International Research Network for Food Quality and Health

FQH Seminar Series

4th Seminar on March 25th, from 9 - 10 am CET on ZOOM

African leaders adopt organic food systems

Programme

9.00-9.05 welcome by FQH president

9.05 – 9.40 African leaders adopt organic food systems by Prof Raymond Auerbach

9.40-10.00 Questions and discussion

Prof Raymond Auerbach spent twenty years farming organically in KwaZulu-Natal, South Africa, followed by twenty years training organic farmers in Africa.

He then set up the Mandela Organic Farming Systems Research Trials, comparing conventional and organic farming systems.

He now serves on the Boards of the South African Organic Sector Organisation and the Agricultural Research Council and is working with the African Union on mainstreaming Ecological Organic Agriculture (EOA).

His talk summarised the research findings on organics and their implications for Africa; he then presented the typology which his team developed for the African Union, and suggested a strategy for Just Transitions in Food Systems in Africa.

The talk drew on current research in Kenya (FiBL) and on the French-funded seven-country Avaclim Project (Agroecology and climate change), as well as the TAFS Project (Transitions towards Agroecological Food Systems).

Prof Raymond Auerbach shares his presentation slides herein.

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African Leaders (African Union) adopt Ecological Organic Farming.

Professor Raymond Auerbach,
Centre of Excellence for Food Security, Univ Western Cape
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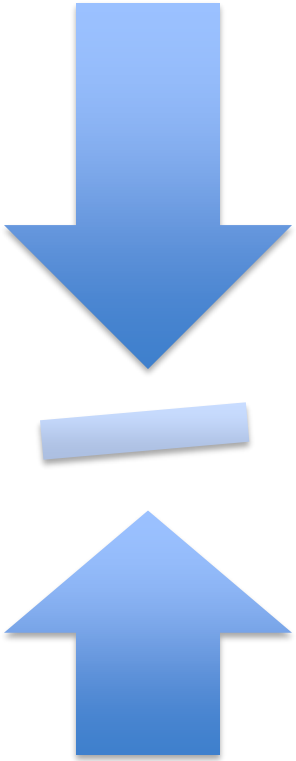
Changes in Farming Systems over the last 50 years

Towards Agro-ecology

- Chemical Monoculture
- Integrated Arable Farming
- Integrated Pest Management
- Conservation Agriculture
- Biological Farming
- Organic Farming
- Permaculture
- French Intensive Method
- BioDynamic Agriculture



What research has been done on Ecological Organic Agriculture (EOA)?

Swiss - FiBL: DOK Trials (organics 20%< conventional systems; quality better).
US - Rodale: Farming Systems comparisons (organics better in dry years).
Denmark – ICROFS: Farming Systems & consumer & farmer research.
UK & France & Germany – Leifert, Lairon, Strassner (Food Systems).

Africa (see AU Assessment, Auerbach Researchgate):
FiBL – Kenya;
Egypt, Morocco & Tunisia;
South Africa: Mandela Trials, Avaclim, TAFS;
African Union: EOA Initiative after Heads of State Resolution, 2011.

In this talk we will try to look at the last two topics in some depth!

South African Organic Sector Organisation

saoso
SOUTH AFRICAN ORGANIC SECTOR ORGANISATION

IFOAM ORGANICS INTERNATIONAL
PROUD TO BE PART

- developed organic standard for South Africa from 2003 to 2016.
- recognise PGS as an alternative to 3rd party certification for smallholder farmers and local markets.
- December 2017 – included in the IFOAM Family of Standards.
- Working Groups now constituted.

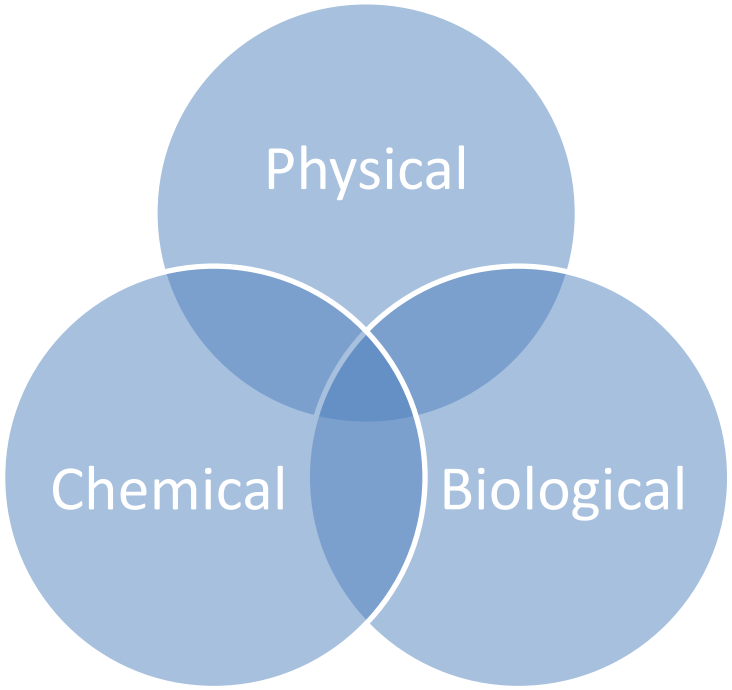
How do we approach agricultural development with a Food Systems lens?

SAOSO decided we need to be an Organic **Sector** Organisation.

We include work on:
Lobbying, Advocacy & Policy
Organic Food Production
Food Quality
Food Processing
Marketing (& SA Participatory Guarantee Systems is a close sister body)
School – education, research, post-grads, training of farmers & consumers

What does a sustainable food system look like?
We are trying to work that out as we go, building linkages and learning from best practice.
We work with Farmers' Markets, PGS Groups, Processors, Retailers and Wholesalers.
We are now starting to interact with cafes, restaurants and caterers.

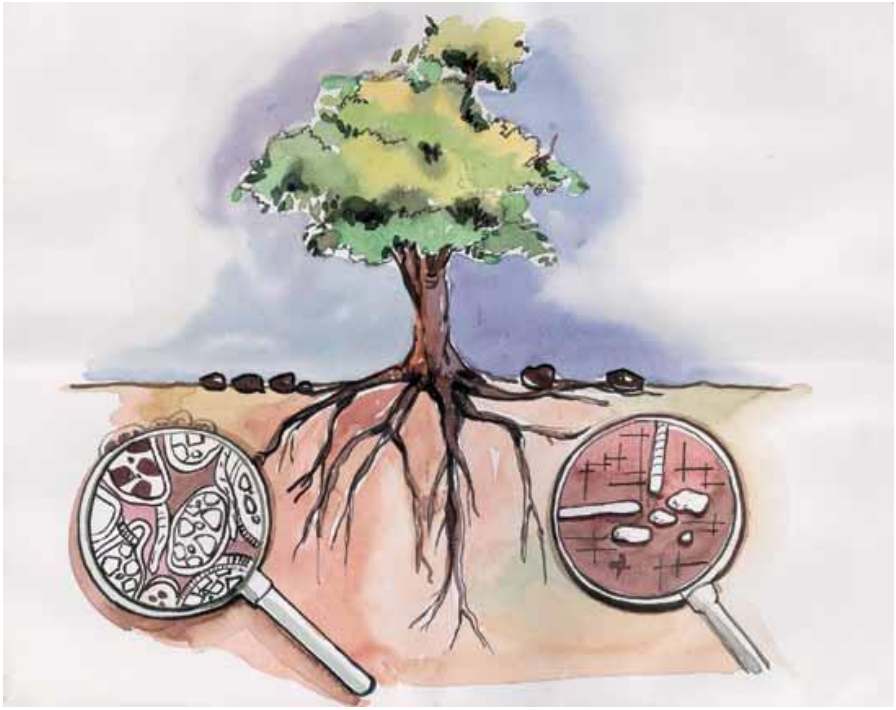
Soil science stands on three legs: soil physics, soil chemistry and soil biology!



The physical structure of the soil depends on aerobic conditions

Tiny roots and water need to penetrate into the soil; if the soil is like concrete (right side), nothing can penetrate!

If the soil has a crumb structure as seen on the left, feeder roots, earthworms, water and air will find space.



The chemical composition of the soil is vital: no P, no crop!

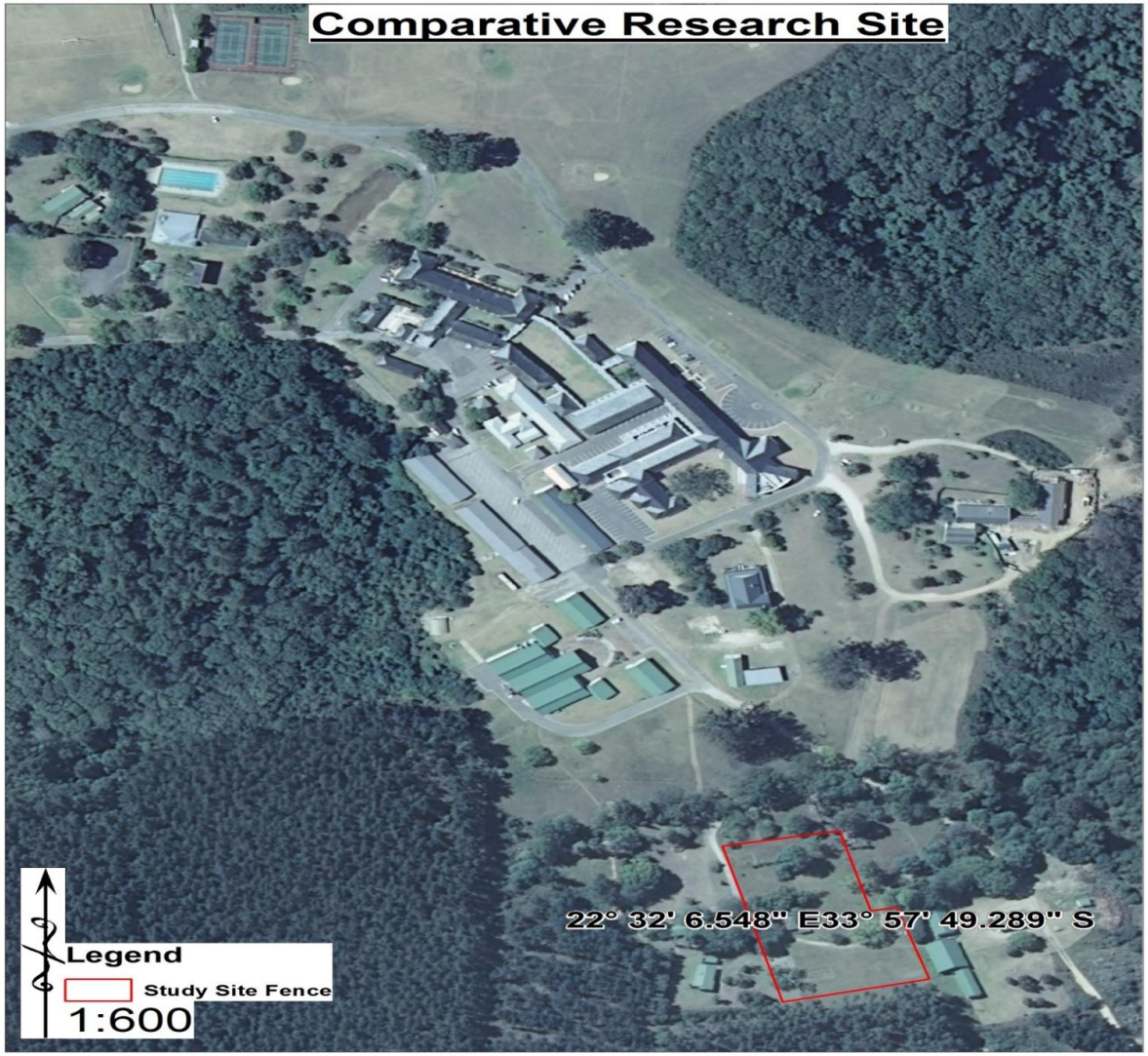
Third season contrast, January 2016; control on left, organic on right.	**Cowpeas and sweet potatoes behind with conventional cabbage beyond.**

Soil Biology: Soil should be alive with earthworms, aerobic bacteria and aerobic fungi!

Red wriggler worms are compost worms; they live in the litter layer of the soil, and are the friends of the organic farmer. Larger grey earthworms are also good for soil, but work more slowly. Earthworms eat dead organic material, and their burrows are lined with colloidal humus, which is pure plant food..

The research trial site for the long-term organic comparative farming systems research trials at the George Campus of Nelson Mandela University in South Africa's Western Cape province.

Research site in red at bottom of slide.



The Mandela Trials; Baseline Study, 2014. Indicator crop of Caliente mustard to evaluate soil heterogeneity

- All plots then receive 1 t/ha of dolomitic lime, ploughed under in August
- Conventional plots get 400 kg/ha 2.3.4 (30) + 200 kg/ha LAN;
- Organic plots get 27 t/ha of compost, as initial dressings.

Soil fertility changes over first three years (2014 to 2016): main results only!
All plots received 1 t/ha dolomitic lime three times (in 2014, 2015 & 2016).

Parameter (Jan 2016)	Control (Original)	Conventional	Organic
Soil P (Bray II) mg/kg	10 (4)	31	13
pH (KCl)	5.2 (5.0)	5.2	5.4
Acid saturation %	11.5 (16.6)	11.6	9.8
Exch Aluminium mg/kg	2.77 (3.3)	2.98	2.93
Organic C %	2.9 (4.4)	3.1	3.5
Soil K (av.) mg/kg	121 (160)	121	156
CEC	6.9 (7.5)	7.1	7.5

All plots (including control) received a total of 3 t/ha dolomitic lime; this raised pH and decreased soil acidity slightly in all plots.
Then conventional, 400 kg/ha 2.3.4 (30); organic 27 t/ha compost. This only in first year, thereafter, half the fertiliser and 5 t/ha compost.
The conventional treatments increased available soil phosphate.
The organic treatments increased soil carbon and decreased acidity.

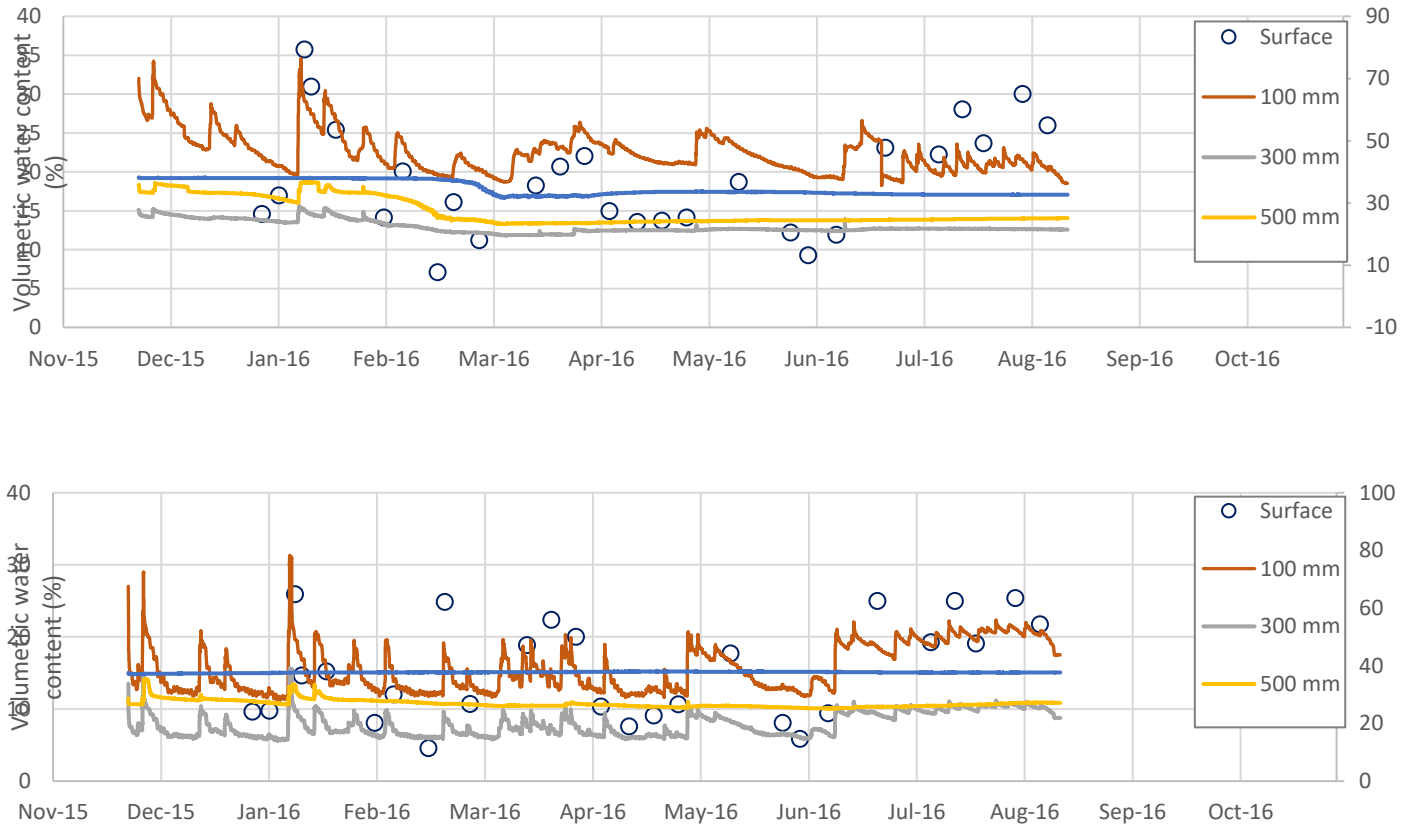
Soil Water Content: Catherine Eckert's Work showed that organic farming holds more water in the soil; she discusses this in her PhD thesis.

Capacitance probes (below) and the data logger and rain gauge connected to a Theta probe (left) to measure mulch effects.

Water Use Efficiency measurements: Initial Theta probe measurements in 2015 show that mulch is a major factor, but soil carbon levels also have an effect

Average of five readings taken with Theta Probe, first one taken Thursday 17/12 7 am, other four taken Friday 18/12 7 am											
	Plot	Moisture %		Moisture %		Moisture %		Moisture %			
Treatment	Rep 1		Rep 2		Rep 3		Rep 4			Mean	Cover?
1	3	21.9	17	22.4	21	19.2	39	22.3		21.4	Mulch
2	1	23.6	19	23.4	29	24.2	35	13.1		21.1	Mulch
3	2	22.3	18	20.6	30	21.1	36	19.9		21.0	Mulch
4	4	16.3	16	12.0	22	12.2	38	20.7		15.3	No Mulch
Organic		21.0		19.6		19.2		19.0		19.7	
5	6	13.2	12	16.7	27	13.7	33	12.1		13.9	No Mulch
6	9	15.1	13	14.4	28	14.8	32	12.2		14.1	No Mulch
7	7	15.1	15	11.6	25	11.7	31	12.1		12.6	No Mulch
8	8	13.7	14	15.6	26	14.6	34	11.4		13.8	No Mulch
Conventional		14.3		14.6		13.7		12.0		13.6	
9	5	14.7	11	16.8	23	12.0	37	13.6		14.3	No Mulch
10	10	16.4	20	16.3	24	14.1	40	13.8		15.1	No Mulch
Control		15.6		16.5		13.0		13.0		14.5	

Water retention and deep water use, comparing an organic & a conventional plot
(surface readings “o” = Theta Probe; 100 to 1100 mm = capacitance probes)



Organics closes the yield gap

Table 1: Mean Results for cabbage harvests (kg/plot); non-significant				
Seasonal rainfall for three years of the research: (George Mean Annual Rainfall – 866 mm):		2015 754 mm	2016 975 mm	2017 605 mm
Management	Planting practice	Mass (kg) Cabbages in nett plot		
system	Monocrop / rotation	2015	2016	2017
	Mono-cropcabbage	48,9	65,5	61,0
	Rotated	50,5	74,6	66,3
Chemical mean		49,7	70,0	63,7
	Mono-crop cabbage	40,4	41,2	66,0
	Rotated	40,5	58,3	75,2
Organic mean		40,5	49,7	70,6
Control mean	Control monocrop cabbage	17,0	5,8	13,1

… at least in the dry years!

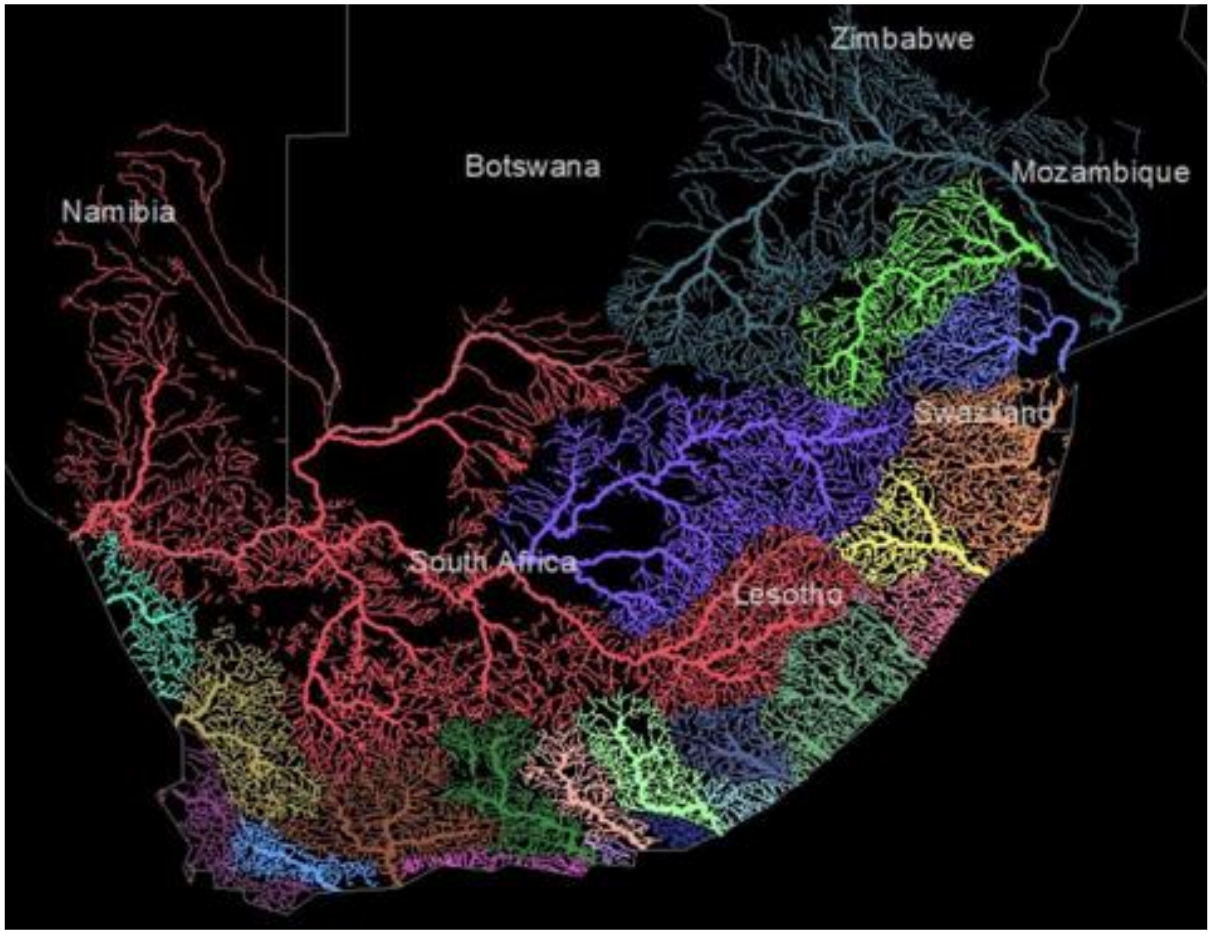
… but you need to use good quality compost!!!

Table 22.2: Mean Results for cabbage harvests (kg/plot); 2015-18					
Seasonal rainfall for the research: (George Mean Annual Rainfall: 866 mm)		2015 754 mm	2016 975 mm	2017 594 mm	2018 693 mm
Management system	Planting practice	Mass (kg) 40 Cabbages in nett plot			
YEAR	Mono-crop / rotation	2015	2016	2017	2018
Conventional mono-crop	Mono-crop	48,9	65,5	61,0	75.5
Conventional rotation	Rotated	50,5	74,6	66,3	84.6
Conventional mean		49,7	70,0	63,7	80.1
Organic mono-crop	Mono-crop	40,4	41,2	66,0	50.7
Organic rotation	Rotated	40,5	58,3	75,2	75.9
Organic mean		40,5	49,7	70,6	63.3
Control mean	Control	17	6	8	4

Food System Transitions:

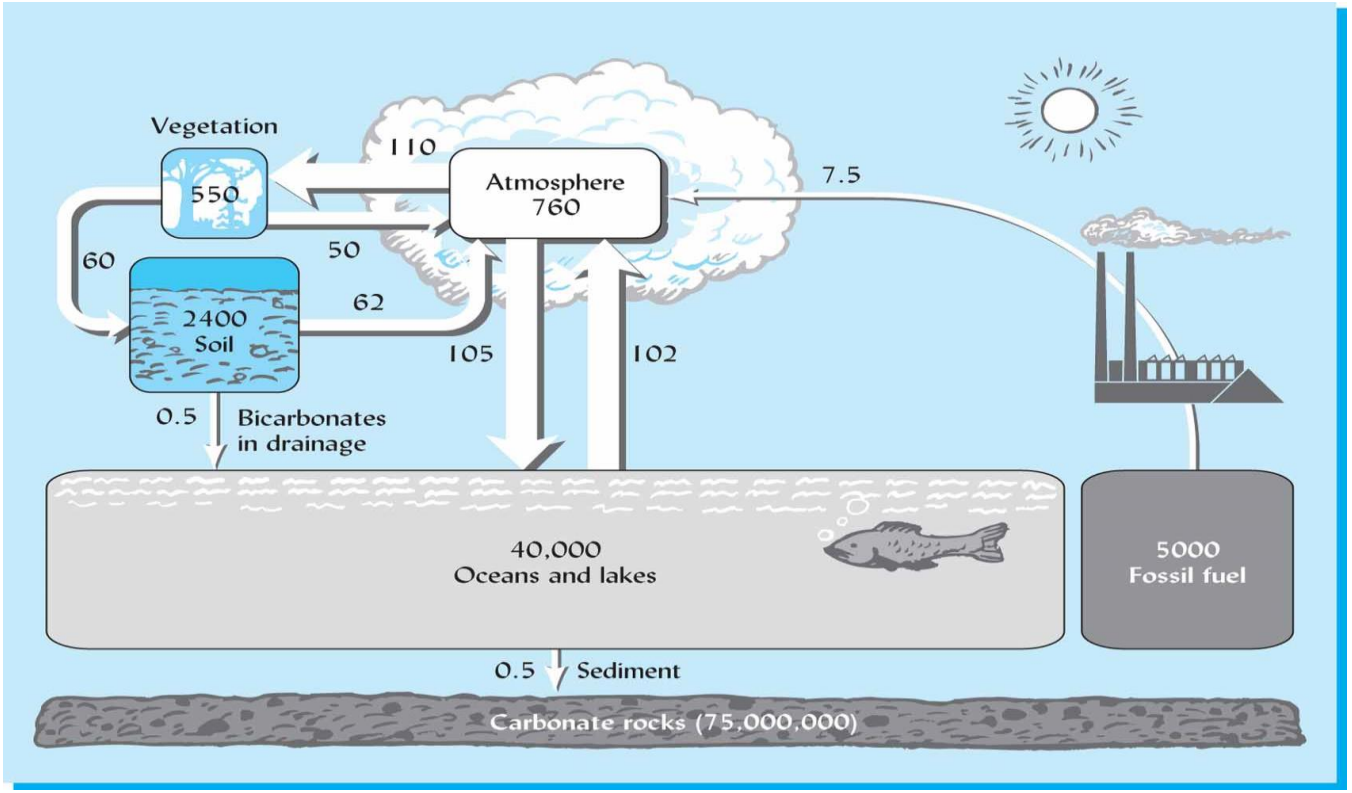
Research Approaches

What scale do we work at?
Are we the experts?
Does our work help others to help themselves?
Does our work help the planet?
What is Mother Earth telling us with Covid-19?
What is Mama Afrika saying?
What about the way we treat animals?


Zimbabwe
Botswana
Mozambique
Namibia
Swaziland
South Africa
Lesotho

The Global Carbon Cycle:
(after Brady & Weil, 2008)

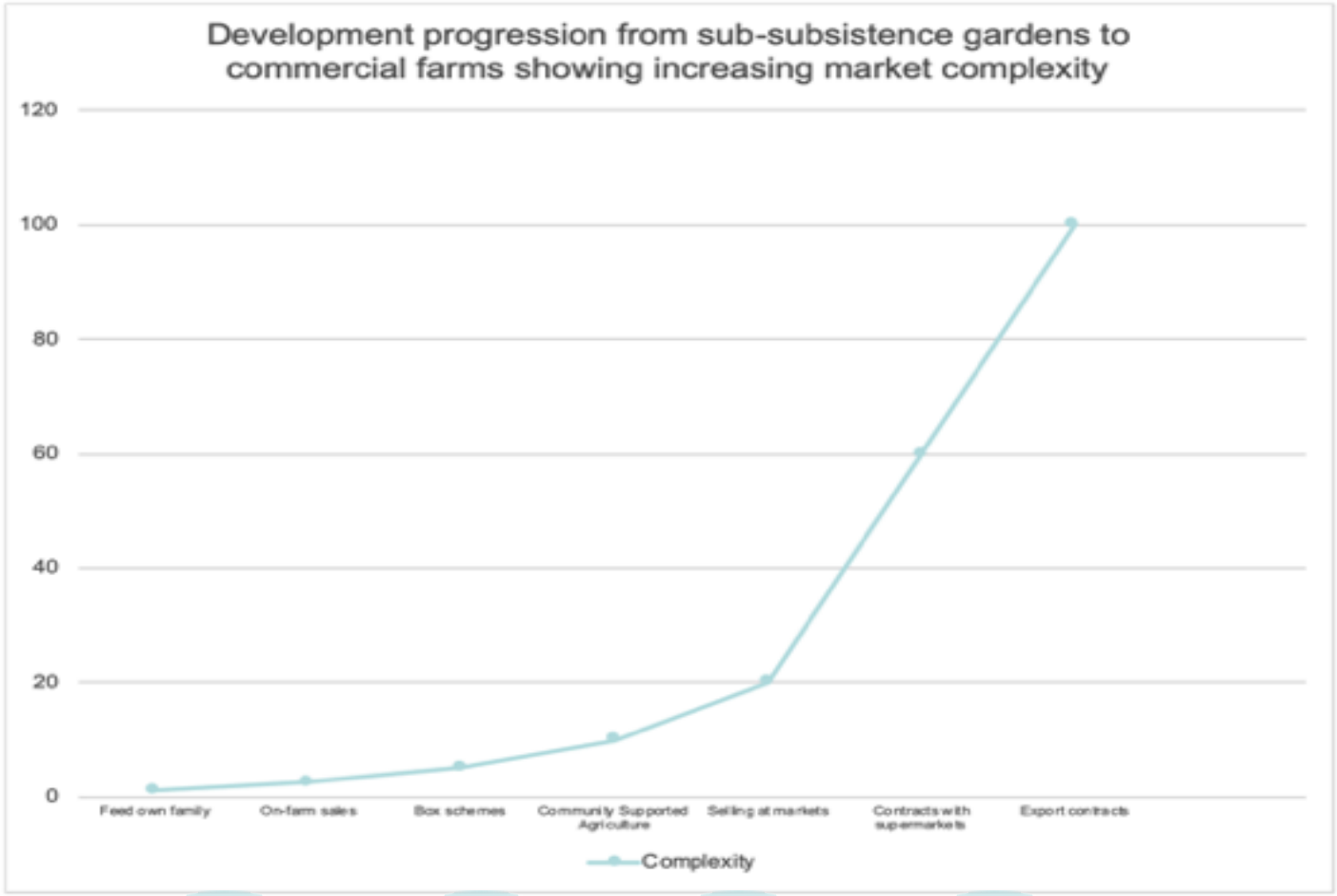
Units are Petagrams; 1 Pg = 1 billion tons Carbon

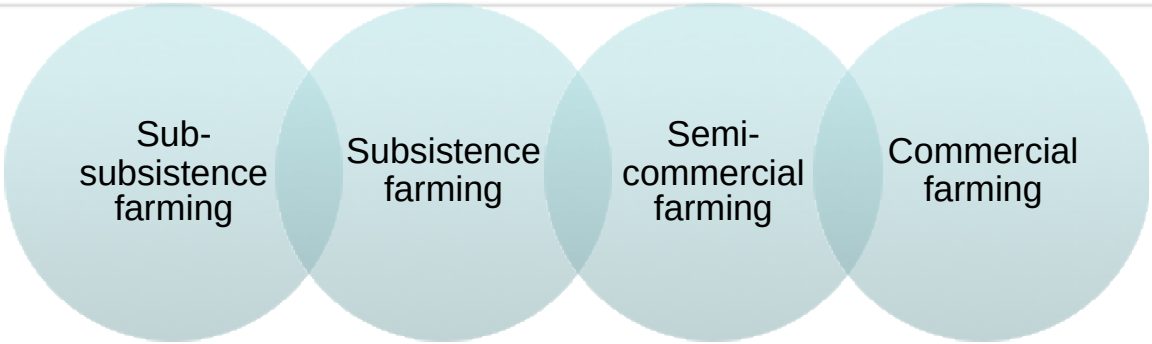


The six pillars of food sovereignty developed at Nyeleni (Mali, 2007) – see Auerbach, 2020, p.85

1. **Focuses on Food for People**
2. **Values Food Providers**
3. **Localises Food Systems**
4. **Puts Control Locally**
5. **Builds Knowledge and Skills**
6. **Works with Nature.**

How do we understand African food systems and lobby to move towards African food sovereignty and also biodiverse food security with health?





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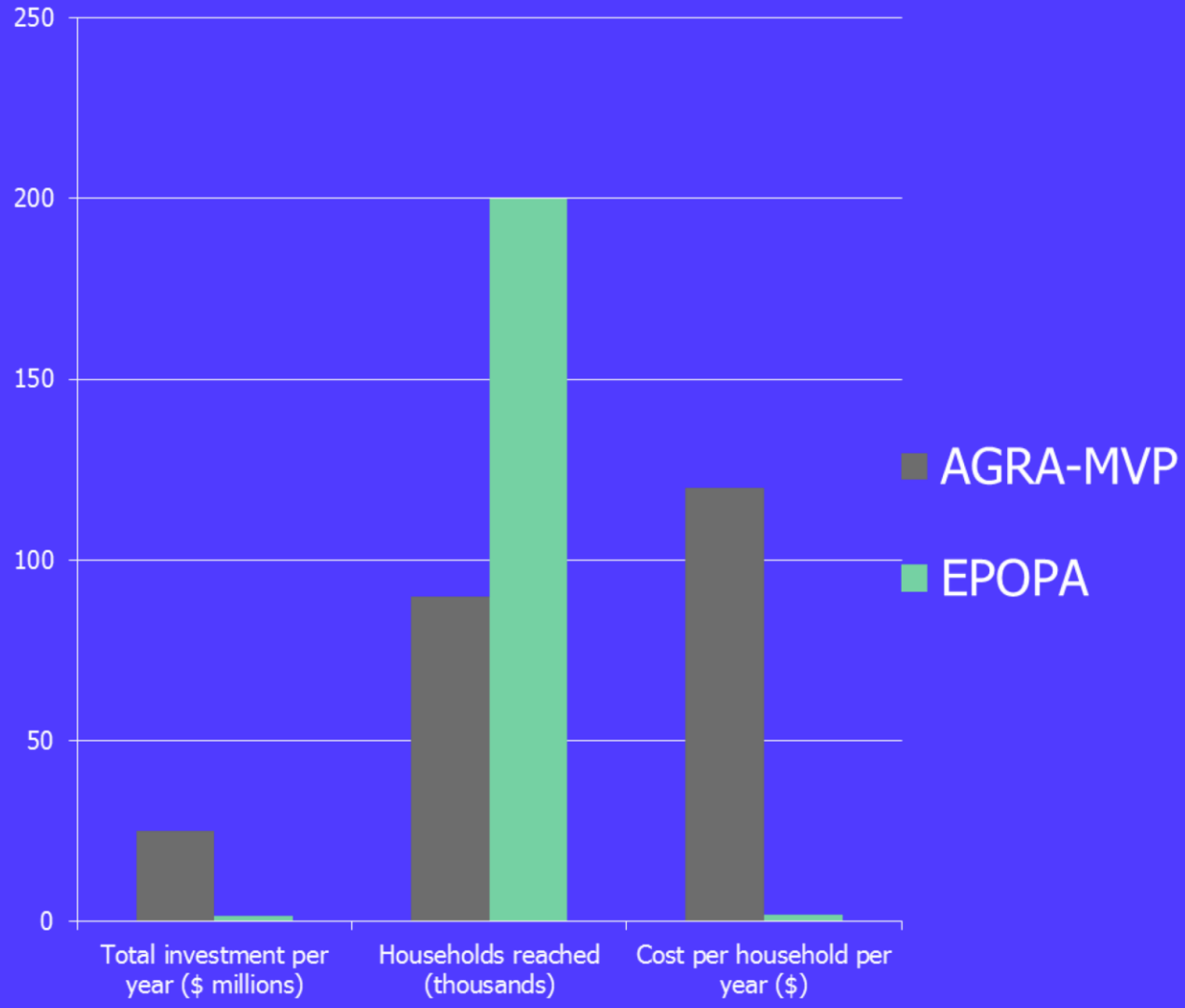
10,000 1,000 100 1 or 2

Auerbach et al. – FAO Book (2013)

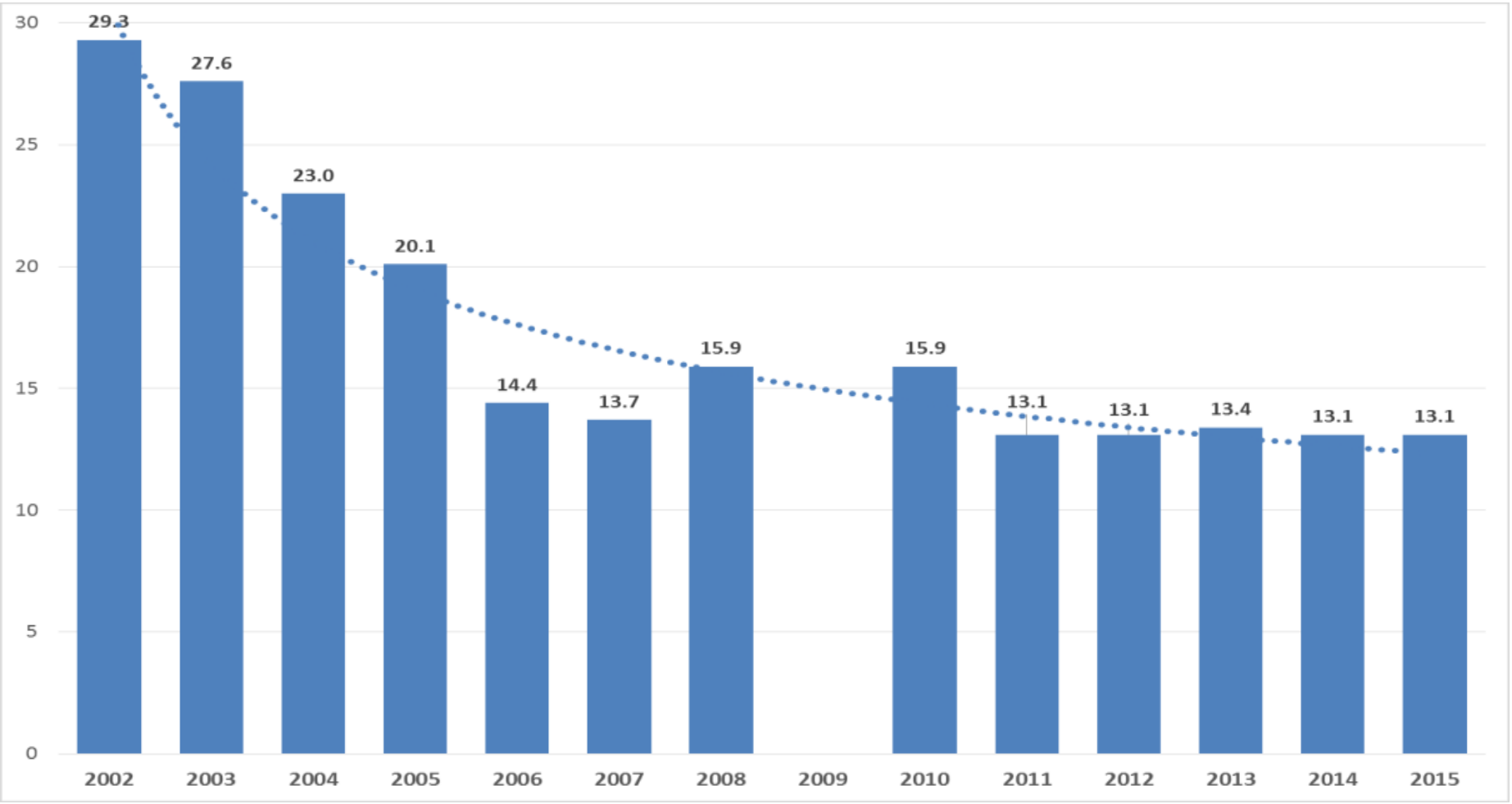
Comparison of Alliance for a Green Revolution in Agriculture Millennium Villages Project (AGRA-MVP) with the Export Programme for Organic Products from Africa (EPOPA). Extracted from Organic Agriculture: African experiences in resilience and sustainability.



Auerbach, Rundgren & Scialabba, 2013 (FAO), p.30

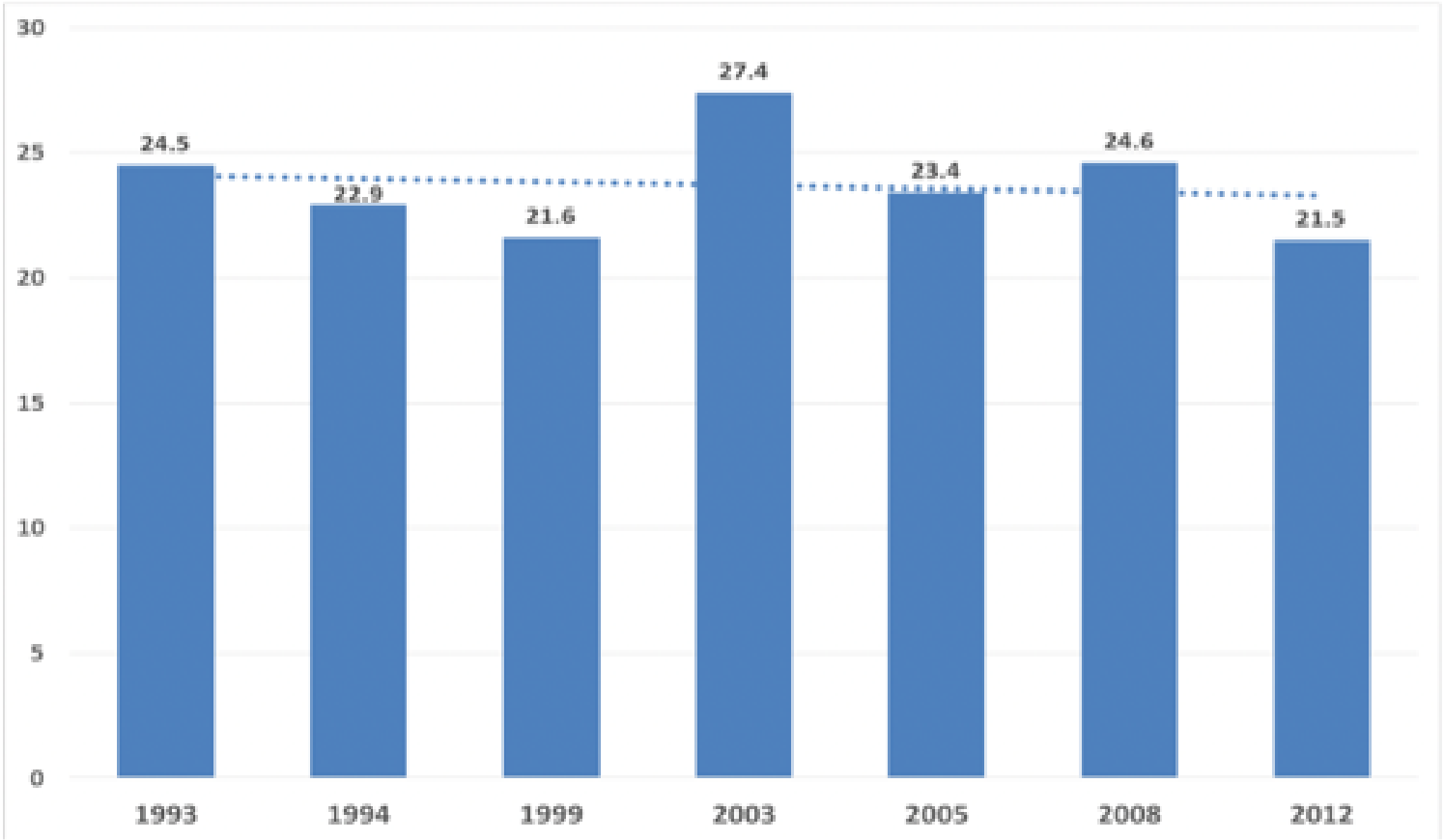
Figure 7.2: South Africa's food security situation in 2012 (authors' own calculation based on data from StatsSA, 2017)

People say they are less hungry since the introduction of the child grant.



… and yet child stunting rates remain stubbornly high!

Figure 7.3. Child stunting rates in South Africa, 1993–2012 (Devereux and Waidler, 2017)



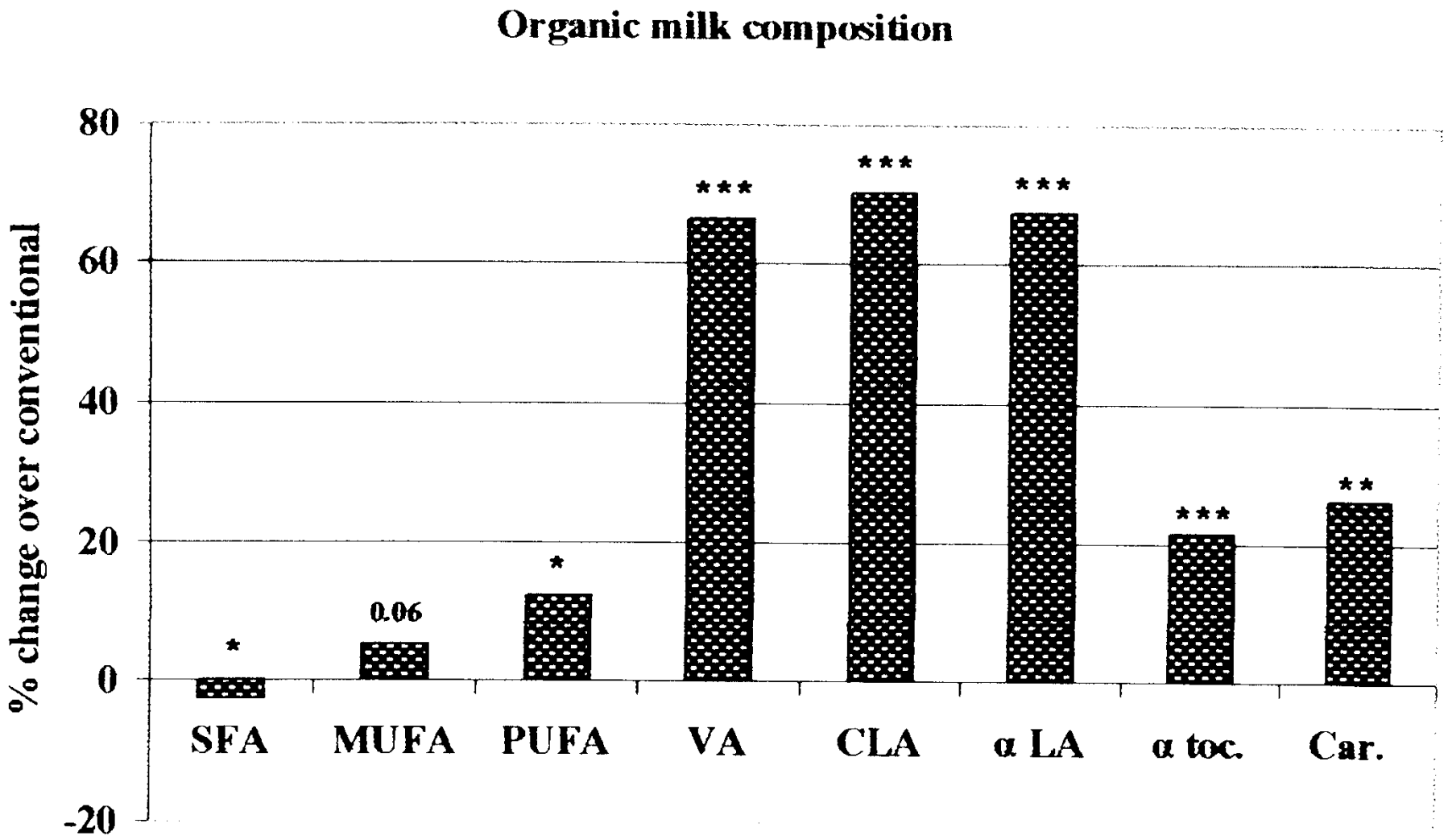


Figure 2. Composition of milk from organic farms, relative to that from conventional farms. SFA, saturated fatty acids; MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids; VA, vaccenic acid; CLA, conjugated linoleic acid; α LA, alpha linolenic acid; α toc, α-tocopherol; Car, carotenoids. ANOVA p values for the difference between organic and conventional milk: * $p<0.05$. ** $p<0.01$. *** $p<0.001$.

Typology for Ecological Organic Agri	Type	Organic Policy	Product standard	Govt support	Farmers organised	Export & domestic markets	Countries	No./ Type n=55
Advanced EOA country	1	Yes	Yes	Strong	NOAM	Yes, both	Madagascar Morocco Tunisia Uganda	4
Active EOA Country	2	Coming	Yes	Promise	NOAM (NOAM is National Organic Agricultural Movement)	Yes, both	Burkino Faso Egypt; Ghana Kenya Mali; Mauritius São Tomé & Principe Senegal Seychelles Sudan; Togo	11
Infant EOA Country	3	No	Yes or No	Little	Yes	Yes Export; Domestic developing	Algeria; Benin Cameroon Ethiopia Liberia; Namibia Nigeria; Rwanda South Africa Tanzania; Zambia Zimbabwe	12
Nascent EOA Awareness	4	No	No	None	Weak	Some export; Little domestic	Cape Verde DRCongo Gambia; Guinea Rep Ivory Coast Malawi Mauritania Mozambique Niger Sierra Leone	10
Awaiting Inspiration	5	No	No	None	None	None	Angola Botswana Burundi; Central Afr Rep; Chad; Comoros; Congo Republic Djibouti Equator. Guinea Eritrea; Eswatini Gabon; Guinea-Bissau; Lesotho; Libya; Somalia South Sudan West Sahara	18

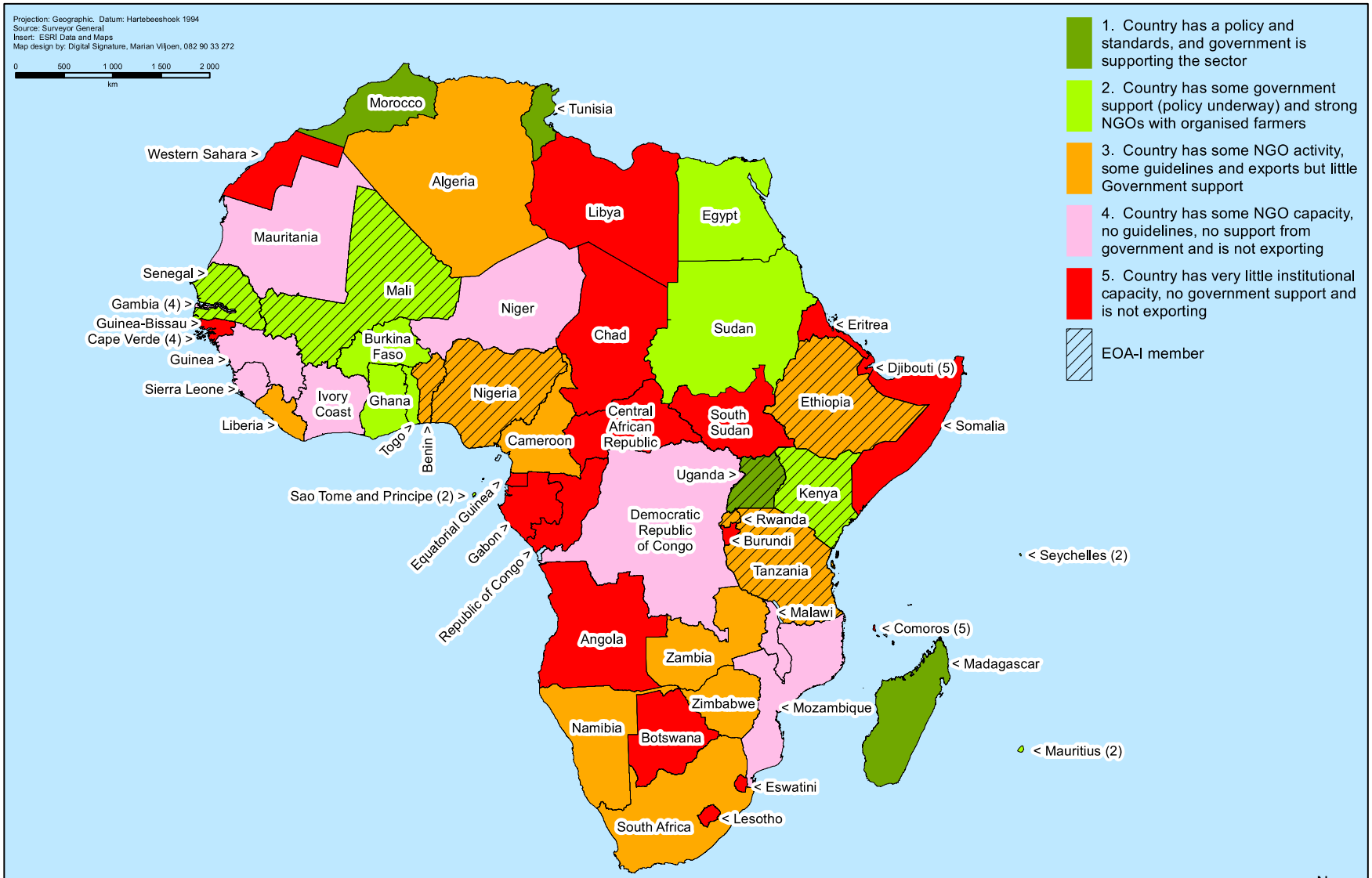


Figure 1: Ecological Organic Agriculture Status of the 55 Countries of Africa
Prepared by Biological Systems Consulting & Research for the African Union Commission in 2020.

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Thank you! Questions? Comments?

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