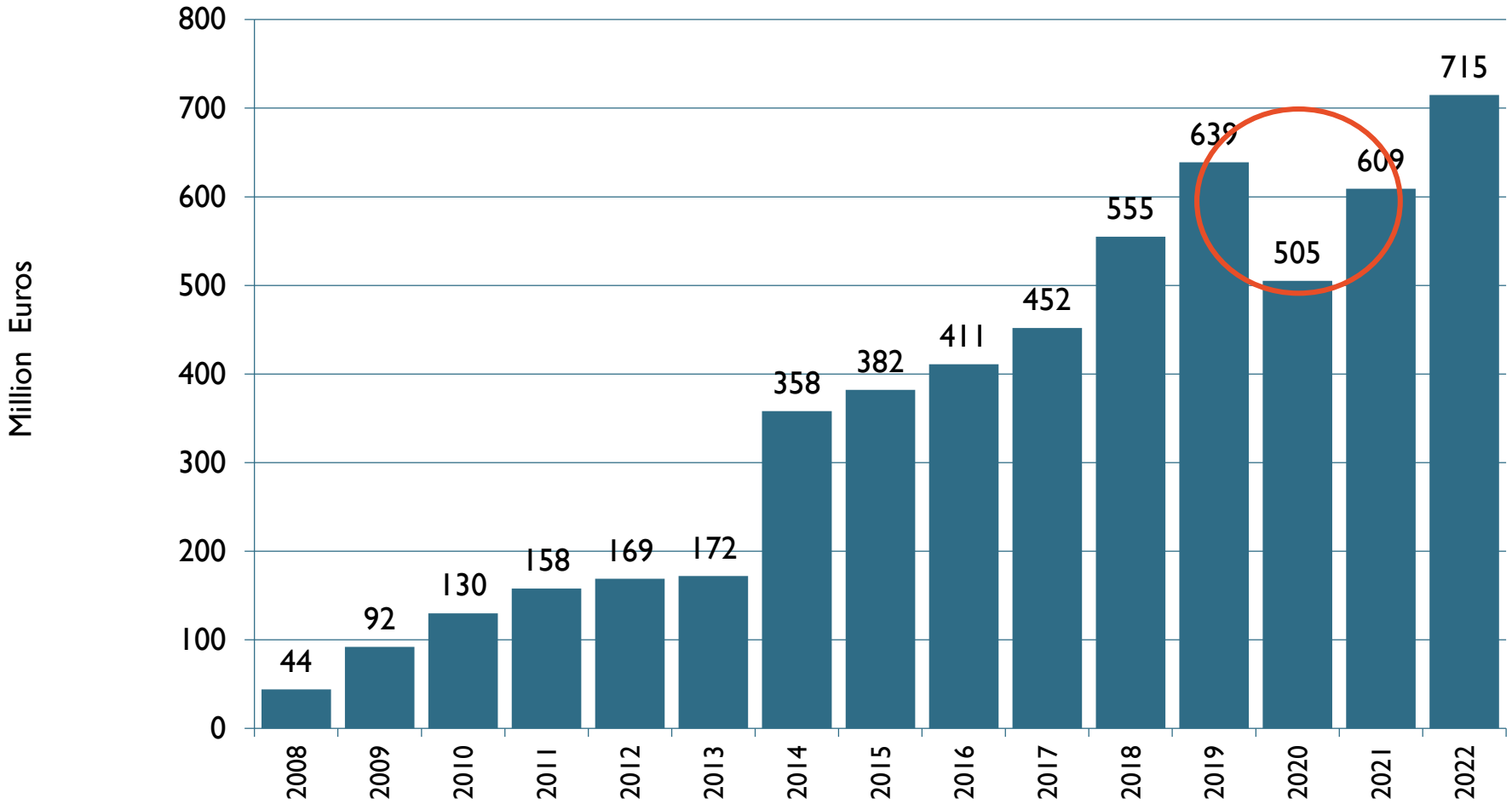
World: Growth of organic retail sales 2000 - 2021

Source: FiBL survey 2001-2023



Development of food service/Restaurants in France

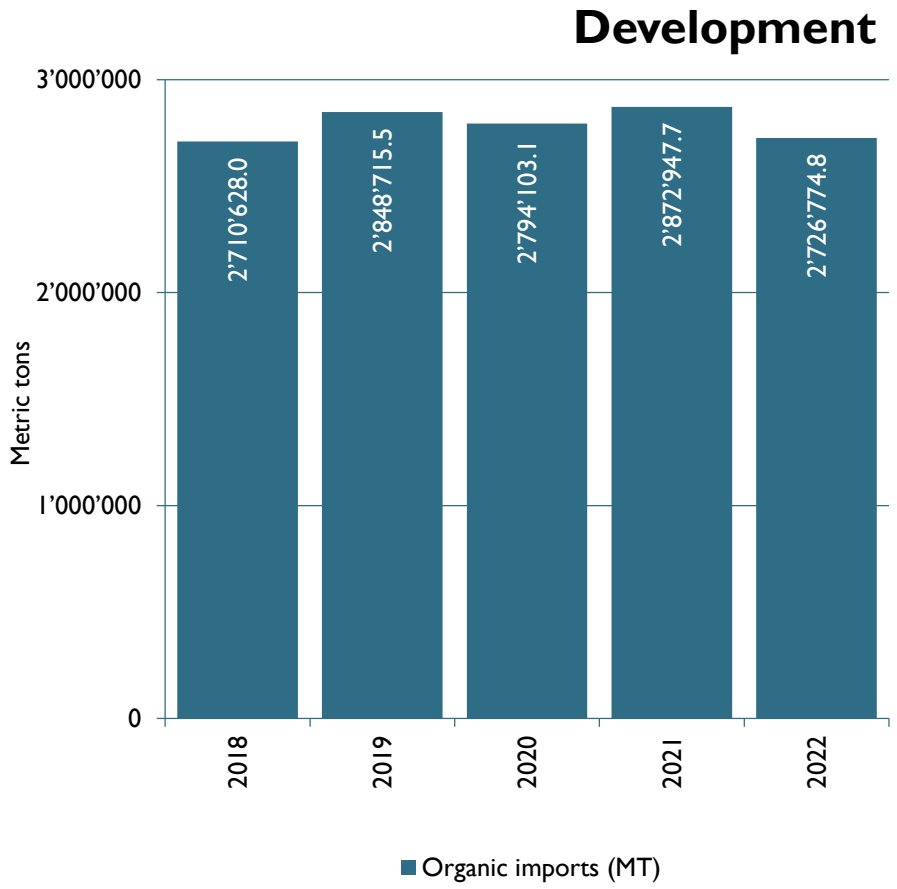
Source: Agence Bio



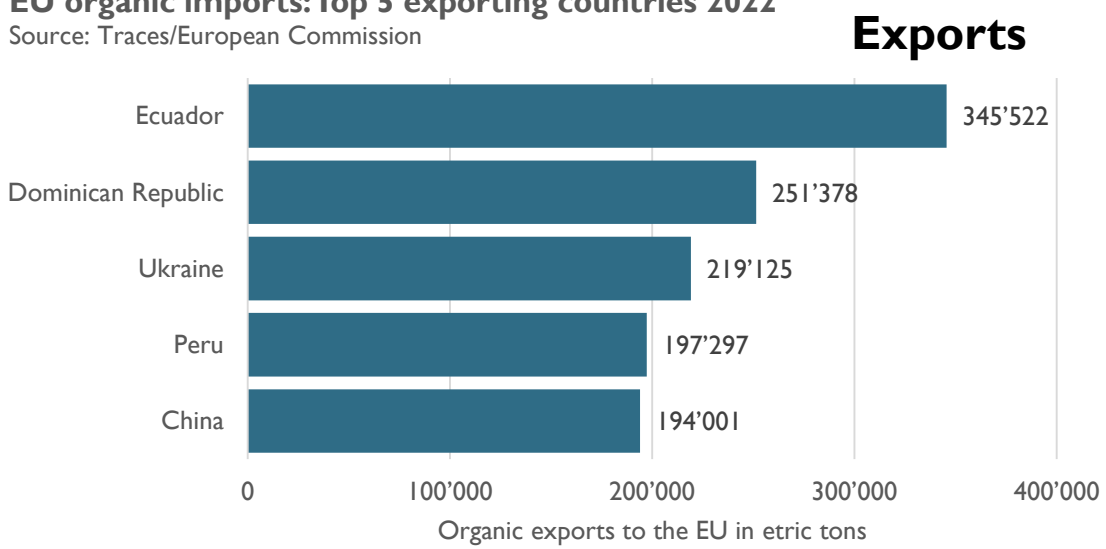
Trends in 2022

EU organic imports 2022

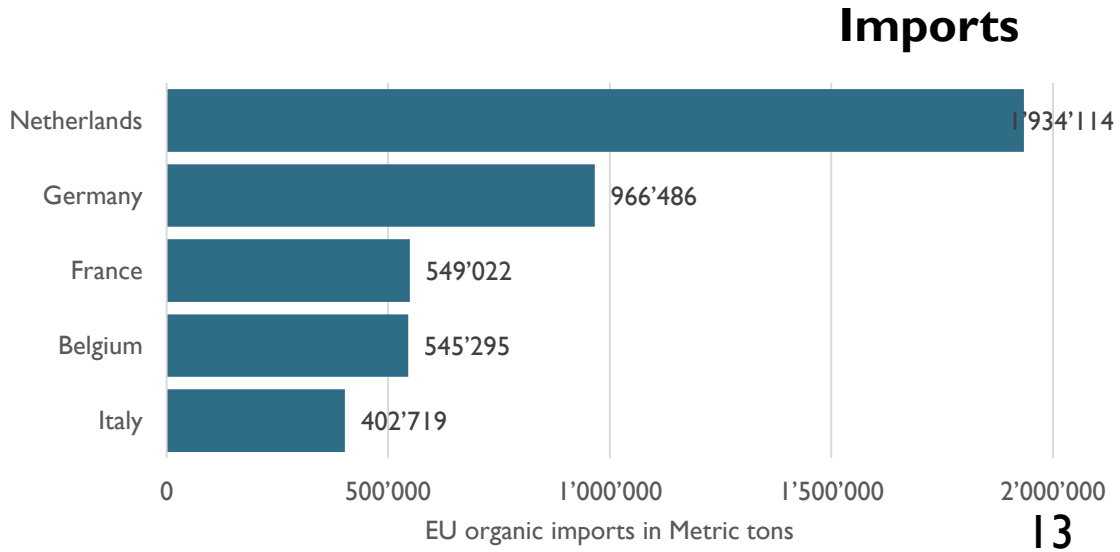
EU organic imports: Development 2018-2022
Source: Traces/European Commission



EU organic imports: Top 5 exporting countries 2022
Source: Traces/European Commission

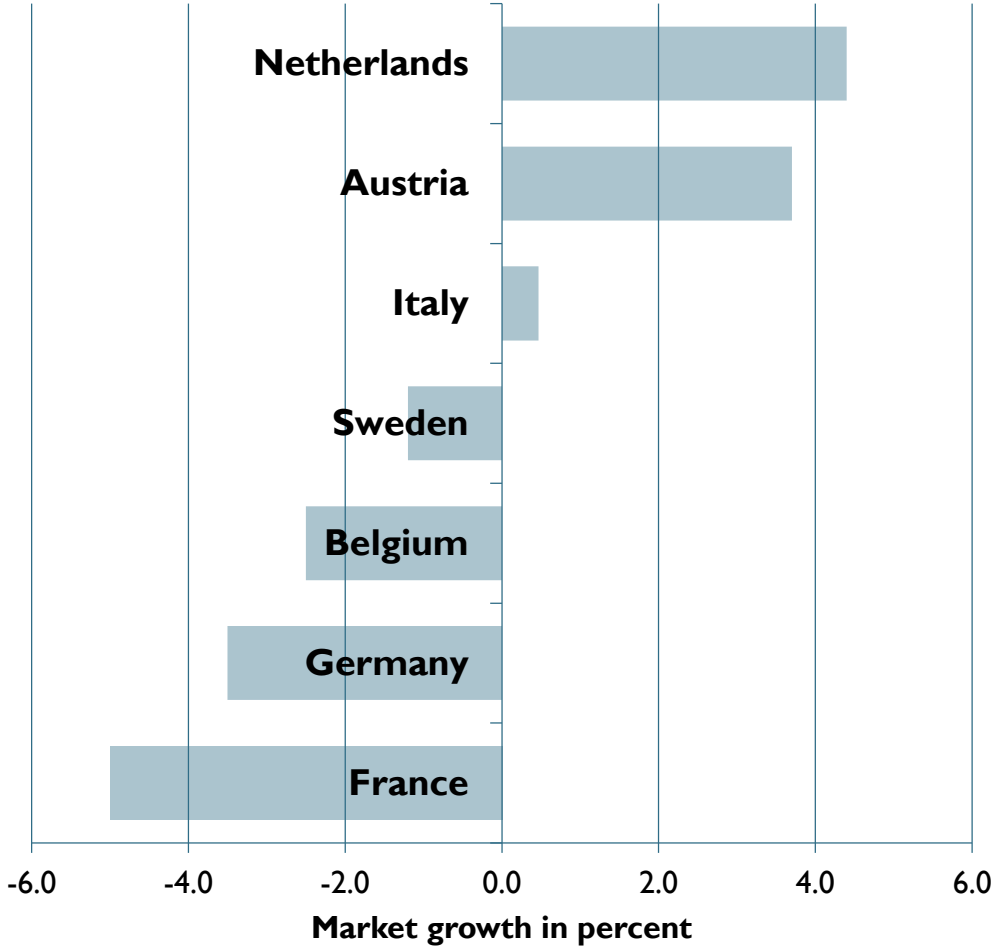


EU organic imports: Top 5 EU importers 2022
Source: Traces/European Commission



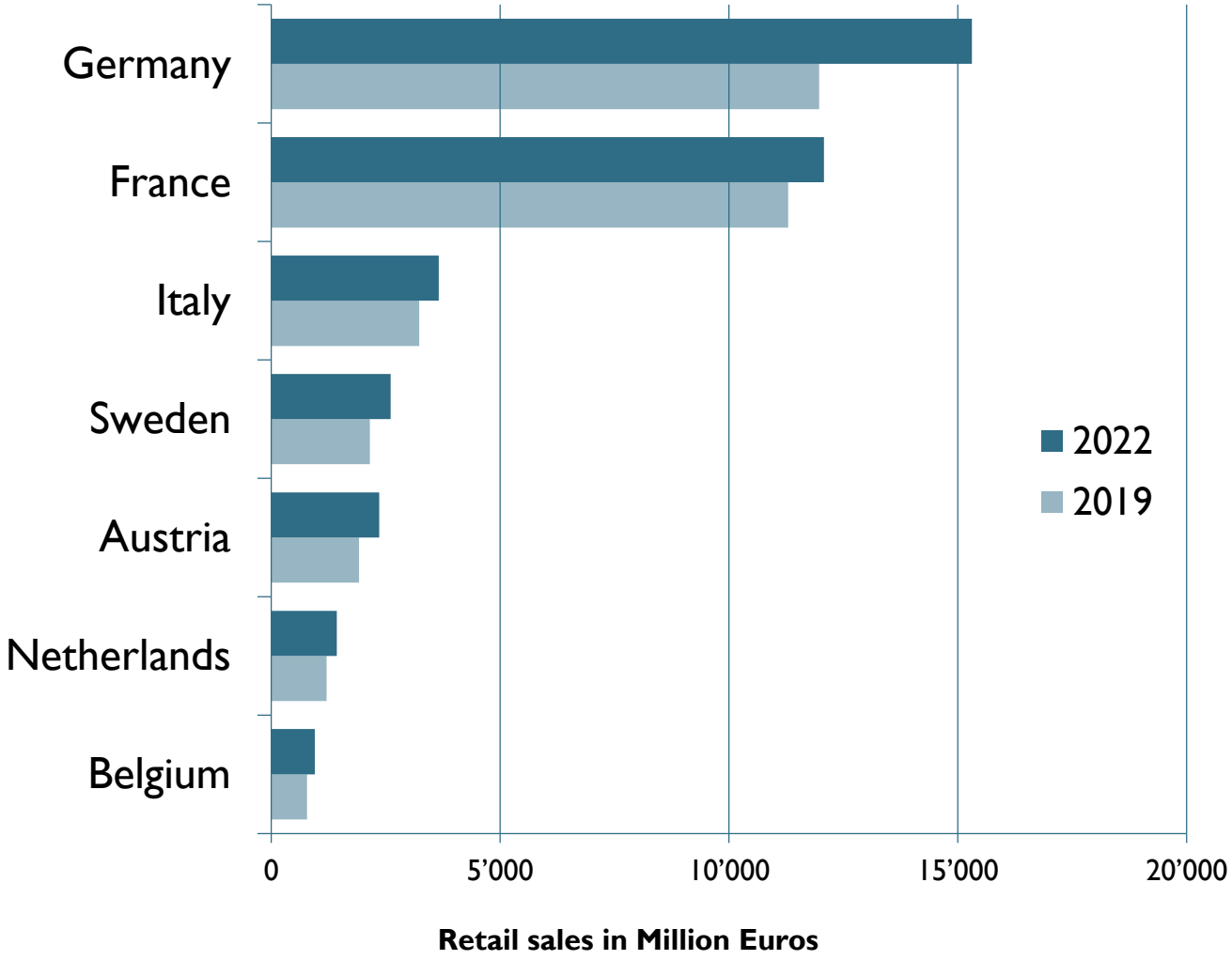
Market development 2022 in 7 EU Member States

Source: FiBL AMI survey 2023



EU market with 2022 data – 2019 and 2022 compared

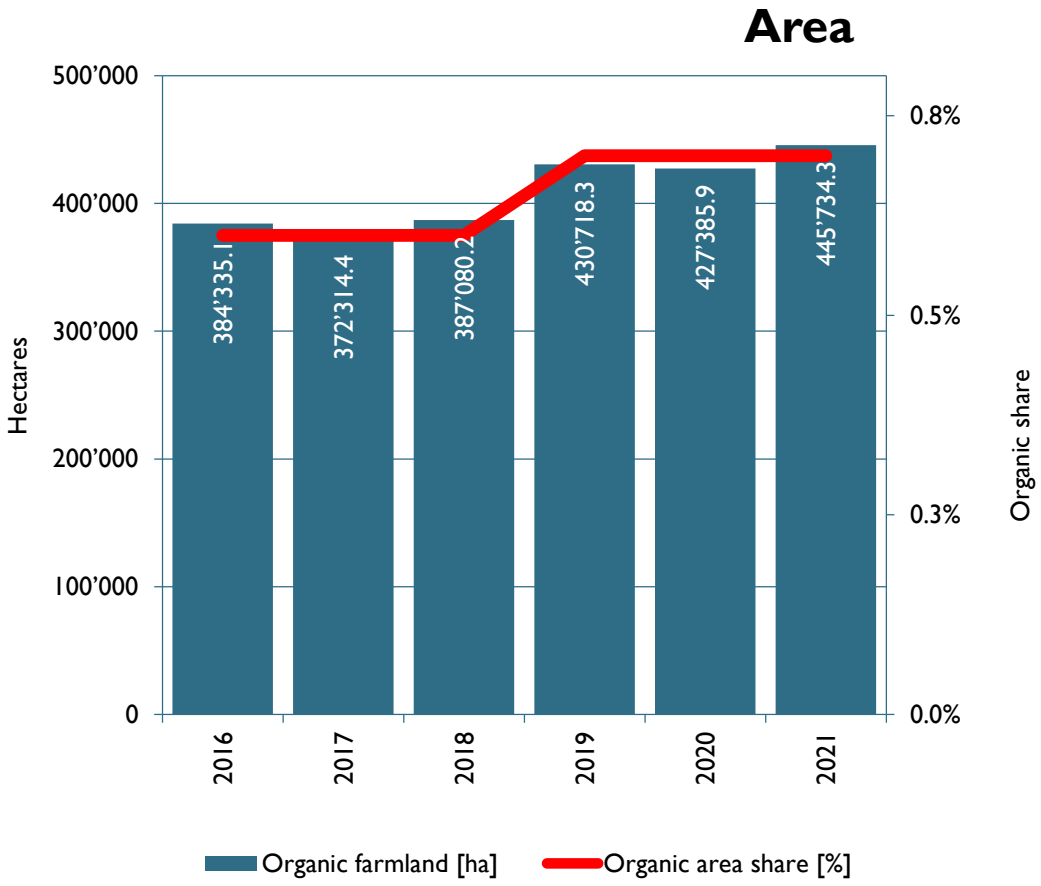
Source: FiBL AMI Survey 2023



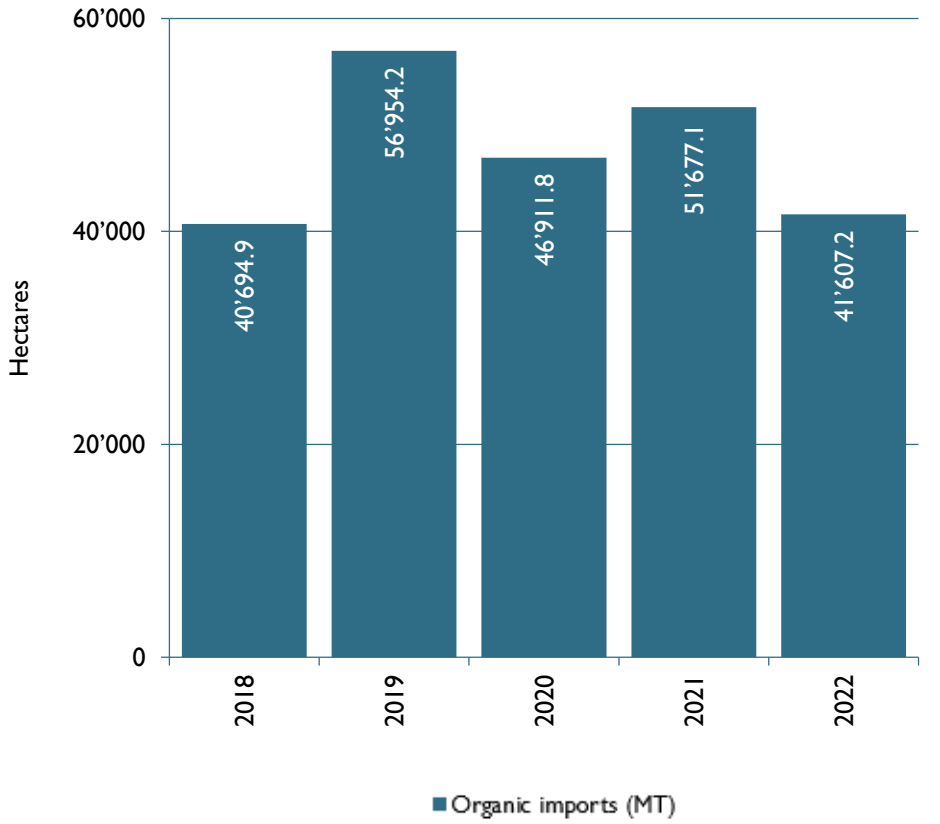
Organic fruit and vegetables

Organic vegetables: Area development, Top 5 countries

Organic vegetables: Organic farmland growth 2016-2021
Source: FiBL Survey



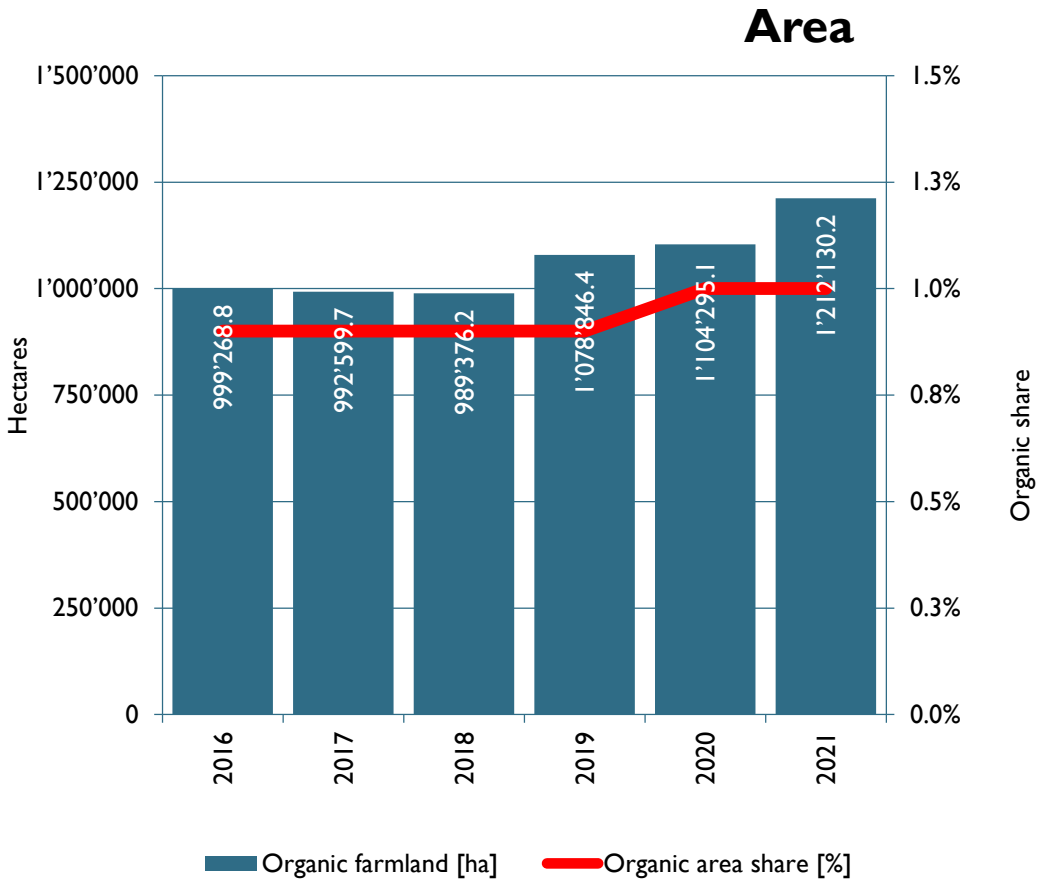
Organic vegetable EU imports (fresh and preserved): Development 2018-2022
Source: TRACES/European Commission



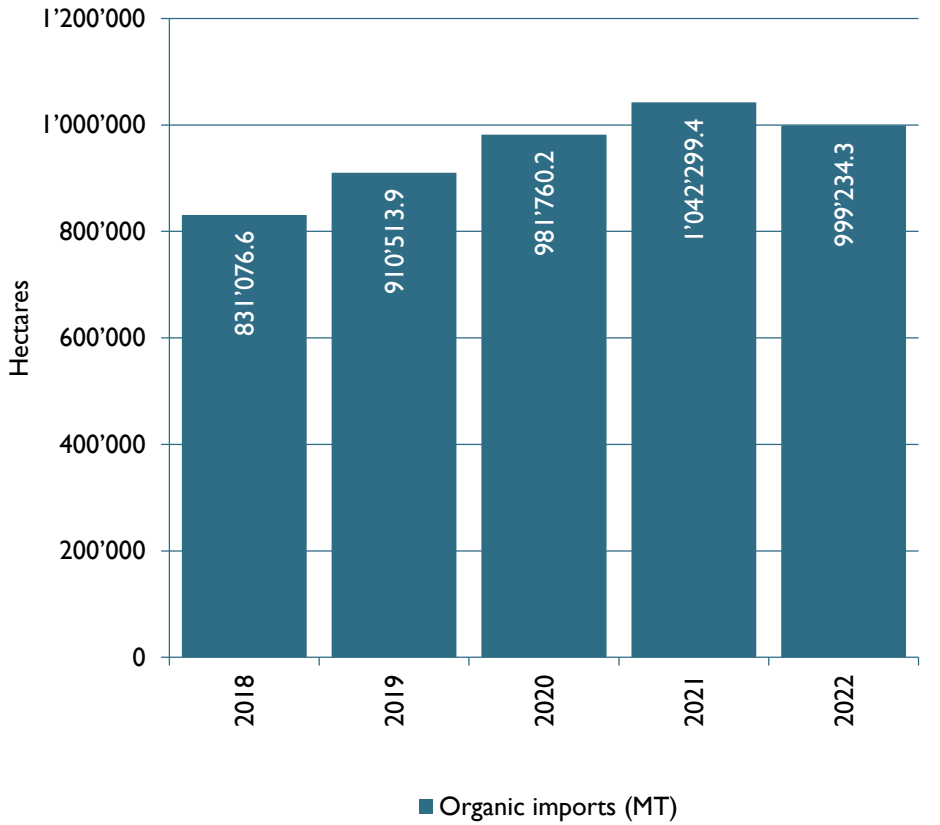
Organic fruit*: Area development, Top 5 countries

*** Fruit includes: Citrus fruit, temperate fruit, subtropical fruit**

Organic fruit: Organic farmland growth 2016-2021
Source: FiBL Survey



Organic fruit imports (fresh and preserved): Development 2018-2022
Source: TRACES/European Commission

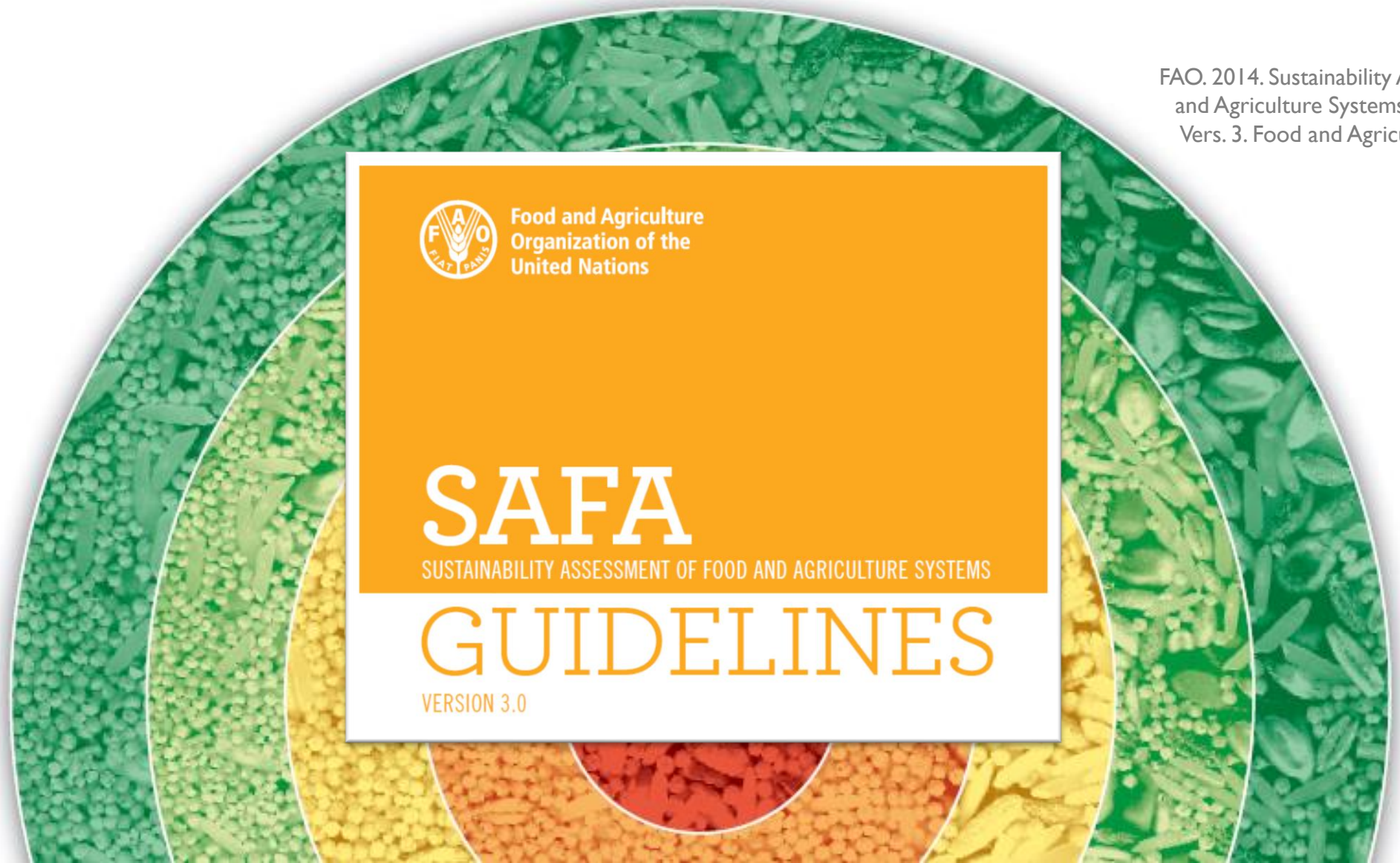


Conclusions from the market data

- The global organic farmland area, the market and exports/imports for organic have continued to grow over the past decades
- Higher growth rates were noted for organic fruit and vegetable compared to organic in general
- Organic fruit and vegetables are very popular among consumers. Their organic retail sales share can reach more than 10 % of total retail sales in some countries
- With the increasing importance of catering/food service, organic fruit and vegetable production and international trade with these products are expected to be boosted
- Current and future drivers: Increasing consumer demand and policy support (Farm to Fork)
- Inflation, the war in Ukraine, the energy crisis had a dampening effect on the organic market in 2022.
- Data that are available for some countries. showed a strong increase of food service in 2022, and a strong increase in food service is expected for the following years
- Outlook 2023: In Germany, the market steadily recovers. Since May 2023, the market has grown again and will probably end up at a similar level as 2021
- Data collection: Large need for better data!

Farm sustainability assessment using the SMART-Farm Tool

SMART-Farm sustainability framework



FAO. 2014. Sustainability Assessment of Food and Agriculture Systems (SAFA) Guidelines, Vers. 3. Food and Agricultural Organization (FAO), Rome.

SMART-Farm sustainability framework: SAFA

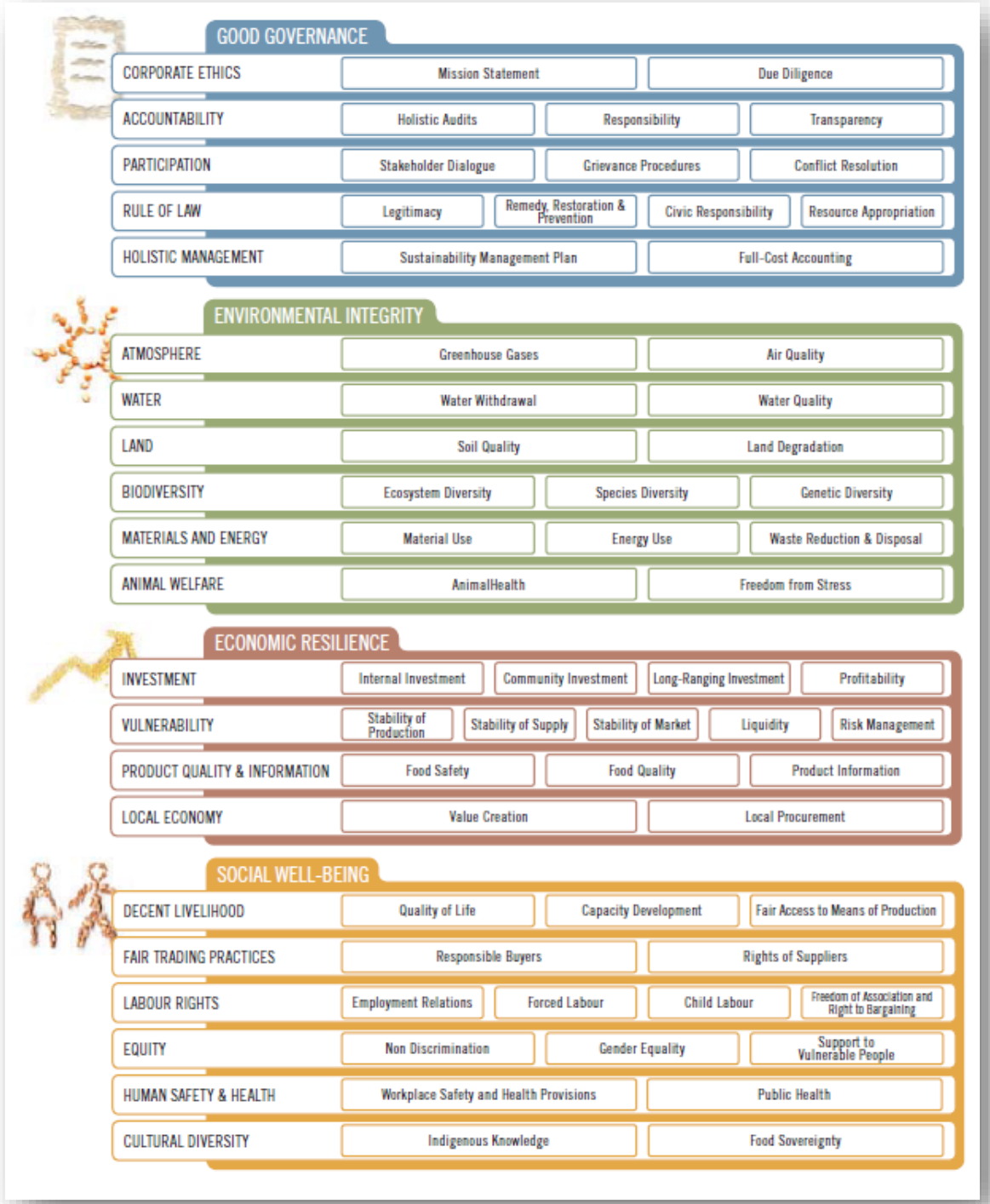
4 Dimensions

21 Themes

58 Subthemes

Objective, description and suggested indicators

- Quantitative/qualitative
- Target/practice/performance



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smart

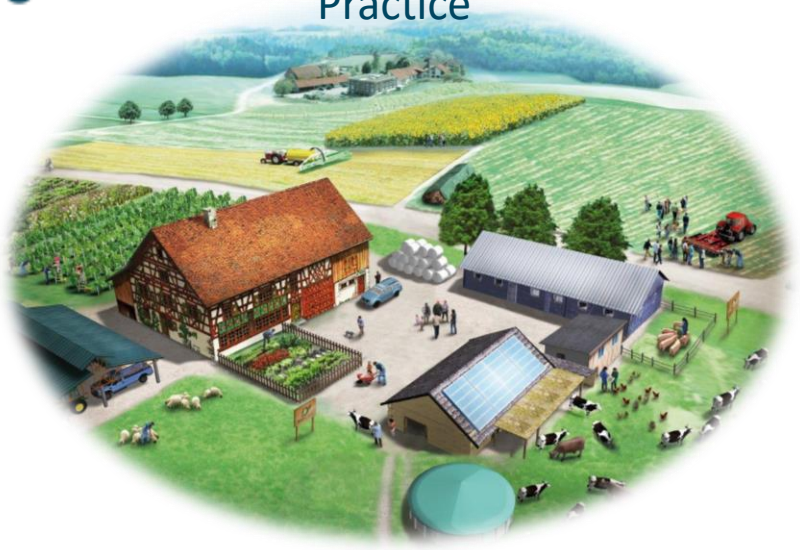
sustainability monitoring
and assessment routine

smart

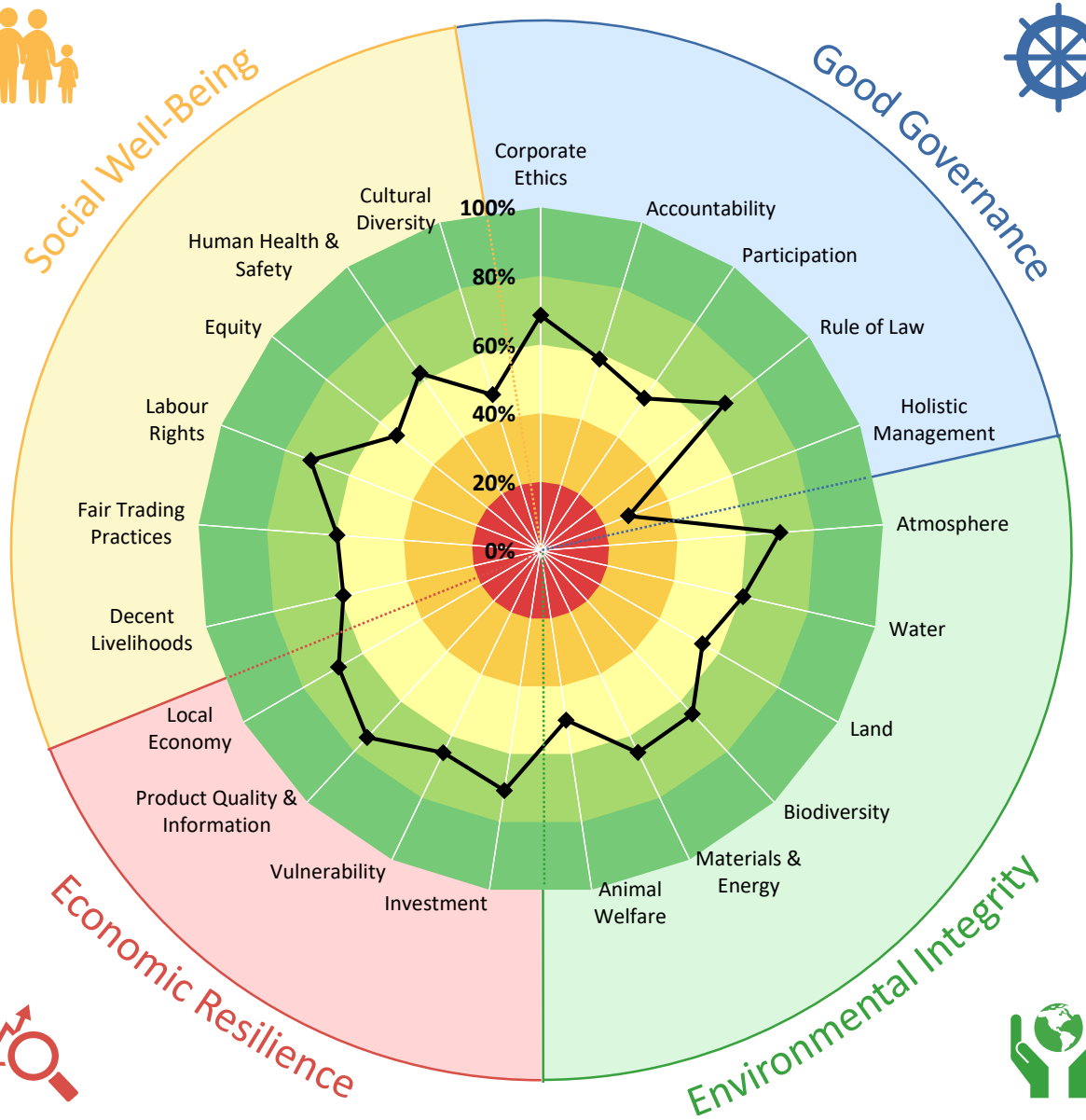
sustainability monitoring and assessment routine

SAFA theory

Practice

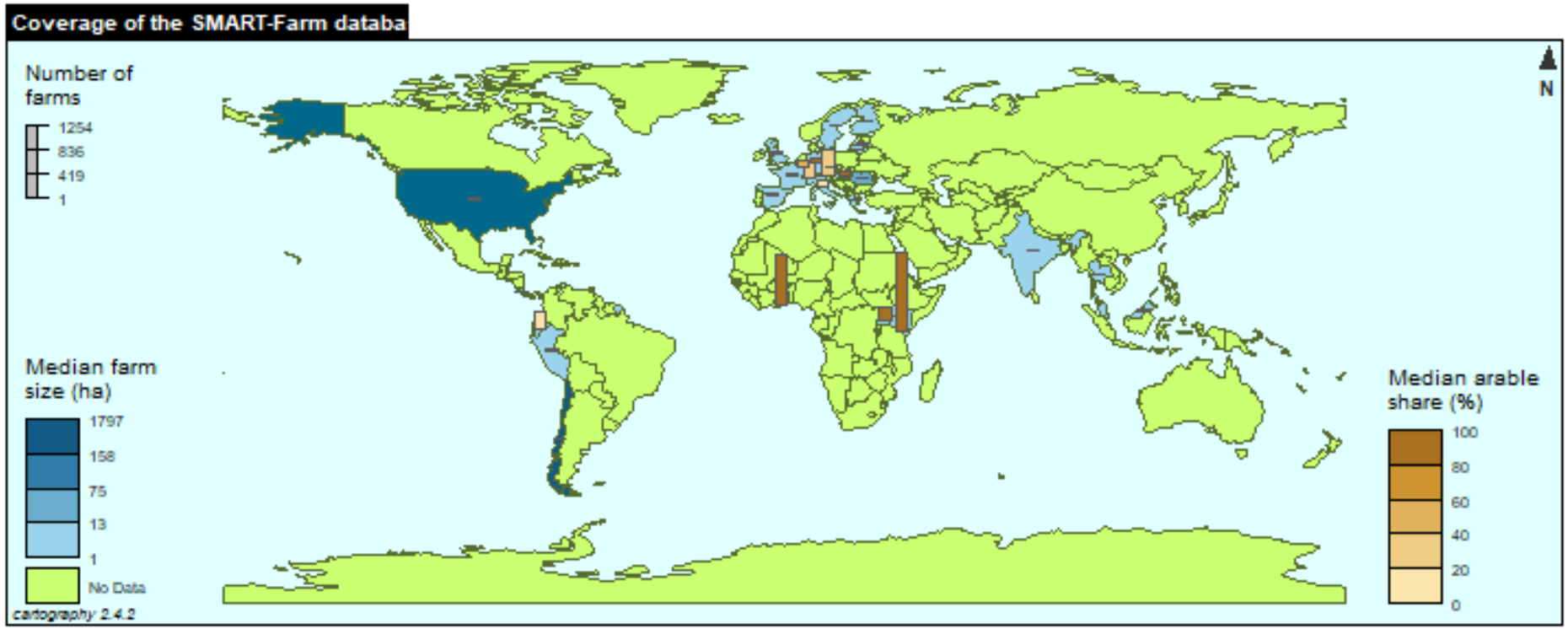


SMART-Farm: Results



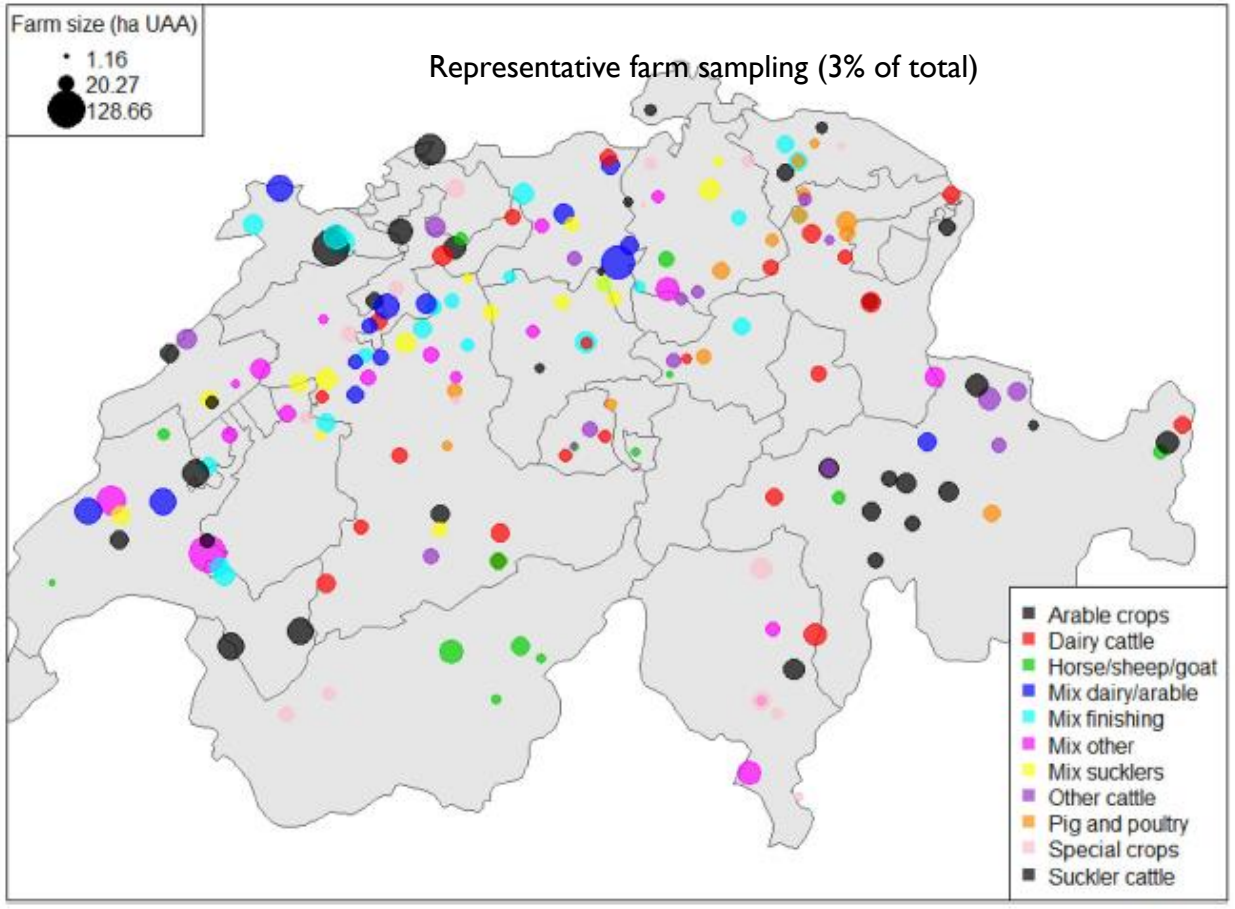
SMART-Farm: Applications

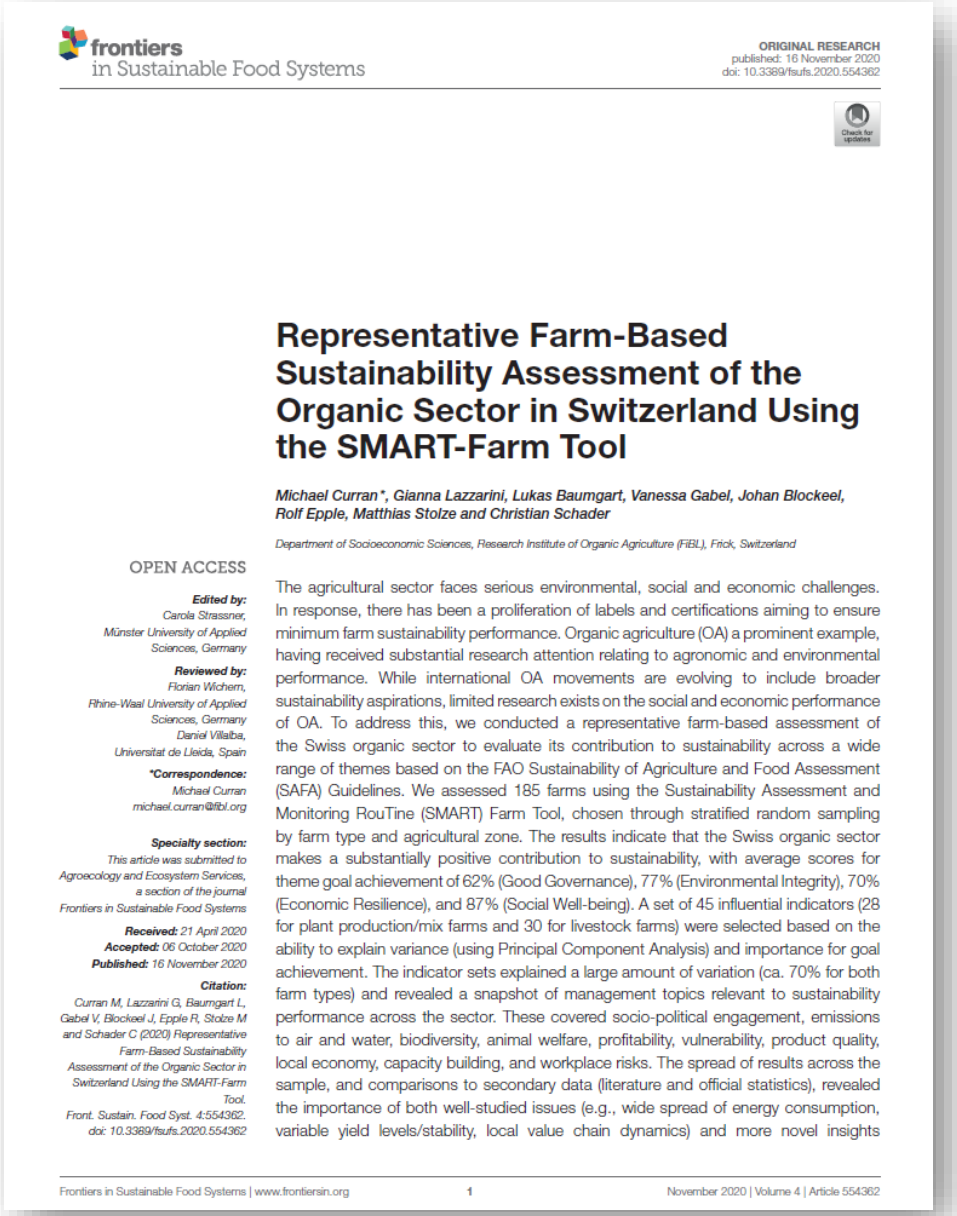
- More than 3‘500 farms assessed globally (as of 2020)
- 9 PhDs, 21 Master theses, numerous scientific papers



SMART-Farm: Case studies

The Swiss organic sector: How does it perform?





frontiers in Sustainable Food Systems

ORIGINAL RESEARCH
published: 16 November 2020
doi: 10.3389/fsufs.2020.554362

Representative Farm-Based Sustainability Assessment of the Organic Sector in Switzerland Using the SMART-Farm Tool

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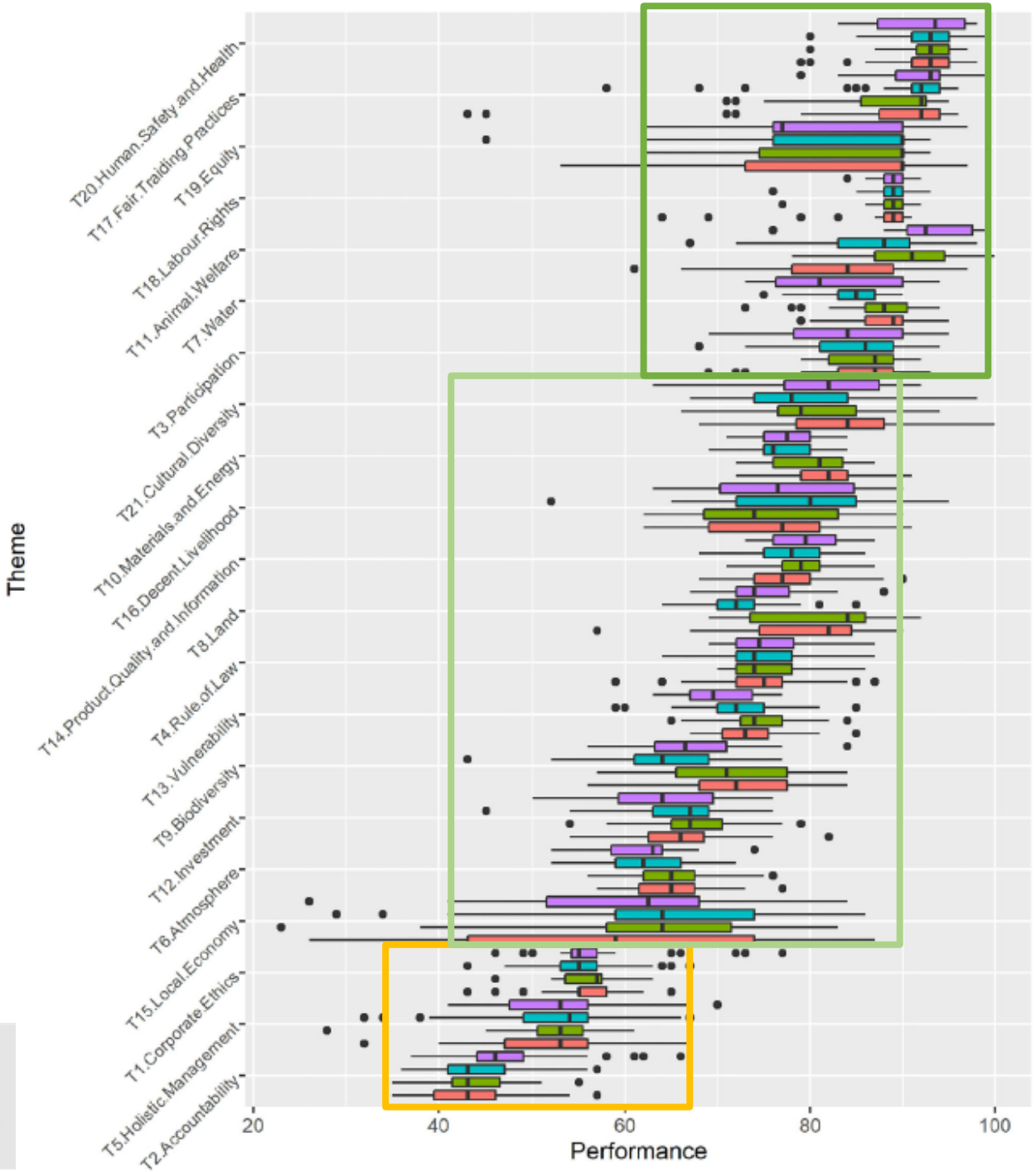
The agricultural sector faces serious environmental, social and economic challenges. In response, there has been a proliferation of labels and certifications aiming to ensure minimum farm sustainability performance. Organic agriculture (OA) a prominent example, having received substantial research attention relating to agronomic and environmental performance. While international OA movements are evolving to include broader sustainability aspirations, limited research exists on the social and economic performance of OA. To address this, we conducted a representative farm-based assessment of the Swiss organic sector to evaluate its contribution to sustainability across a wide range of themes based on the FAO Sustainability of Agriculture and Food Assessment (SAFA) Guidelines. We assessed 185 farms using the Sustainability Assessment and Monitoring RouTine (SMART) Farm Tool, chosen through stratified random sampling by farm type and agricultural zone. The results indicate that the Swiss organic sector makes a substantially positive contribution to sustainability, with average scores for theme goal achievement of 62% (Good Governance), 77% (Environmental Integrity), 70% (Economic Resilience), and 87% (Social Well-being). A set of 45 influential indicators (28 for plant production/mix farms and 30 for livestock farms) were selected based on the ability to explain variance (using Principal Component Analysis) and importance for goal achievement. The indicator sets explained a large amount of variation (ca. 70% for both farm types) and revealed a snapshot of management topics relevant to sustainability performance across the sector. These covered socio-political engagement, emissions to air and water, biodiversity, animal welfare, profitability, vulnerability, product quality, local economy, capacity building, and workplace risks. The spread of results across the sample, and comparisons to secondary data (literature and official statistics), revealed the importance of both well-studied issues (e.g., wide spread of energy consumption, variable yield levels/stability, local value chain dynamics) and more novel insights

Curran, M., G. Lazzarini, L. Baumgart, V. Gabel, J. Blockeel, R. Epple, M. Stolze, and C. Schader. 2020. Representative Farm-Based Sustainability Assessment of the Organic Sector in Switzerland Using the SMART-Farm Tool. Frontiers in Sustainable Food Systems 4.

The Swiss organic sector: How does it perform?

- Overall high performance across the sector
- Confirms organic as “sustainable” value chain
- High variability across farms
- Why the difference?



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Sustainability communication with SMART-Farm

- Coverage of the product range of "Back to the Origin" (Hofer/Aldi Süd)
- Breakdown of farm performance to product performance
- Product labelling of highly performing subthemes

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"Bottom-up" sustainability assessment: Deliberative Diets project

- Co-creating and prioritizing criteria with producers (olives, ES, cocoa, EC)
- Working with a "citizen's jury" of consumers in Switzerland to evaluate findings
- Developing visions/policy recommendations

https://www.deliberative-diets.net/

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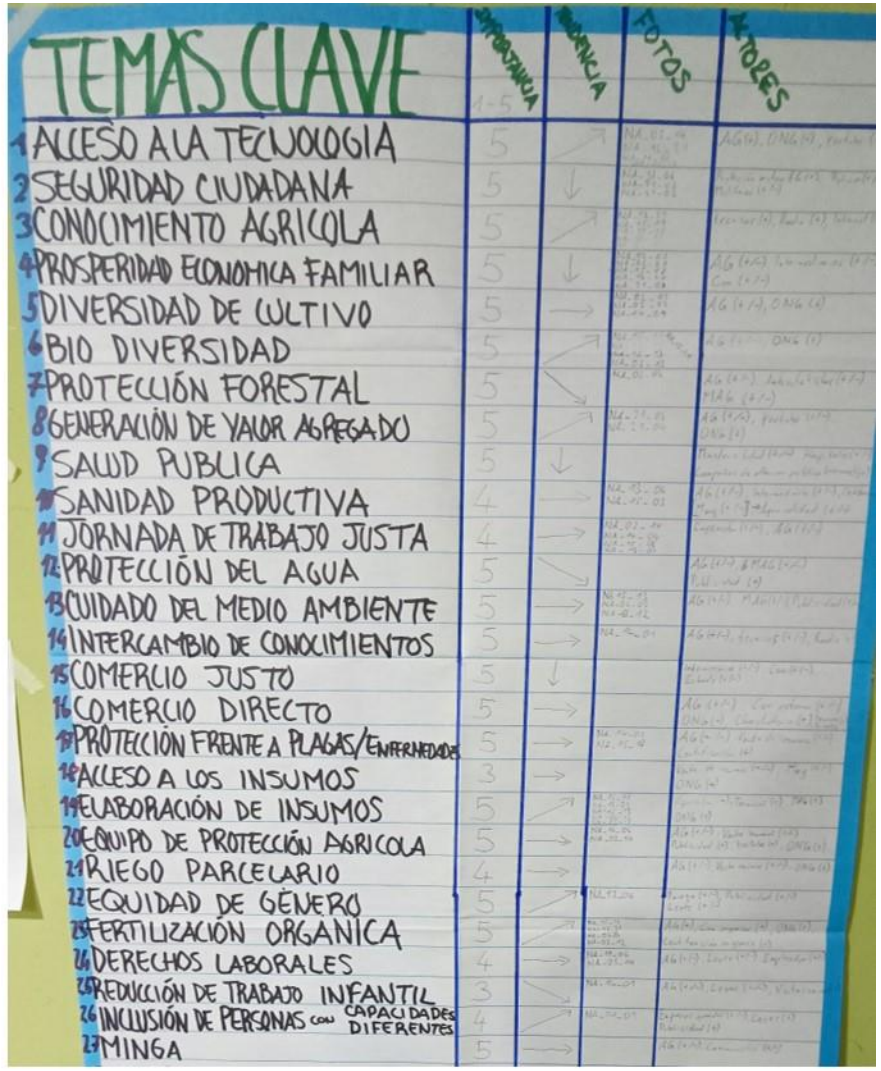

TEMAS CLAVE
IMPORTANCIA
TENDENCIA
FOTOS
ACTORES
1 ACCESO A LA TECNOLOGIA
2 SEGURIDAD CIUDADANA
3 CONOCIMIENTO AGRICOLA
4 PROSPERIDAD ECONOMICA FAMILIAR
5 DIVERSIDAD DE CULTIVO
6 BIO DIVERSIDAD
7 PROTECCIÓN FORESTAL
8 GENERACIÓN DE VALOR AGREGADO
9 SALUD PUBLICA
10 SANIDAD PRODUCTIVA
11 JORNADA DE TRABAJO JUSTA
12 PROTECCIÓN DEL AGUA
13 CUIDADO DEL MEDIO AMBIENTE
14 INTERCAMBIO DE CONOCIMIENTOS
15 COMERCIO JUSTO
16 COMERCIO DIRECTO
17 PROTECCIÓN FRENTE A PLAGAS/ENFERMEDADES
18 ACCESO A LOS INSUMOS
19 ELABORACIÓN DE INSUMOS
20 EQUIPO DE PROTECCIÓN AGRICOLA
21 RIEGO PARCELARIO
22 EQUIDAD DE GÉNERO
23 FERTILIZACIÓN ORGANICA
24 DERECHOS LABORALES
25 REDUCCIÓN DE TRABAJO INFANTIL
26 INCLUSIÓN DE PERSONAS con CAPACIDADES DIFERENTES
27 MINGA

① TE-327

Trabajadora

EXTRACTO:

- Madrugadora con alegria de animo
- Trabajando con machete en movimiento traigional en el campo cortando lleña
- La Señora limpiando platanera para crecer con animo que le producto mas grande

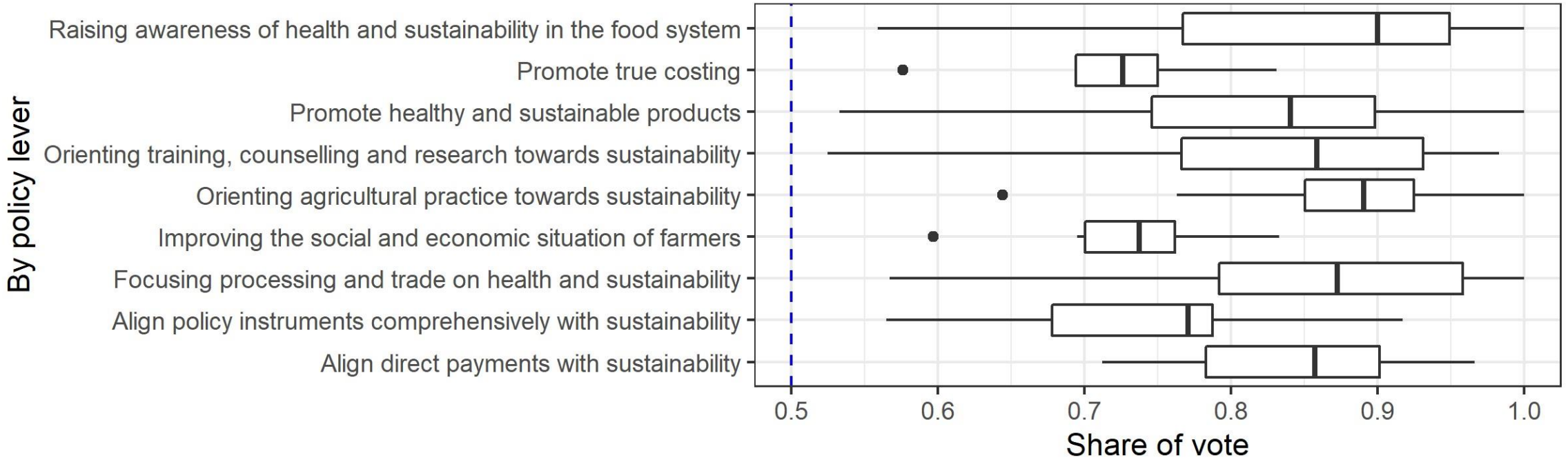
Ficha Hemerografica

FORMA VERGEL UG-16A

https://www.buergerinnenrat.ch/

"Bottom-up" sustainability assessment: Deliberative Diets project

- Switzerland concluded first "**citizen's assembly**" on food sustainability
- Wide-reaching recommendations across the policy spectrum



SMART-Farm Tool in short…

Reliable identification of sustainability risks and hotspots

Supply chain sustainability, supplier monitoring

Credible and authentic sustainability communication

Deliberative Diets

Engaging producers and consumers to co-create a sustainable food future for Switzerland

Financed by: Swiss National Science Foundation

www.deliberativediets.org

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WSL

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Thank you for your attention!

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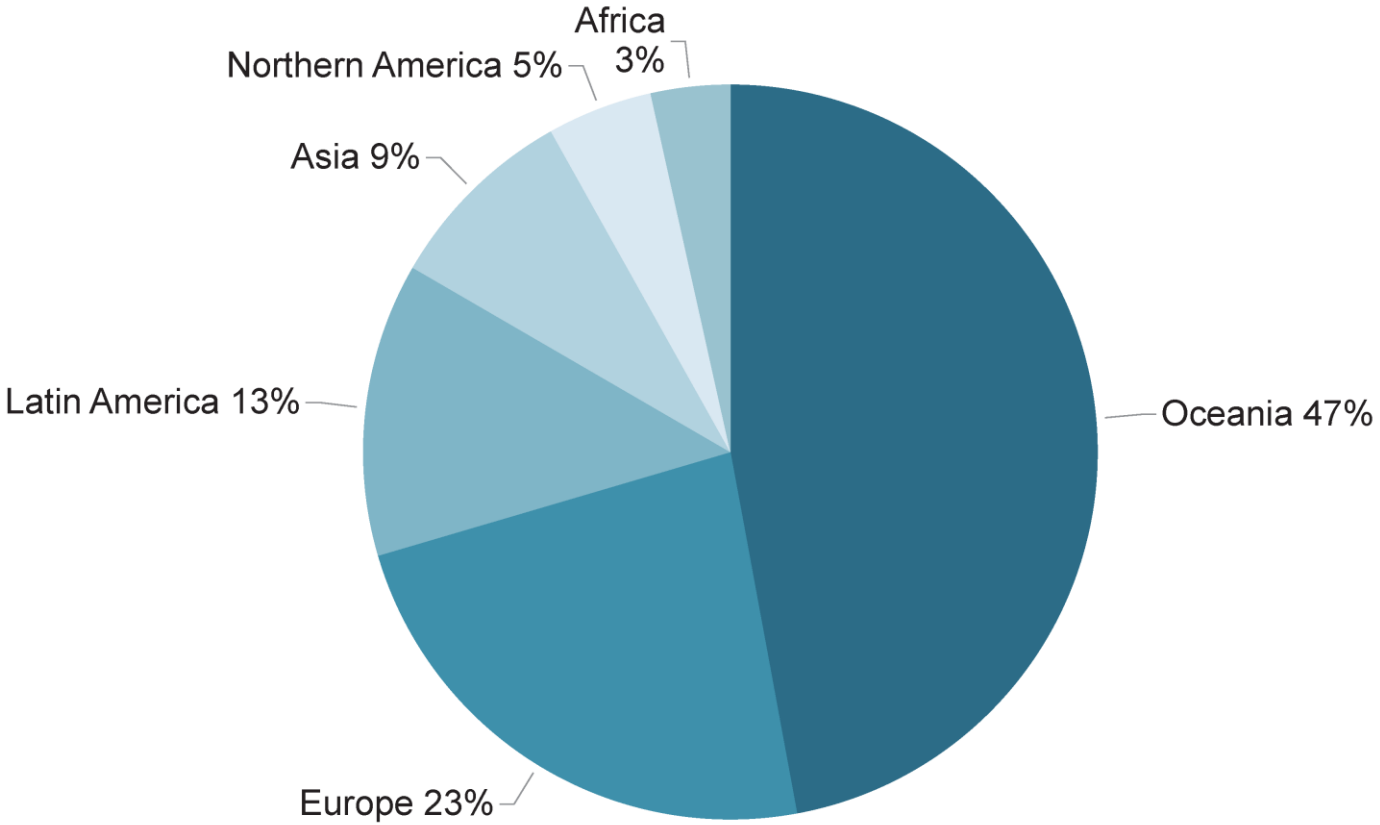
- Socioeconomic Sciences
- International Cooperation
- Extension, Training & Communication
- Suisse Romande
- Finances, Resources & Administration

World: Distribution of organic agricultural land by region 2021

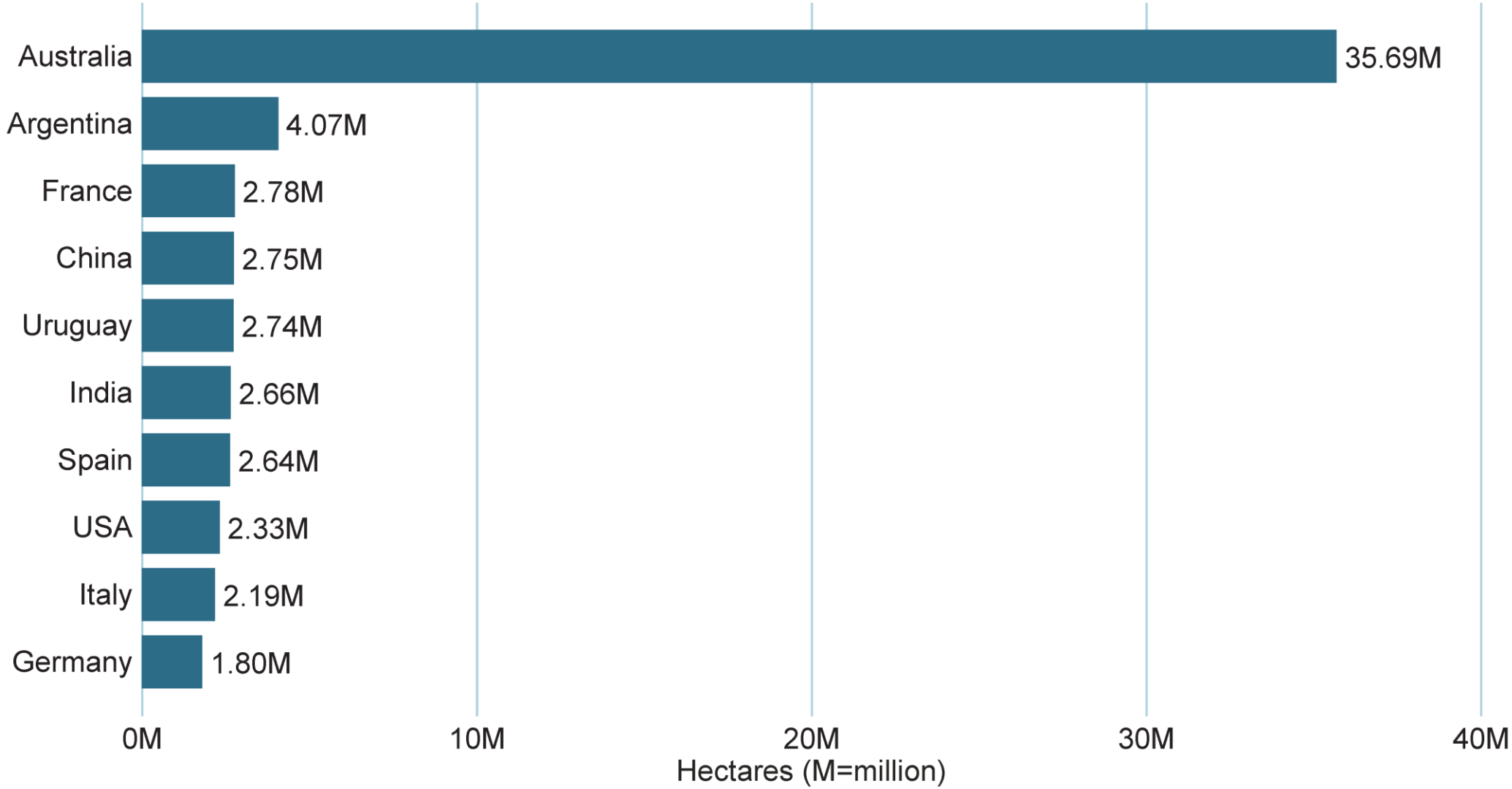
Source: FiBL survey 2023



Distribution of organic farmland by region 2021

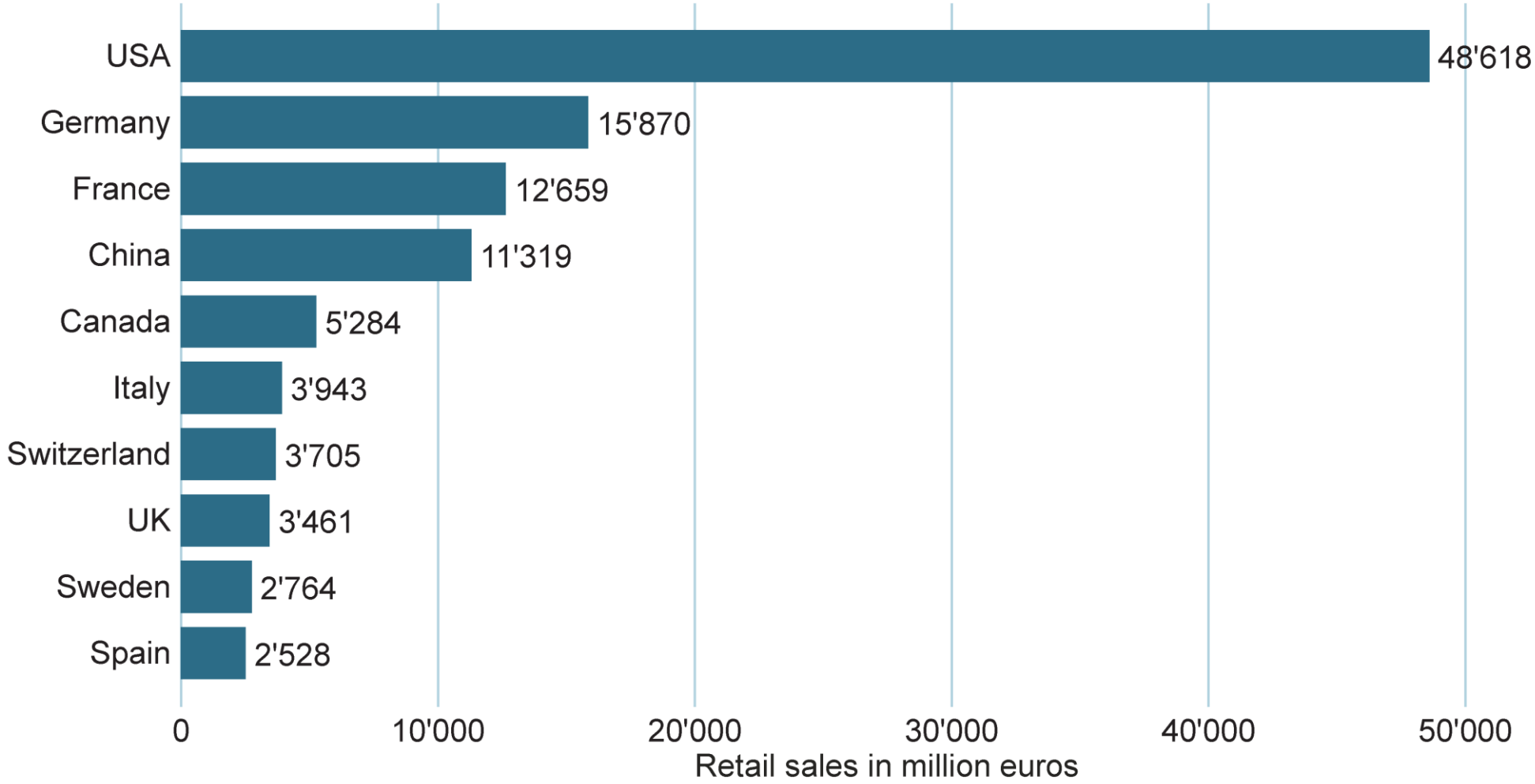
World: The ten countries with the largest areas of organic agricultural land 2021

Source: FiBL survey 2023



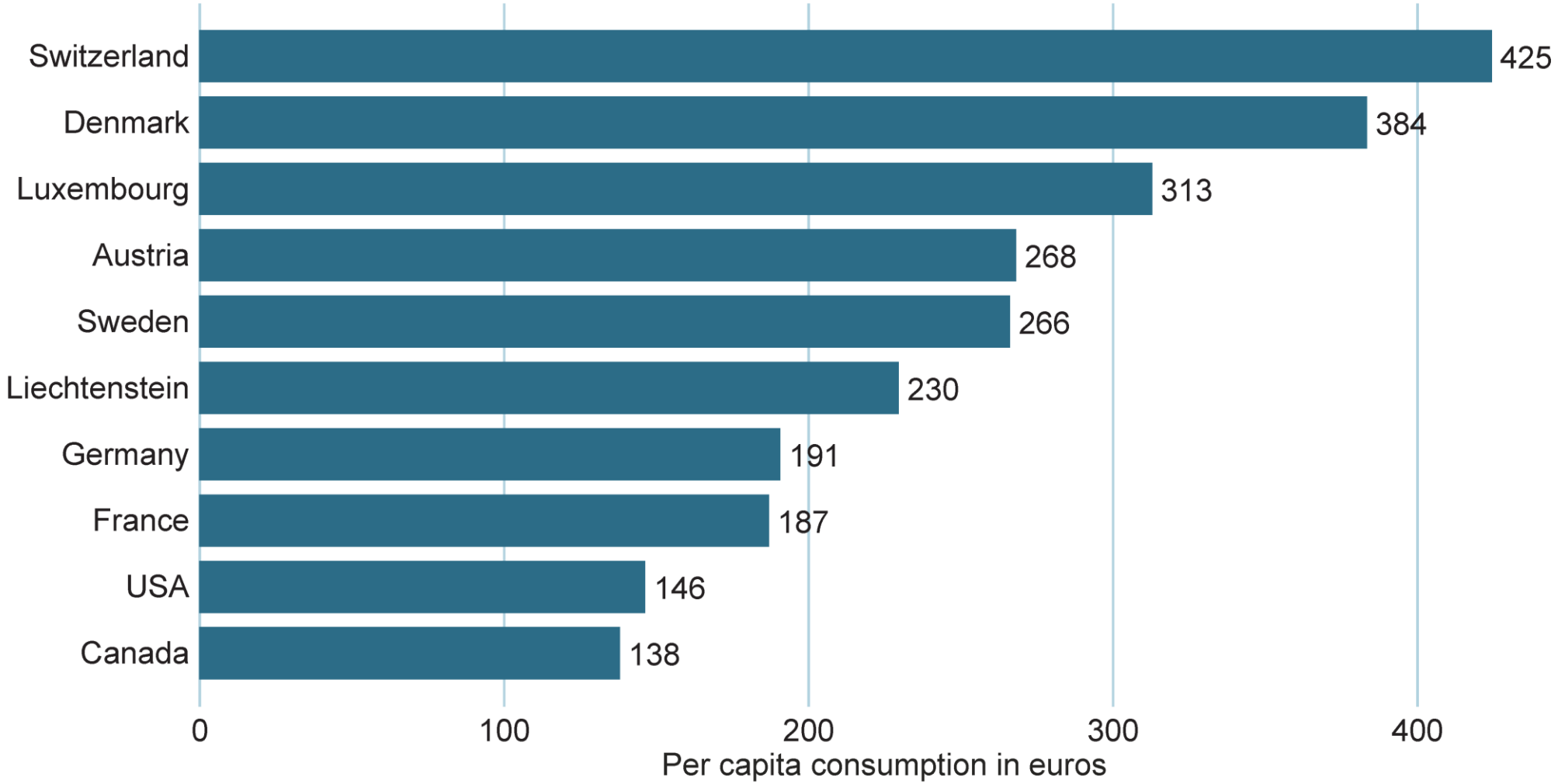
World: The countries with the largest markets for organic food 2021

Source: FiBL-AMI survey 2023



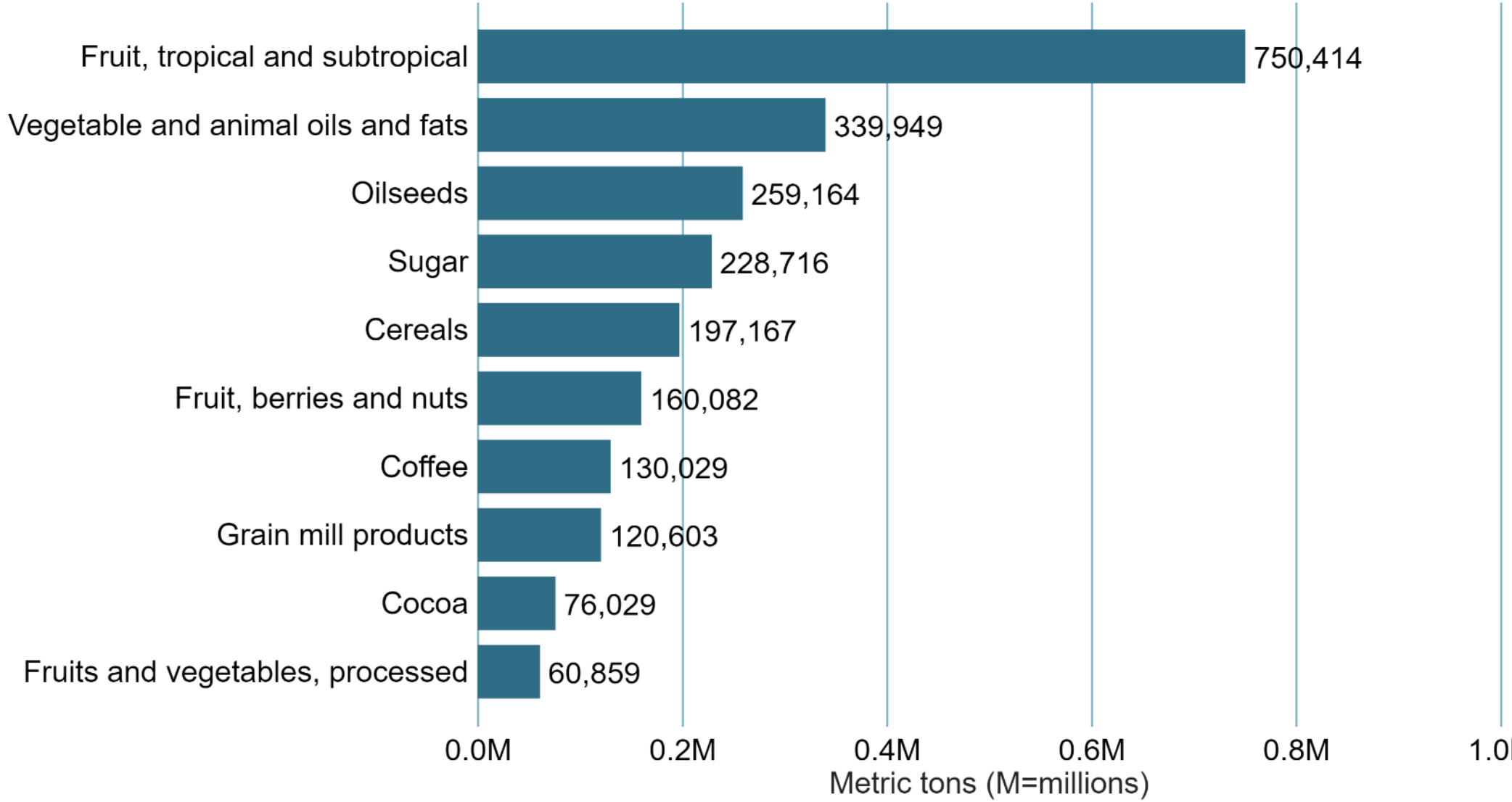
World: The ten countries with the highest per capita consumption 2021

Source: FiBL-AMI survey 2023



European Union: Main product categories of EU organic agri-food imports 2020

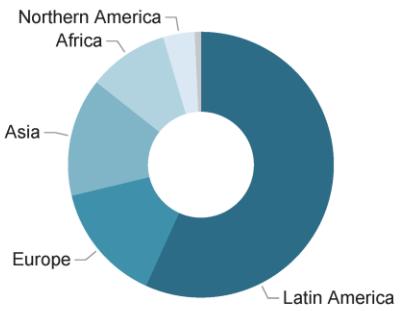
Source: Traces/European Commission 2021



US AND EU ORGANIC IMPORTS 2021

World
4.7M
metric tons

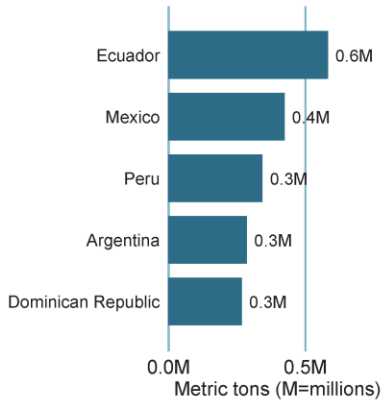
While the European Union imported nearly 2.9 million MT; the US imported over 1.8 million MT. By region, Latin America had the lead in export (2.7 million MT) followed by Europe (0.7 million MT) and Asia (0.7 million MT).



Distribution of organic imports by region 2021.

Ecuador
584K
metric tons

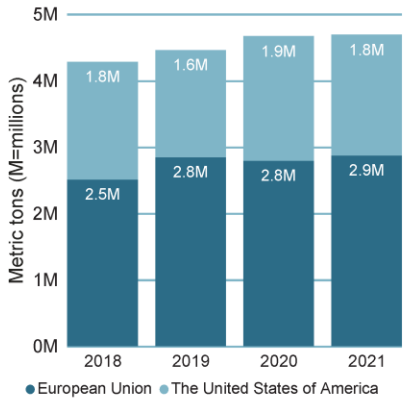
The country with the largest export volume was Ecuador, followed by Mexico and Peru.



The five countries with the largest organic exports 2021.

0.5%
percent increase in 2021

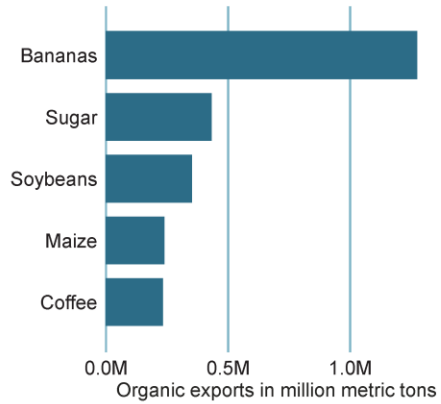
Organic imports to the U.S.* decreased by 3% and increased by 2.8% to the European Union.



Growth of imports in MT by region.

Bananas
1.3M
metric tons

The top commodities were bananas (1.3 million MT), sugar (0.4 million MT) and soybeans (0.4 million MT).



Top 5 commodities imported in 2021.

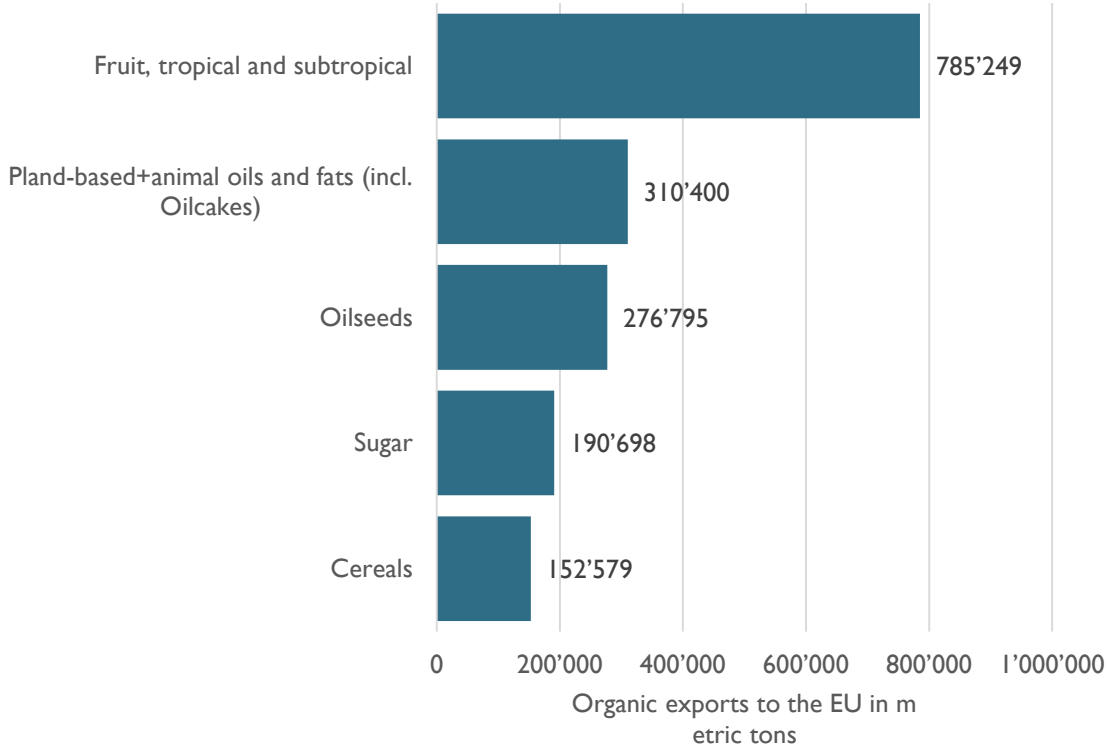
*US organic imports: selected commodities only

FiBL www.fibl.org

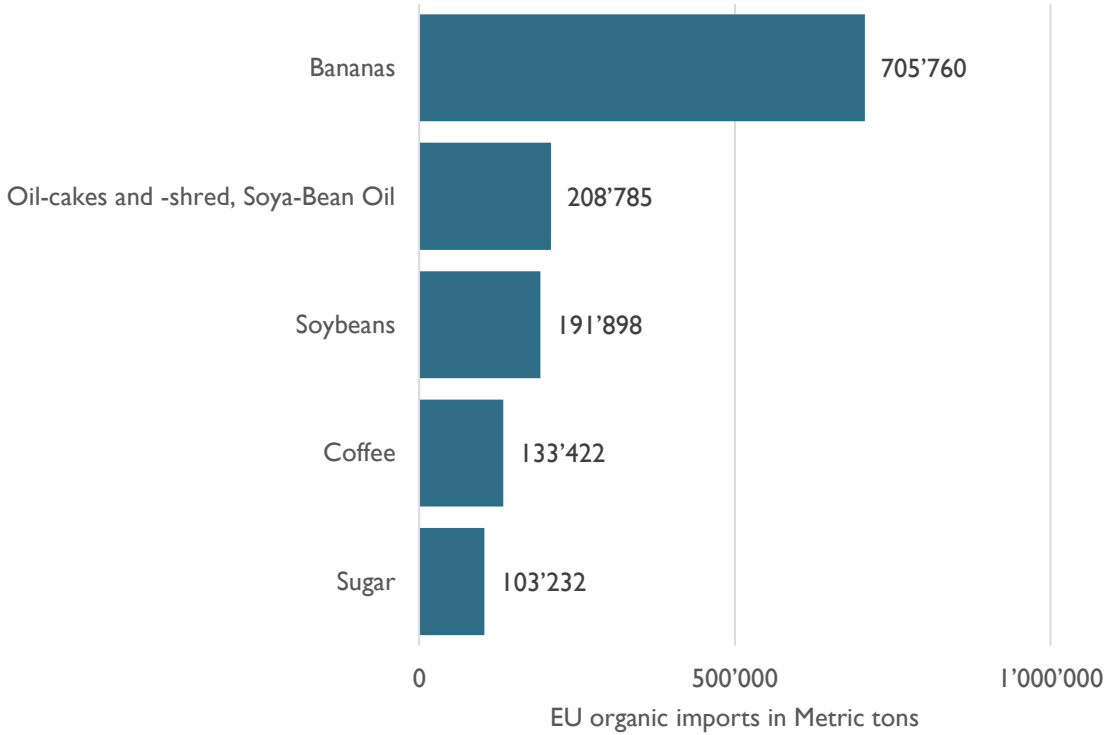
Source: FiBL 2023, www.organic-world.net - statistics.fibl.org

EU Organic Imports 2022: Key product groups and products

EU organic imports: Top 5 export groups 2022
Source: FiBL survey 2023

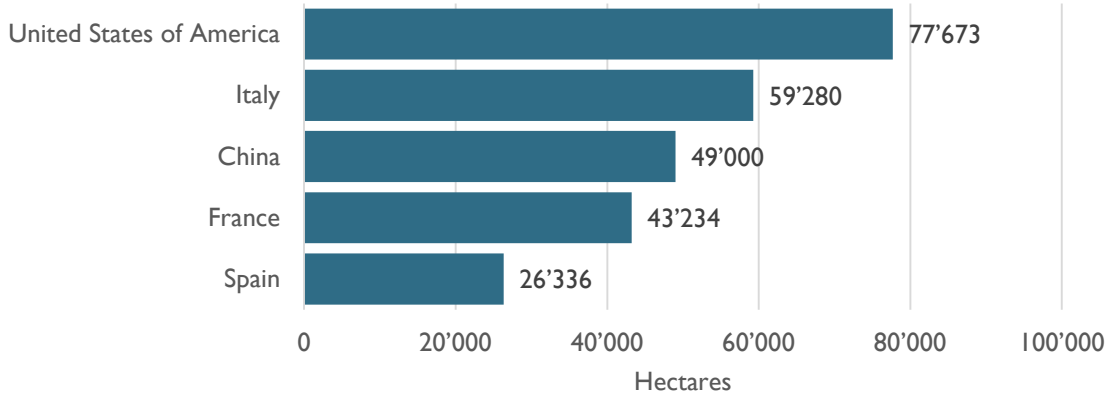


EU organic imports: Top 5 EU export products 2022
Source Traces/European Commission 2023

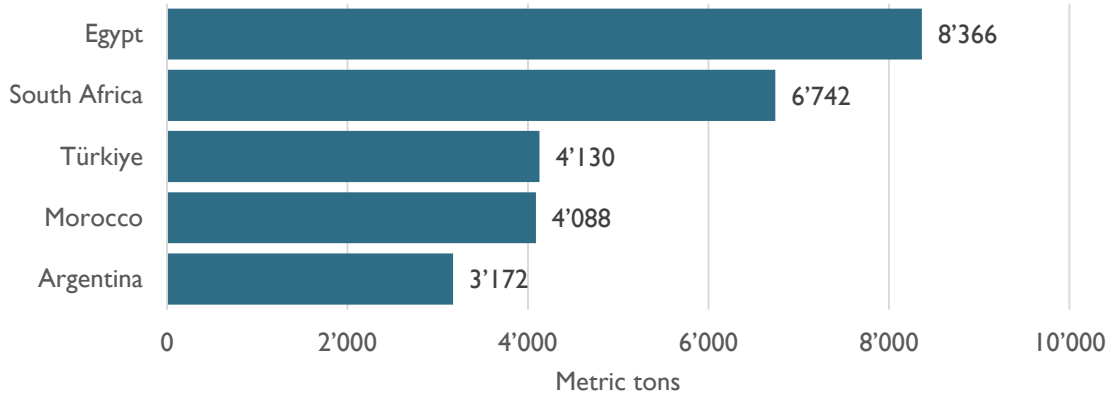


EU organic vegetable* imports: Development, top 5 countries
*Fresh and preserved vegetables

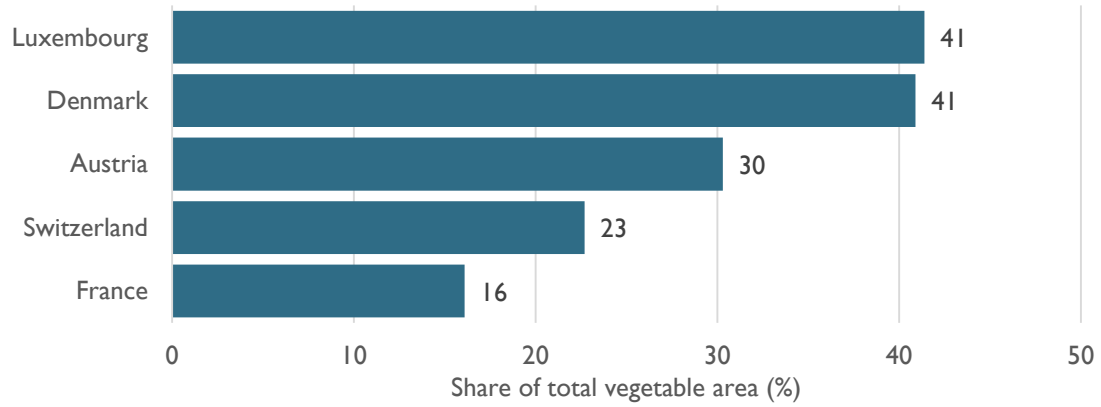
Organic vegetables: Top 5 countries (area) 2021
Source: FiBL survey 2023



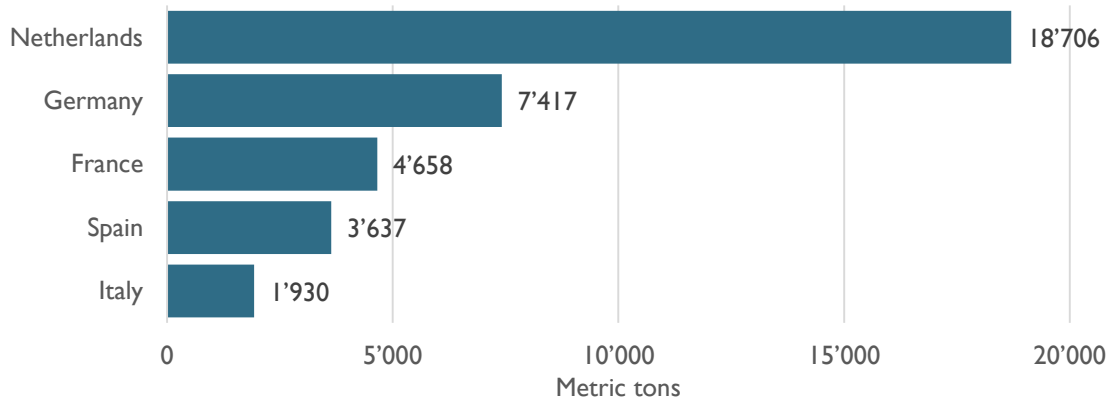
EU organic vegetable imports: Top 5 exporters 2022
Source: TRACES/European Commission



Organic vegetables: Top 5 countries (area share %) 2021
Source: FiBL survey 2023



EU organic vegetable imports: Top 5 importers 2022
Source: Traces/European Commission

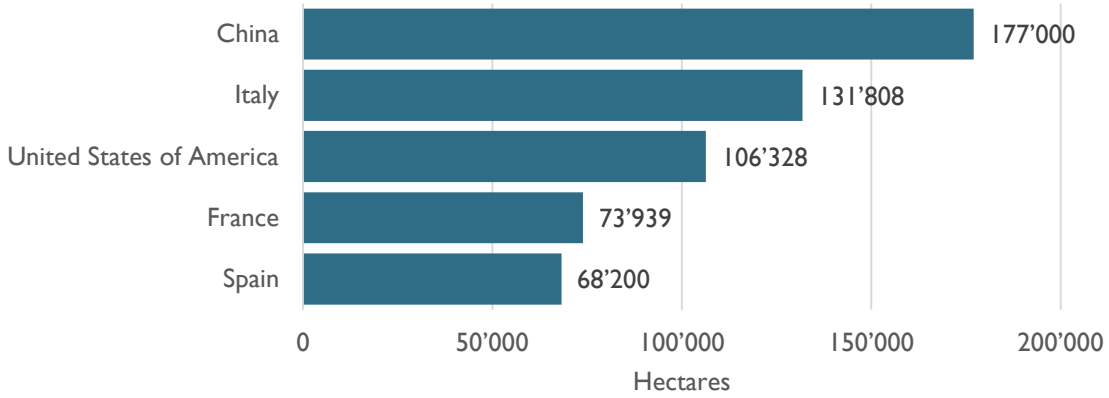


EU organic fruit imports*: Development, Top 5 countries

*** Fruit includes fresh and preserved citrus fruit, temperate fruit, subtropical fruit**

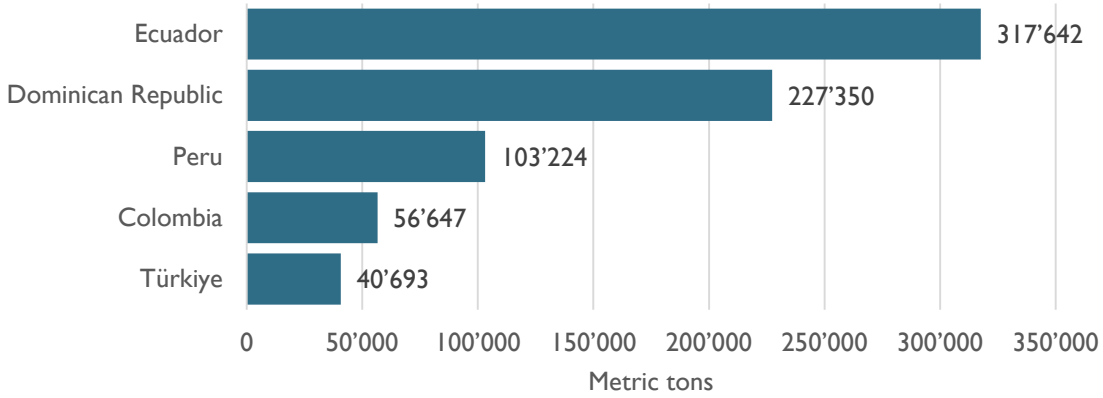
Organic fruit: Top 5 countries (area) 2021

Source: FiBL survey 2023



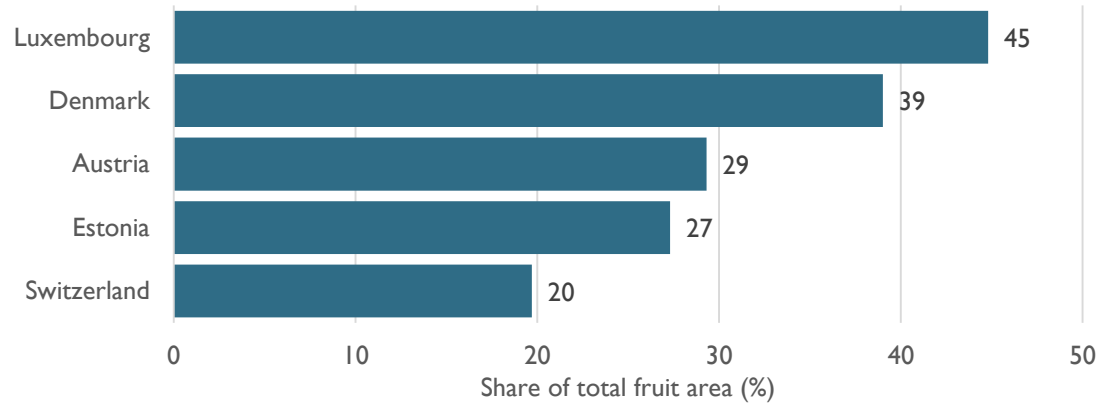
EU organic fruit imports: Top 5 exporters 2022

Source: TRACES/European Commission



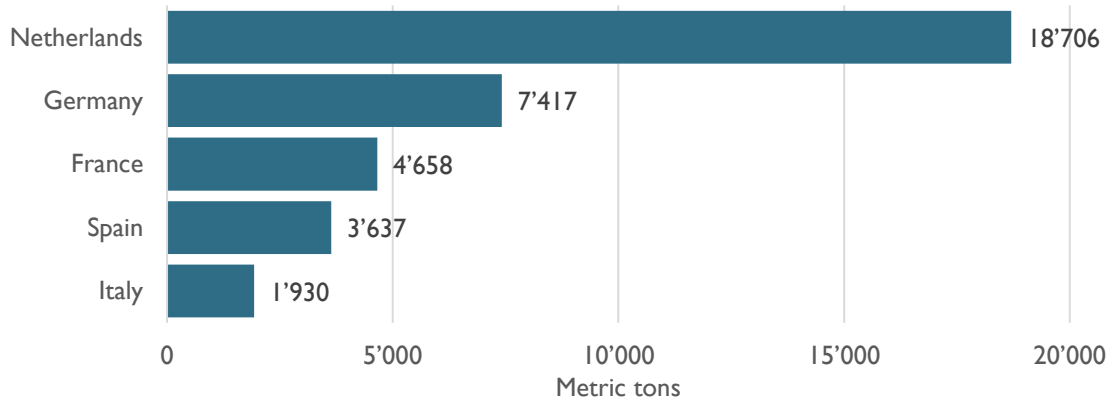
Organic fruit: Top 5 countries (area share %) 2021

Source: FiBL survey 2023



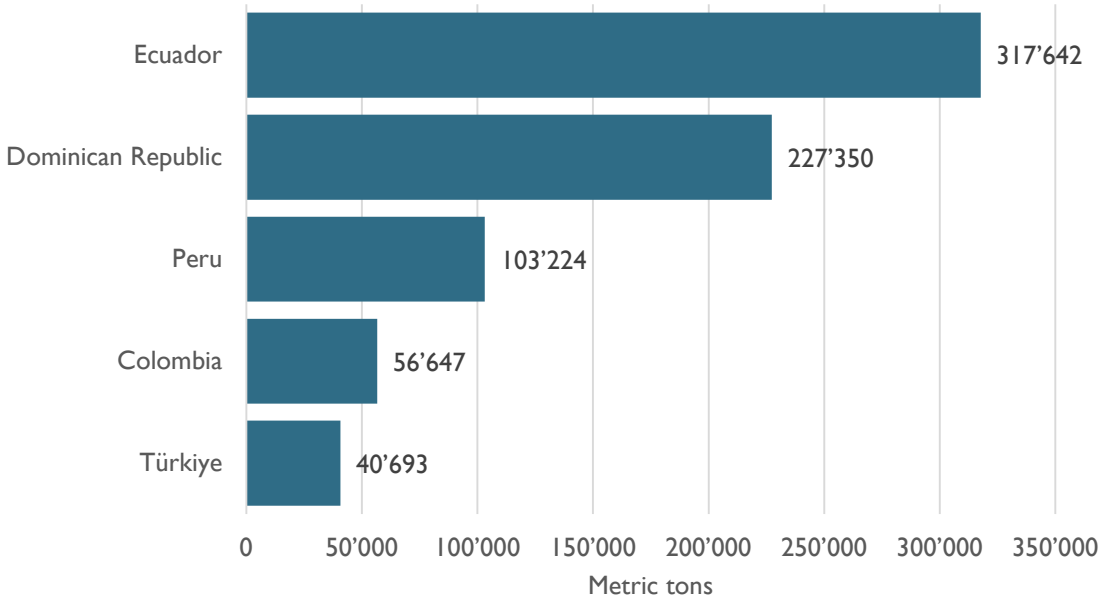
EU organic fruit imports: Top 5 importers 2022

Source: Traces/European Commission

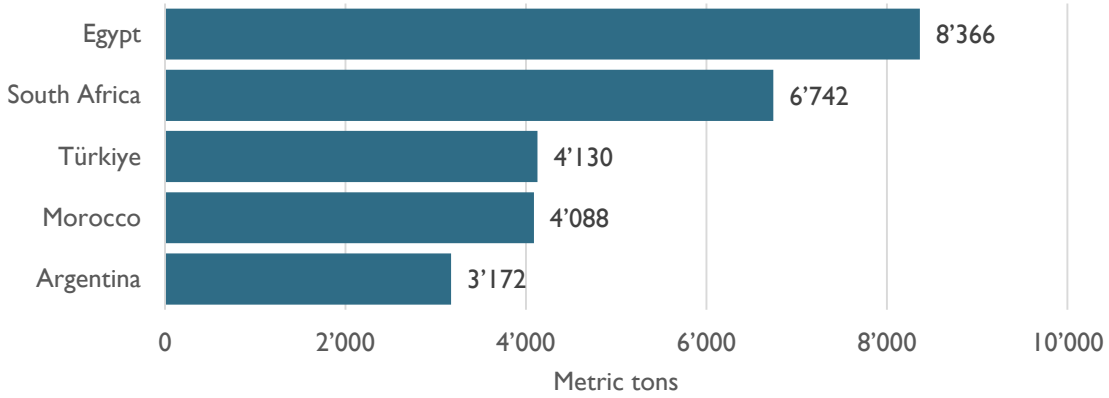


EU organic fruit and vegetable imports (fresh and preserved): Top 5 countries

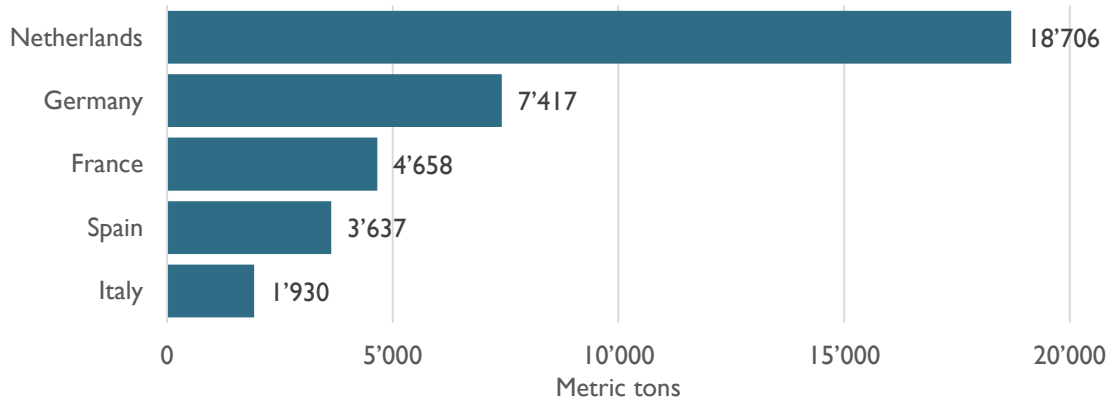
EU organic fruit imports: Top 5 exporters 2022
Source: TRACES/European Commission



EU organic vegetable imports: Top 5 exporters 2022
Source: TRACES/European Commission



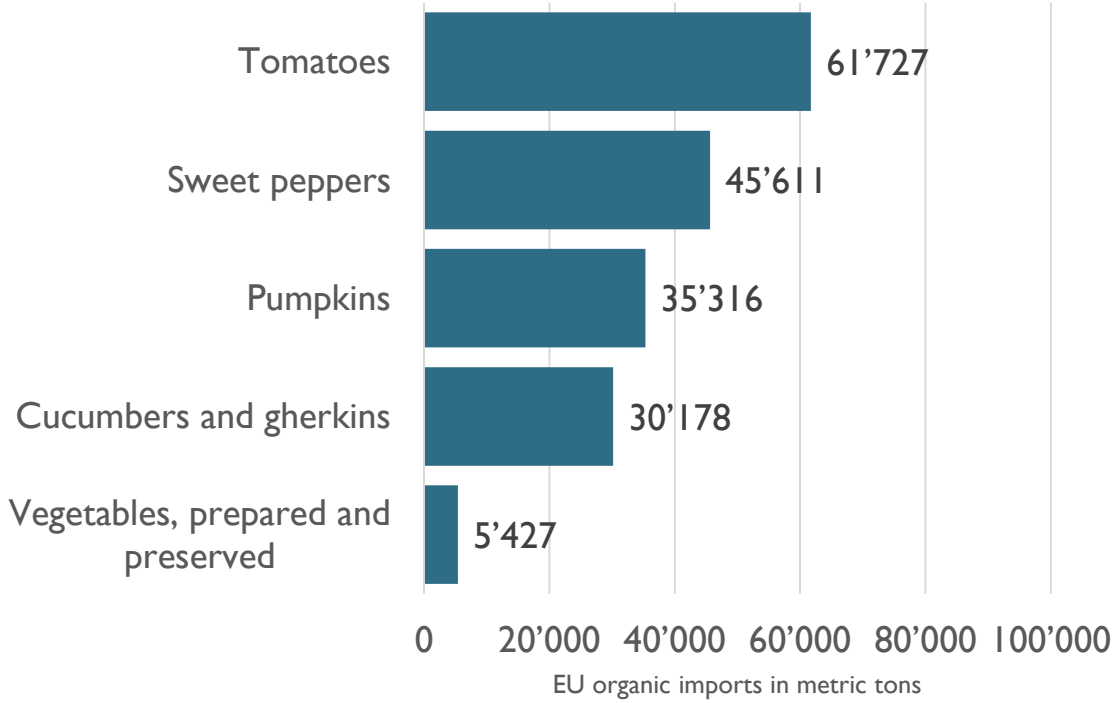
EU organic vegetable imports: Top 5 importers 2022
Source: Traces/European Commission



EU organic fruit and vegetable imports 2022: Top 5 products (Fresh and preserved fruit & vegetables)

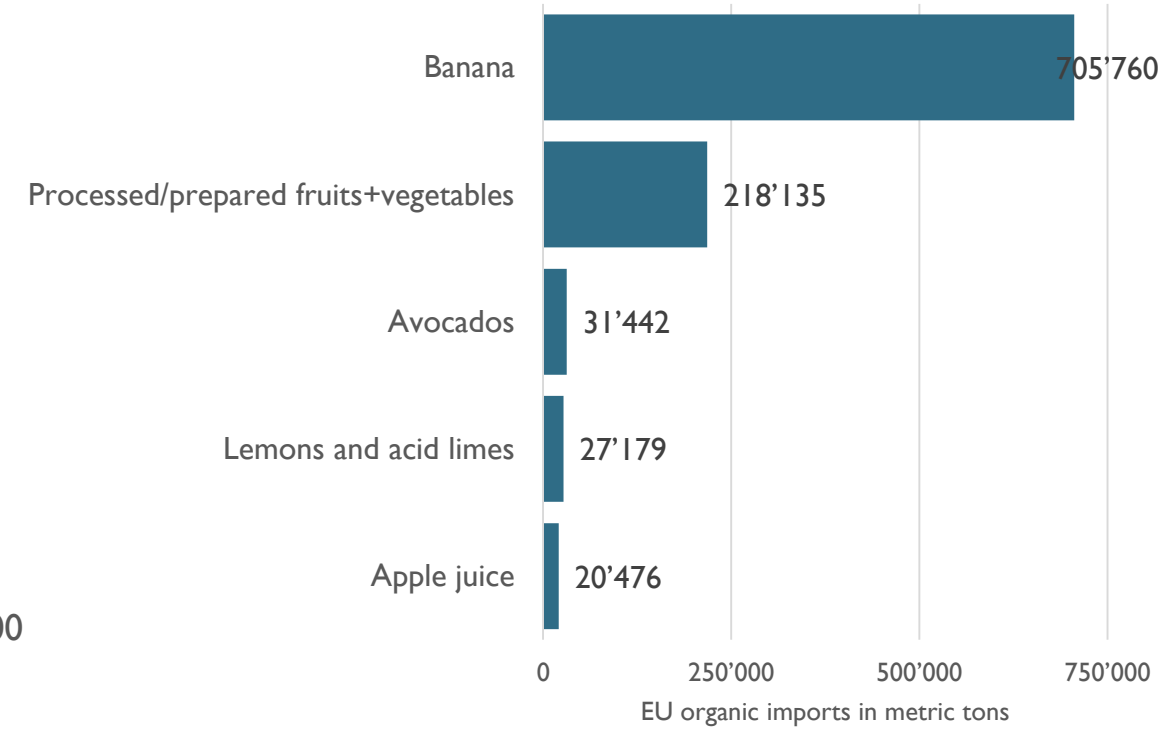
EU organic vegetable imports: Top 5 EU export products 2022

Source Traces/European Commission 2023



EU organic fruit imports: Top 5 EU export products 2022

Source Traces/European Commission 2023



Organic market shares 2021 (based on value in euros)

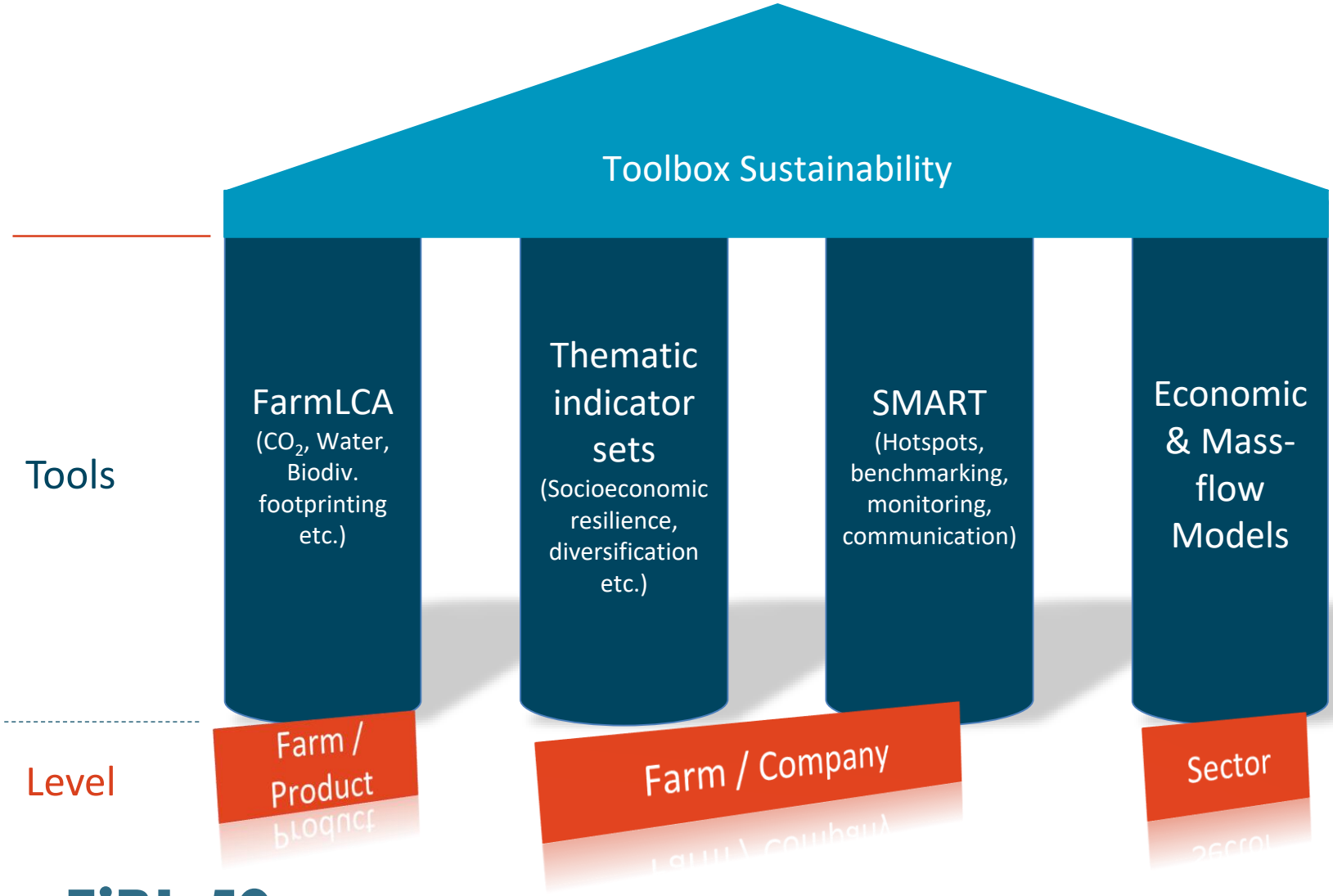
	Austria	Belgium	France	Germany	Nether-lands	Switzer-land	UK (2000)
Fresh vegetables	20.5%	8.8%	7.6%	13.7%		23.8%	4.8%
Fruit	14.2%	6.9%	8.8%	10.1%		19.4%	3.0%
Vegetables fruit together			8.2%		4.5%	21.6%	
Meat and meat products (For comparison)	6.2% (meat)		3.2%	5.9%	3.3 %	6.2% (incl. fish)	1.6%
Organic share of the total market	11.6%	3.8%	6.6% (2021)	7.0%	3.3%	10.9%	1.8%

Sources: FiBL-AMI survey 2022 (Willer et al., 2022), based on data from Austria: RollAMA based on GfK, Belgium: Biowallonie,
France: Agence Bio, Germany: Agricultural Market Information Company AMI based on GfK; Netherlands: Bionext; Switzerland: Bio Suisse based on Nielsen; UK: Soil Association;
USA: Organic Trade Association.
Note: Due to classifications and nomenclatures differing from country to country, it is not possible to supply data for all product groups, even if data for individual products may be available.
Not all countries have data on the market shares of organic products.

Organic fruit and vegetables in the marketplace

- The available data for fruit and vegetables show that organic fruit and vegetables are reaching high market shares in some countries, showing that organic fruit and vegetables, which have a pioneering role in organic agriculture, are very much appreciated by organic consumers, many of whom tend to a vegetarian/vegan lifestyle.
- Organic fruit and vegetables reach a higher market share than the total organic market; E.g. in Switzerland, 21.6% of the value of all vegetables and fruit sold was organic. In contrast, the market share for all organic food was 10.9% in 2021.
- At the same time, meat and meat products have comparably low organic retail sales shares, compared to organic fruit and vegetables.

Sustainability assessment toolbox



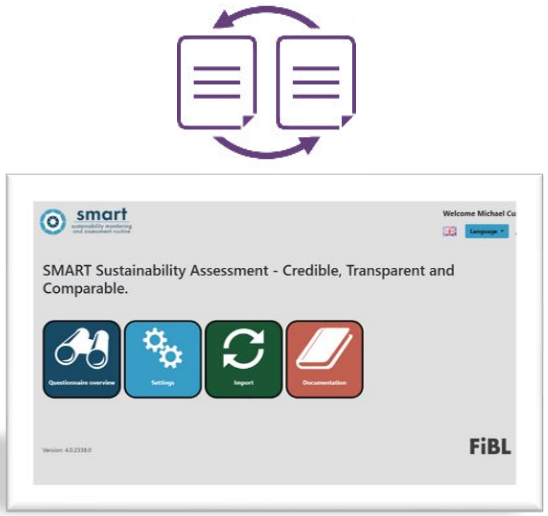
- Multiple **FiBL-developed tools** for the **appropriate purpose**

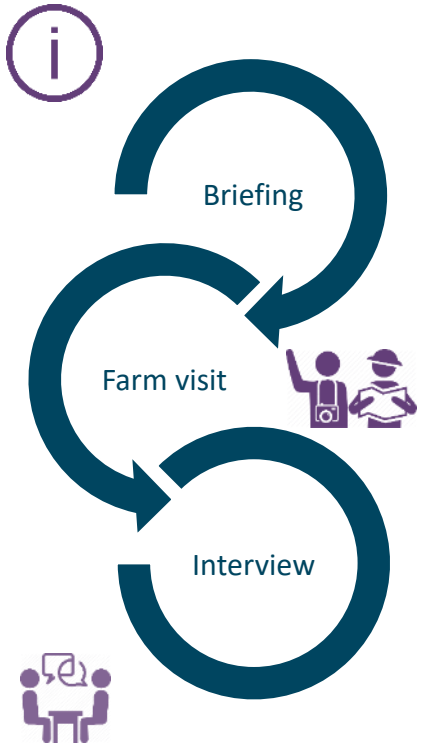
Sustainability assessment toolbox

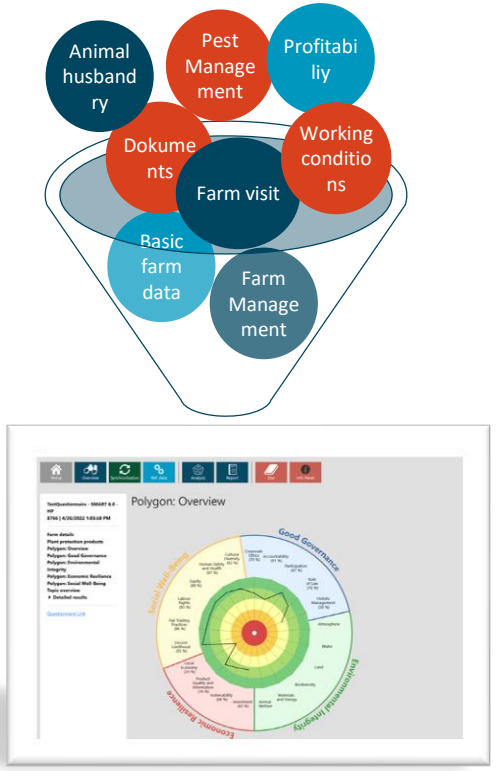
Characteristic	Classes
Primary purpose	• Research, • Advisory service • Supplier assessment • Certification • Monitoring • Policy advice
Level of assessment	• Farm level • Product / supply chain level • Agricultural sector level
Dimensions of sustainability covered	• Environmental • Social • Economic
Geographical scope	• Applicable globally, applicable to a specific country or region
Sector scope	• Applicable to all agricultural/food products or farm types • Applicable to specific product or farm types
Perspective on sustainability	• Farm/business perspective (is the company economically healthy and developing on a resilient pathway?) • Societal perspective (does the company contribute to sustainable development of society?) • Mixed perspective (farm/business perspective and societal perspective are mixed)

Schader, C., J. Grenz, M. S. Meier, and M. Stolze. 2014. Scope and precision of sustainability assessment approaches to food systems. Ecology and Society 19.

SMART-Farm: How does it work?







1. Import of existing data → 2. Farm visit & Interview → 3. Analysis & Evaluation → 4. Reporting

SMART-Farm: Data collection

Similar to compliance check

Semi-structured interview

~3 hours for a medium-sized farm (up to 100 ha)

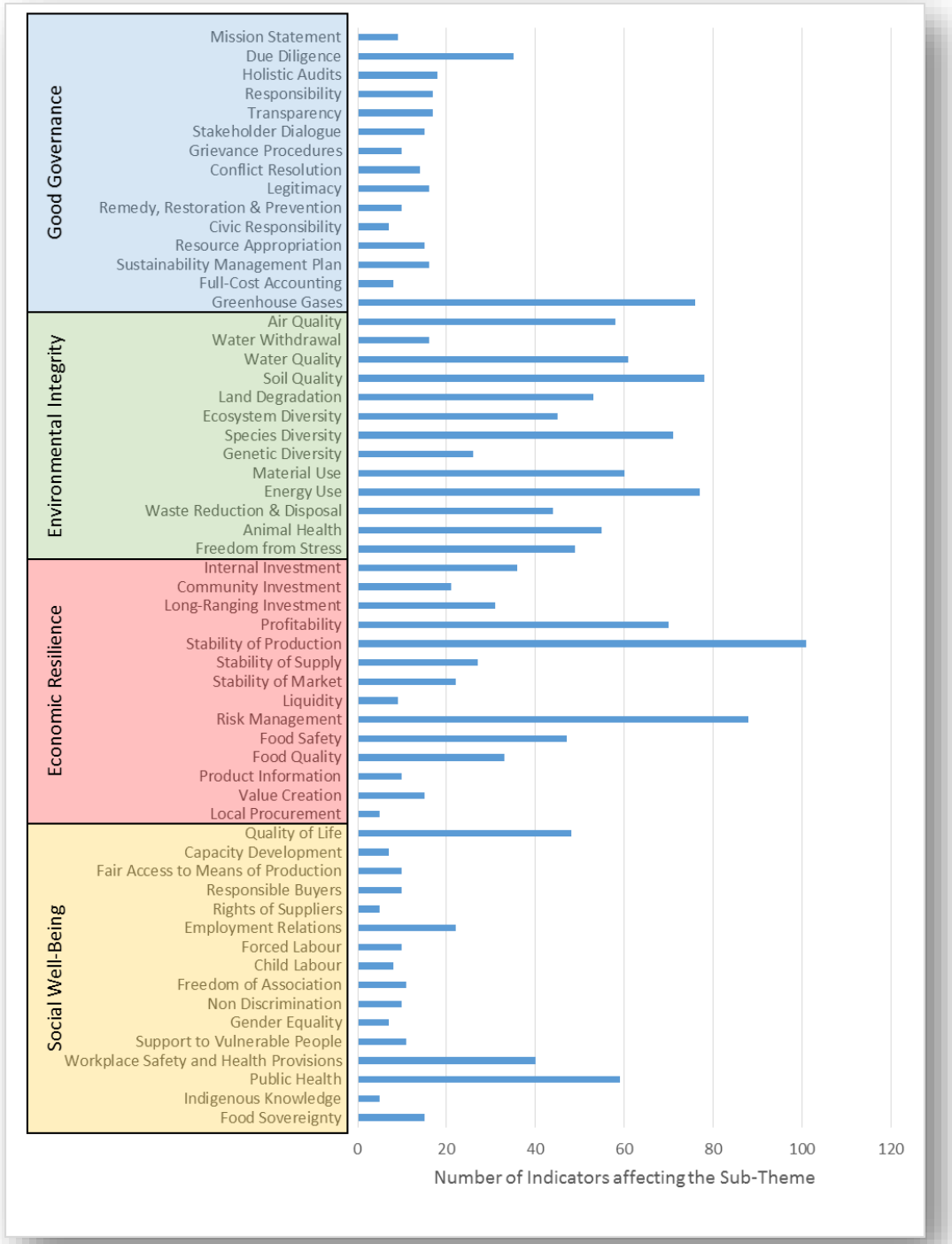
Introduction & farm tour → Parcels & infrastructure → Crops & grassland → Animal husbandry → Operational management → Employees & contractors → Farm economics

SMART-Farm: Methodology

Indicator-based Multi-Criteria Assessment (MCA)

>300 indicators covering all SAFA sub-themes

Subtheme performance = weighted average of indicator scores



Schader, C., et al. 2016. Using the Sustainability Monitoring and Assessment Routine (SMART) for the Systematic Analysis of Trade-Offs and Synergies between Sustainability Dimensions and Themes at Farm Level. Sustainability 8:274.

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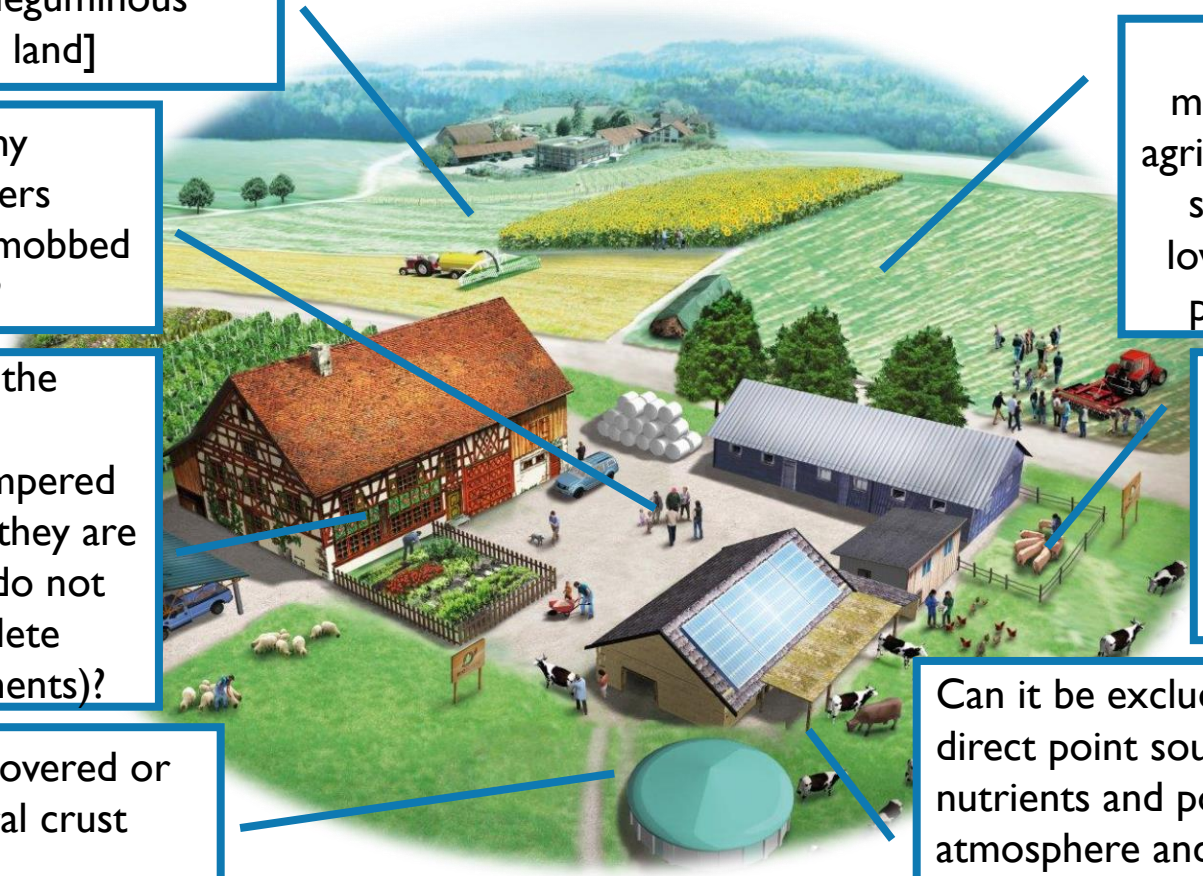
SMART-Farm: Methodology

What proportion of the arable land is devoted to leguminous crops? [% of arable land]

Have there been any incidences of workers being harassed or mobbed in the past 5 years?

Is there a risk that the children's school performance is hampered by that work (e.g., they are tired at school or do not have time to complete homework assignments)?

Are slurry stores covered or does a stable natural crust cover the surface??



Are sufficient measures taken on agricultural areas with sloping gradients lower than 15 % to prevent erosion?

On average, how many hours per day do the pigs have outdoor access?

Can it be excluded that there are direct point source emissions of nutrients and pollutants to the atmosphere and water bodies (incl. wells and drinking water sources) on the farm and its utilized areas?

Example questions (>300 indicators in total)

SMART-Farm: Methodology

SAFA Goal achievment: 39%

(80% x 0% + 60% x 50% + 40% x 100%)
(80% + 60% + 40%)

Weight: 80%

Weight: 60%

Weight: 40%

Score: 0%

Score: 50%

Score: 100%

Indicator 1: Is all operational waste water correctly disposed of (channeled and treated)?

Indicator 2: Are active ingredients used that are classified as very persistent in water (half-life > 60 days) according to the "PAN Pesticide Database"?

Indicator 3: Does the farm have access to information on water quality (water quality analyses)?

(0) UNACCEPTABLE 0% - 20% of the sustainability objective are achieved.

(1) LIMITED 21% - 40% of the sustainability objective are achieved.

(2) MODERATE 41% - 60% of the sustainability objective are achieved.

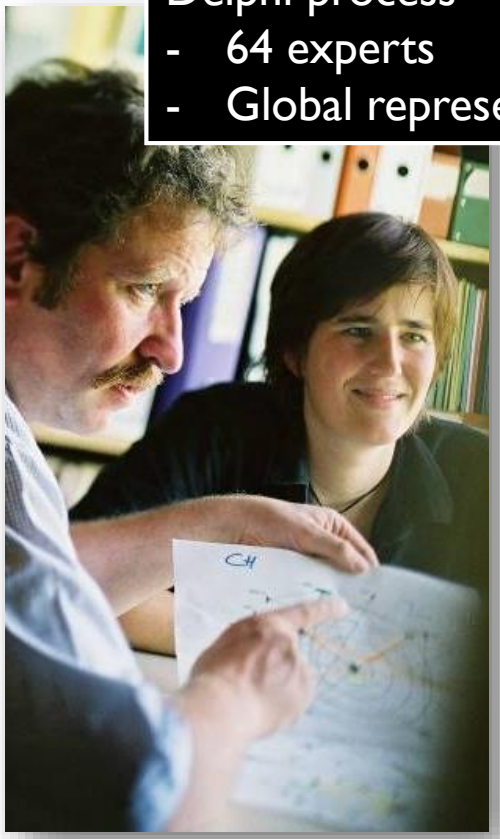
(3) GOOD 61% - 80% of the sustainability objective are achieved.

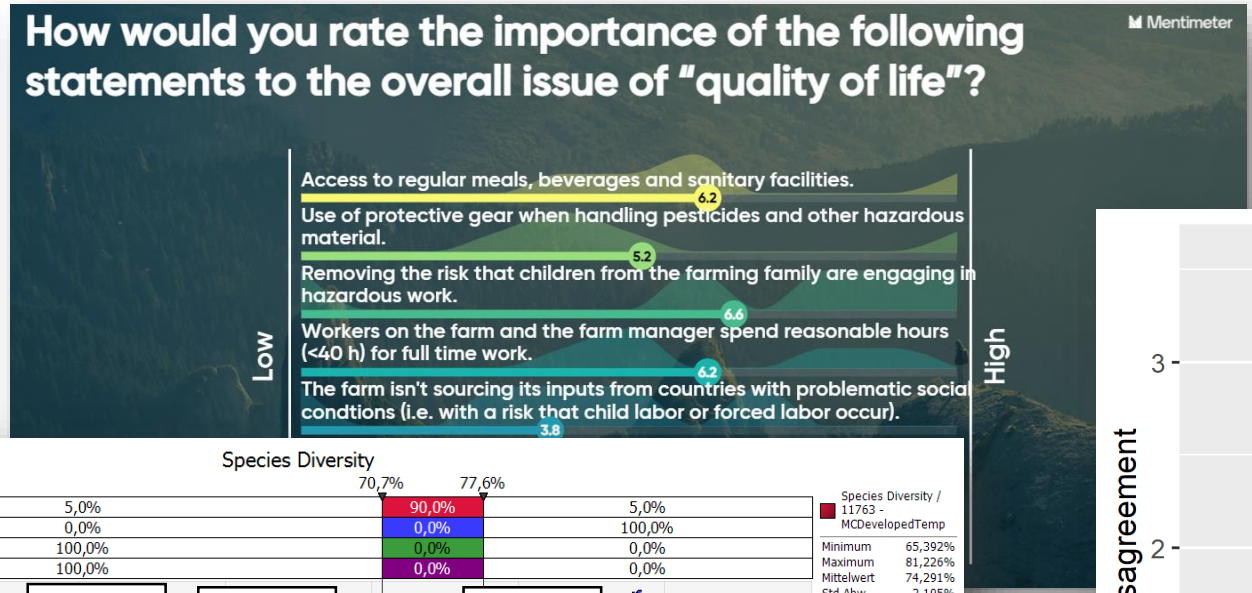
(4) BEST 81% - 100% of the sustainability objective are achieved.

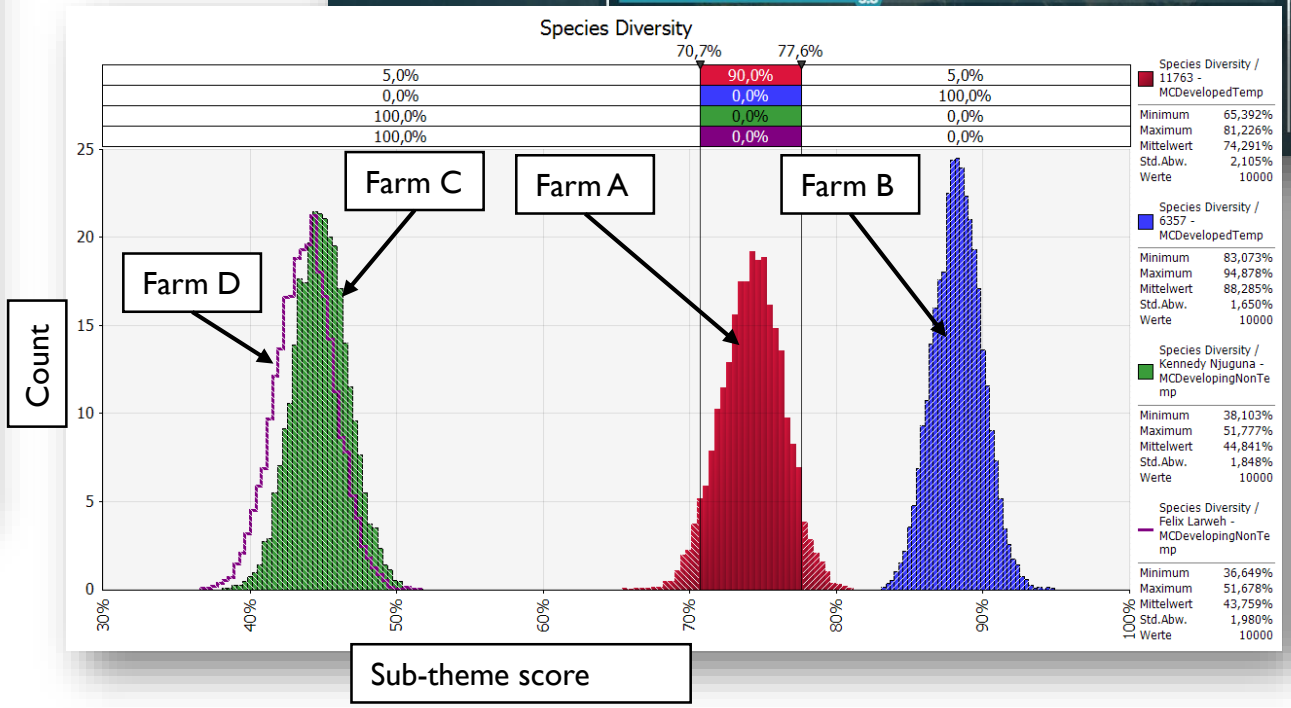
SMART-Farm: Methodology

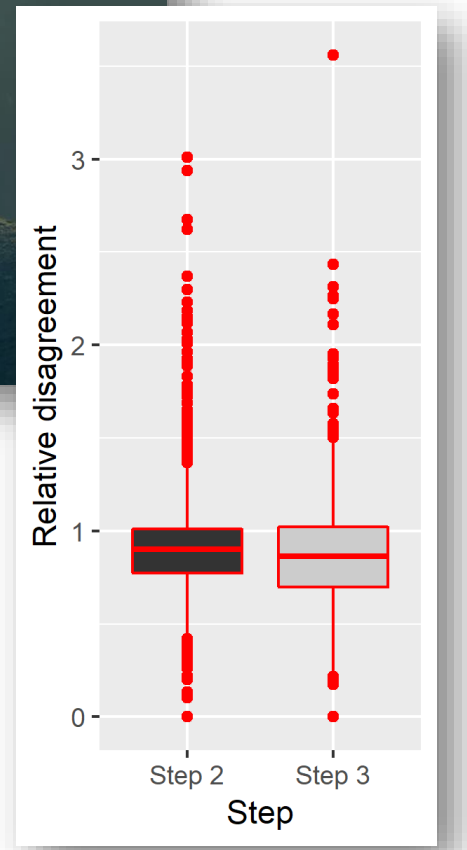
Schader, C., et al. 2019. Accounting for uncertainty in multi-criteria sustainability assessments at the farm level: Improving the robustness of the SMART-Farm Tool. Ecological Indicators 106:105503.

Delphi process
- 64 experts
- Global representation









The Swiss organic sector: Key indicators

- Indicator clusters that contribute strongly to farm performance
- Basis for monitoring and improvement measures

Atmospheric emissions	EI	Renewable energy production on-farm (ID 00186)
		Presence of point-source pollution (ID 00380), farmyard manure as share of fertilizer use (ID 00308)
		Direct electricity consumption for farm production (ID 00332)
Water use		Incidences of yield losses from lack of water (ID 00400), use of precipitation measurements to plan irrigation (ID 00389), use of organic pesticide with known toxicity to aquatic organisms (ID 00257_2)
Agro-biodiversity		Extensive management of permanent grasslands (ID 00253)
		Share of woodland on the farm (ID 00208)
		Permanent grassland use (cuts and grazing) intensity (ID 00620), share of livestock with summer grazing in the mountains (ID 00227), presence of rare or endangered livestock breeds (ID 00246)
Animal welfare		Share of dehorned ruminants (ID 00356), amount of outdoor access for livestock (ID 00370_5), presence of loose animal housing system (ID 00701), hardness of the lying area for livestock (ID 00715)
Socio-political engagement	GG	Involvement of the farm manager in the development of laws and regulations (e.g. through active membership of a political organization) (ID 0057)
		Volunteer social engagement (in days per year) outside of the farm (ID 00075)

The Swiss organic sector: Key indicators

- Indicator clusters that contribute strongly to farm performance
- Basis for monitoring and improvement measures

Profitability and investment	ER	Use of high-input hybrid cultivars (ID 00247)
		Land ownership or secure use rights over next 10 years (ID 00767)
		Perceived viability of the farm in supporting a single income (ID 00775), perceived yield level versus the regional average (ID 00128_1), price premium through differentiated marketing channels (ID 00161)
Socio-economic vulnerability		Incidences of yield loss over past 5 years (ID 00095), degree of reliance on externally-sourced fertilizers (ID 00712), perceived availability of alternative markets for key products (ID 00084), availability of replacement farm manager in emergency (ID 00623), planning of farm succession near to retirement (ID 00124)
		Diversification of income sources related to agriculture (ID 00158), income share of direct sales (ID 00141), social security for partner in event of divorce/death (ID 00456_5)
		Diversity of sales channels for main products (ID 00083)
Product quality		Knowledge or testing of contamination risk (antibiotics) for animal-based fertilizer (ID 00295), incidences of failure to meet food safety standards (ID 00170)
		Use of hormonal treatments (fertility) for livestock (ID 00613)
Local economy		Sourcing of locally-produced farm inputs (ID 00793), on-farm processing and value addition (ID 00145)
Capacity building	SW	Amount of external training offered to staff per year (ID 00072)
		Training on sustainability issues beyond agronomic production (ID 00125)
Workplace risks		Use of organic pesticides with known acute human toxicity (ID 00377_7), particularly via inhalation (ID 00377_75)
		Total number of days absence due to occupational illness or accident for all staff (ID 00474)
		Degree of mechanization for moving roughage and feeding livestock (ID 00629), degree of mechanization for mucking out (ID 00631)

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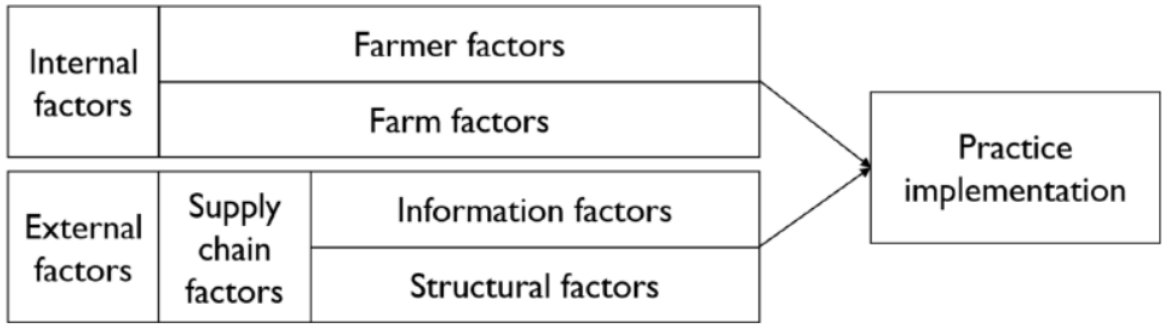
Thematic indicators from SMART-Farm: Resilience of cocoa farmers

- Indicator set to assess **socioeconomic resilience** capacities of cocoa farmers

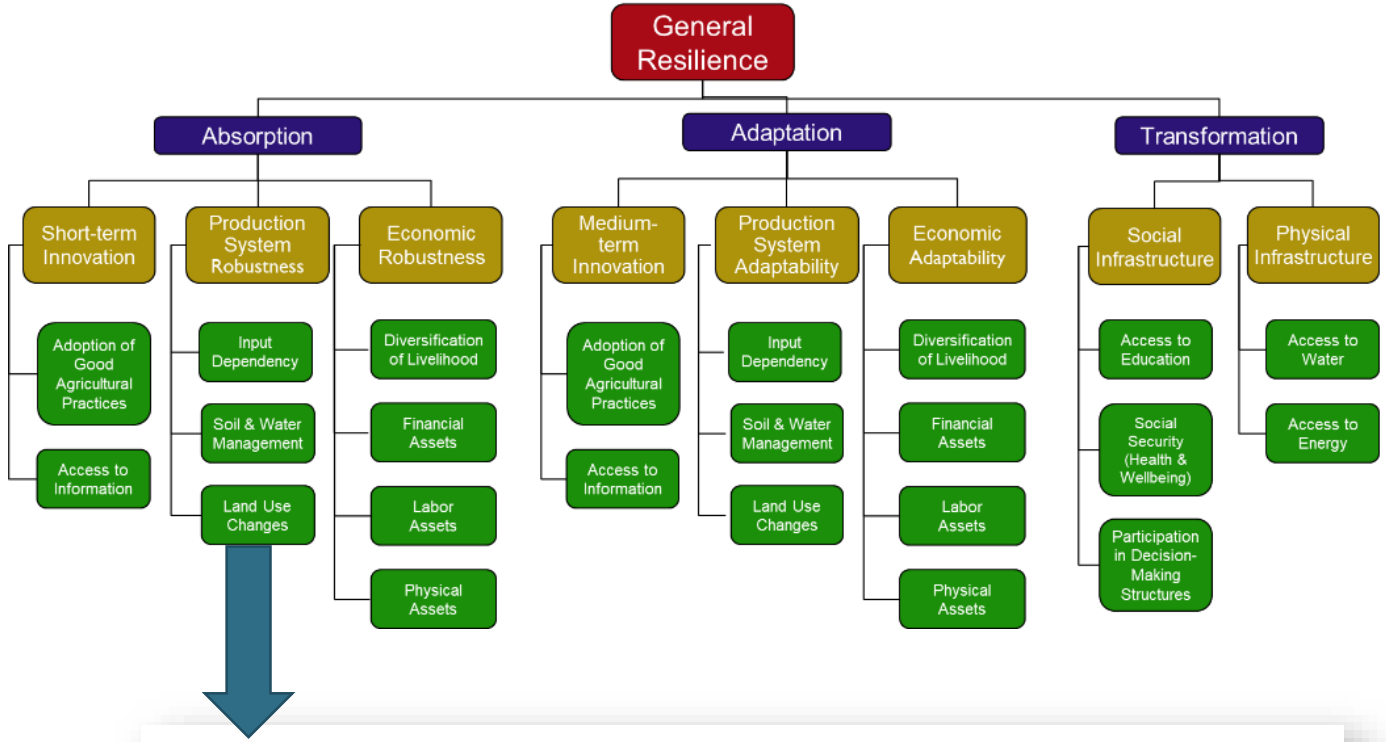


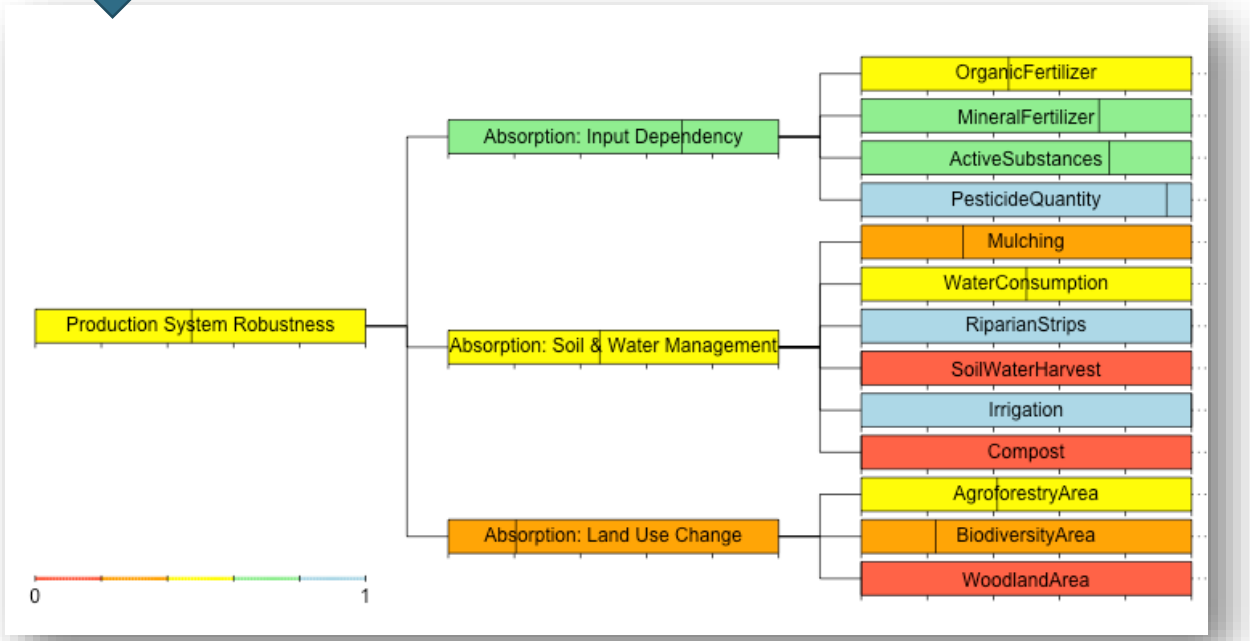
Tennhardt, L. M., et al. 2023. Implementation of sustainable farming practices by cocoa farmers in Ecuador and Uganda: the influence of value chain factors. Frontiers in Sustainable Food Systems 7.

FiBL 50 JAHRE ANS YEARS

Thematic indicators from SMART-Farm: Resilience of cocoa farmers

- Indicator set to assess **socioeconomic resilience** capacities of cocoa farmers
- Validated in two countries (Ecuador and Uganda) during the COVID-19 pandemic

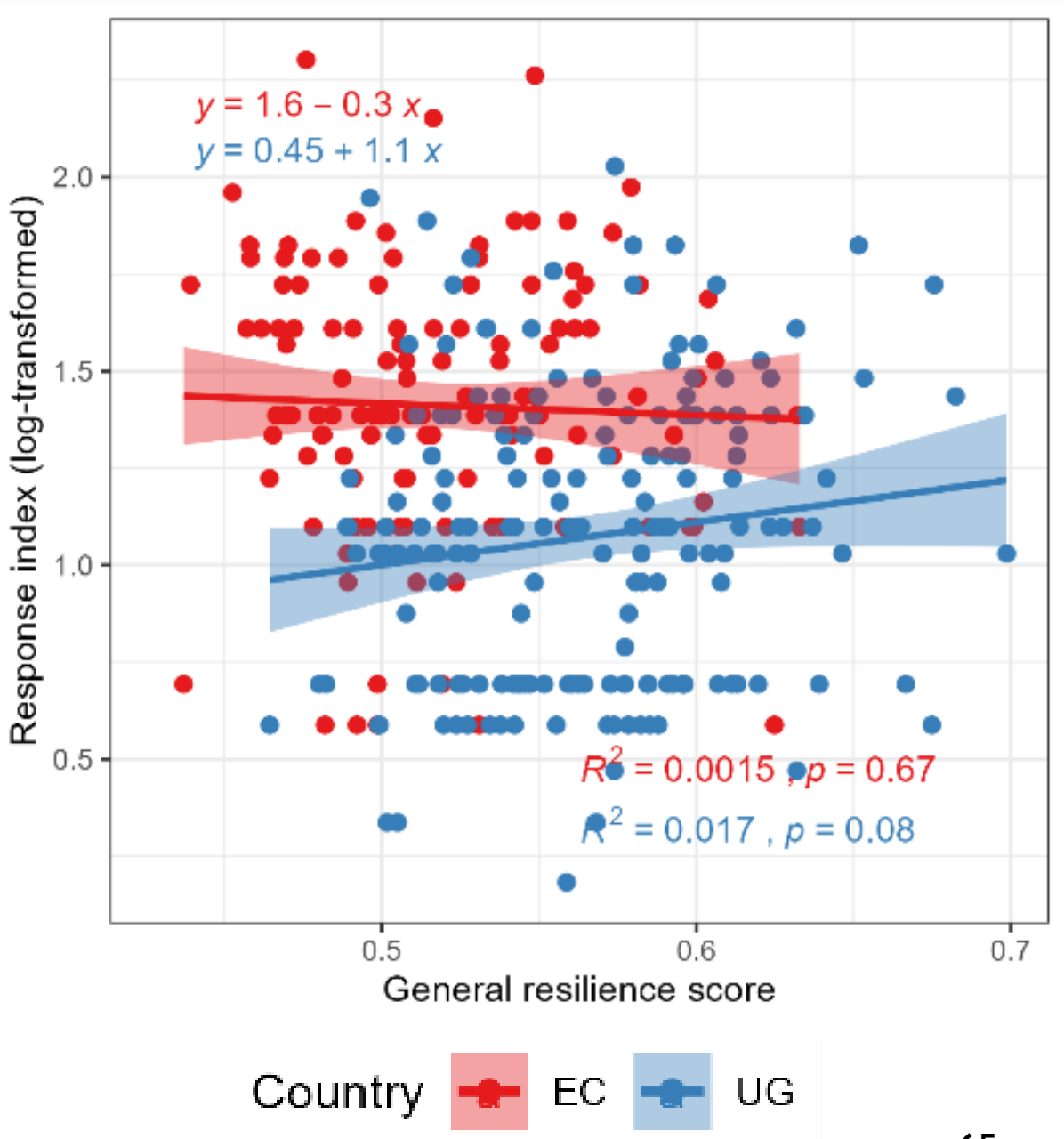




Egger, M., et al. in prep. Unpublished data.

Thematic indicators from SMART-Farm: Resilience of cocoa farmers

- Calculated resilience scores in 2019 (pre-pandemic)
- Compared to self-reported impacts and responses to the COVID-19 pandemic in 2021
- Significant link found only in Uganda



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