

The effect of conservation agriculture on earthworm population in a wheat-chickpea rotation in Morocco

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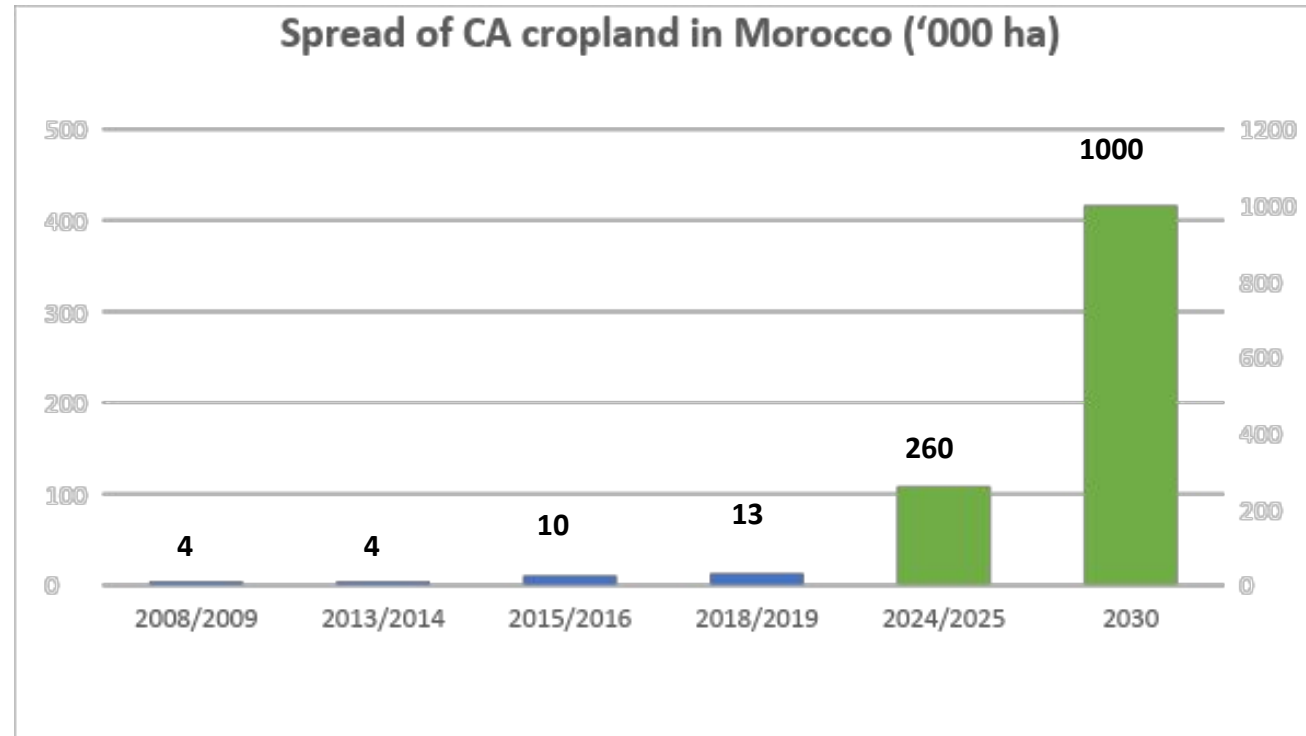
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Theme:
Building a Resilient Future in Africa
through Conservation Agriculture and Sustainable
Mechanization

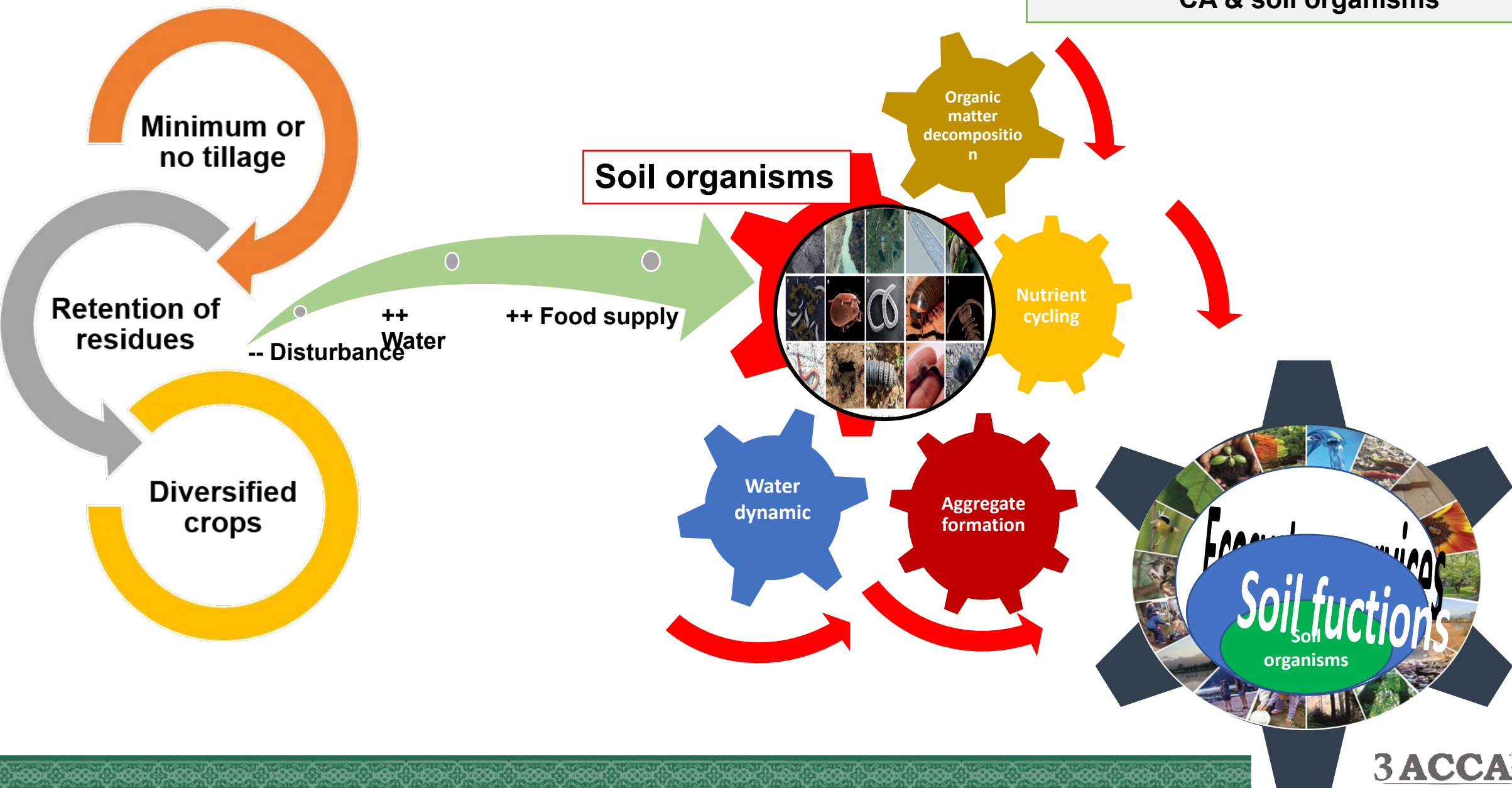


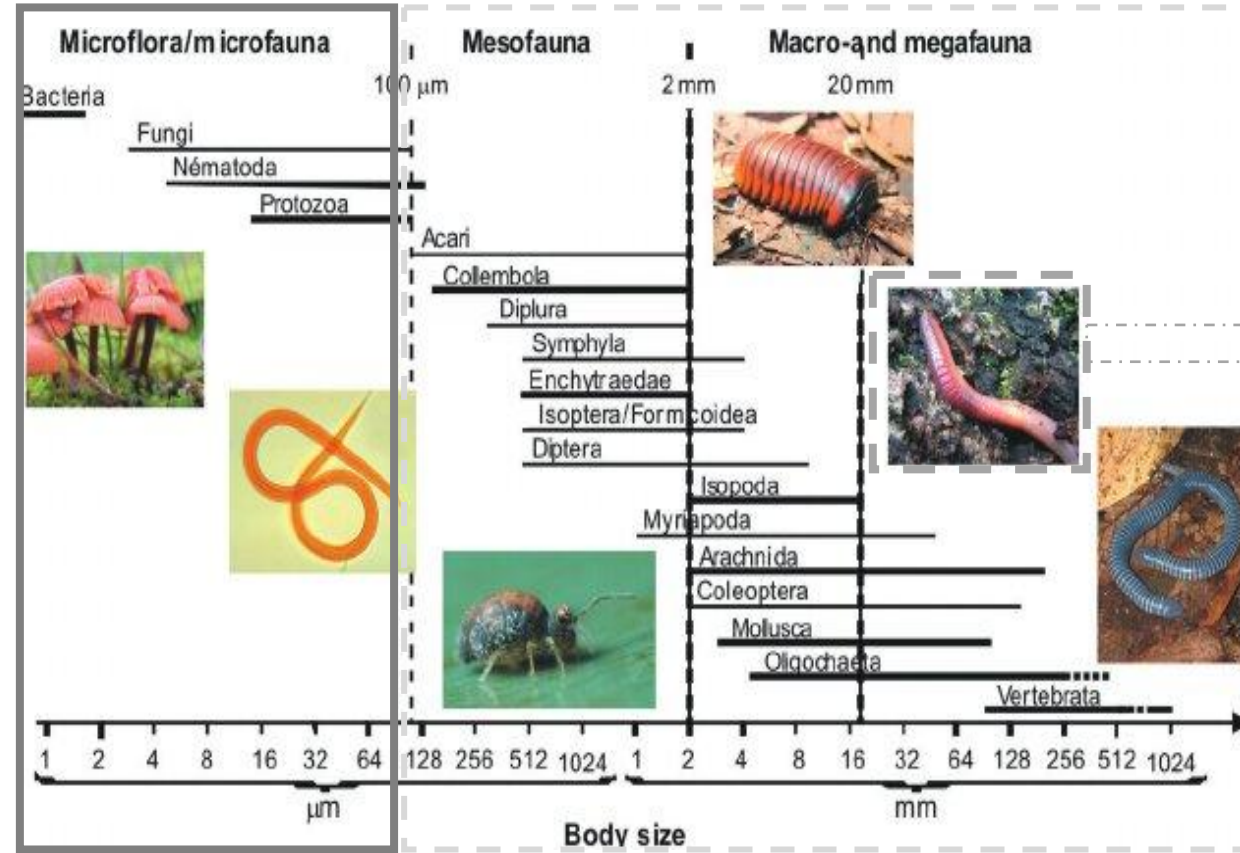
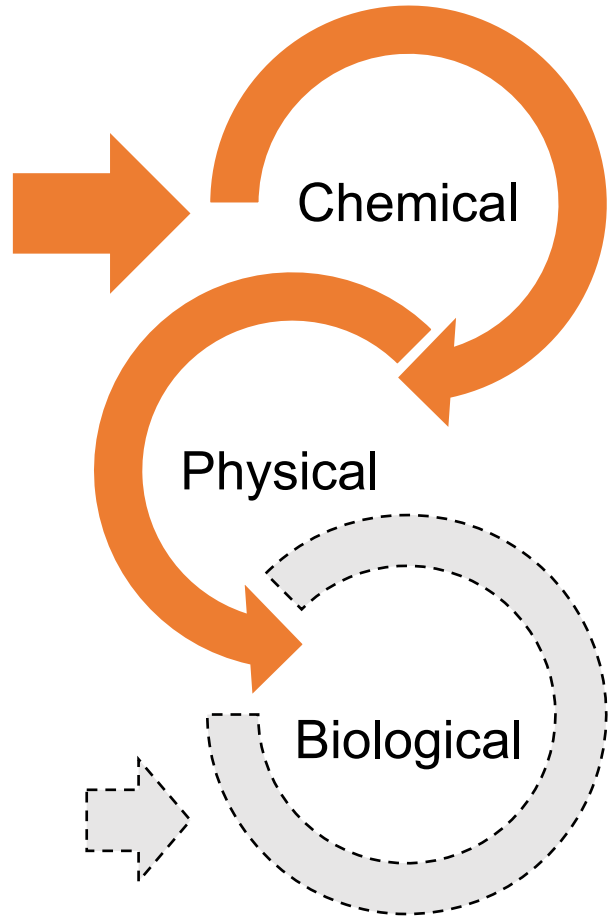
Green Generation



*Kassam et al. (2022)

*MAFRDWF (2023)

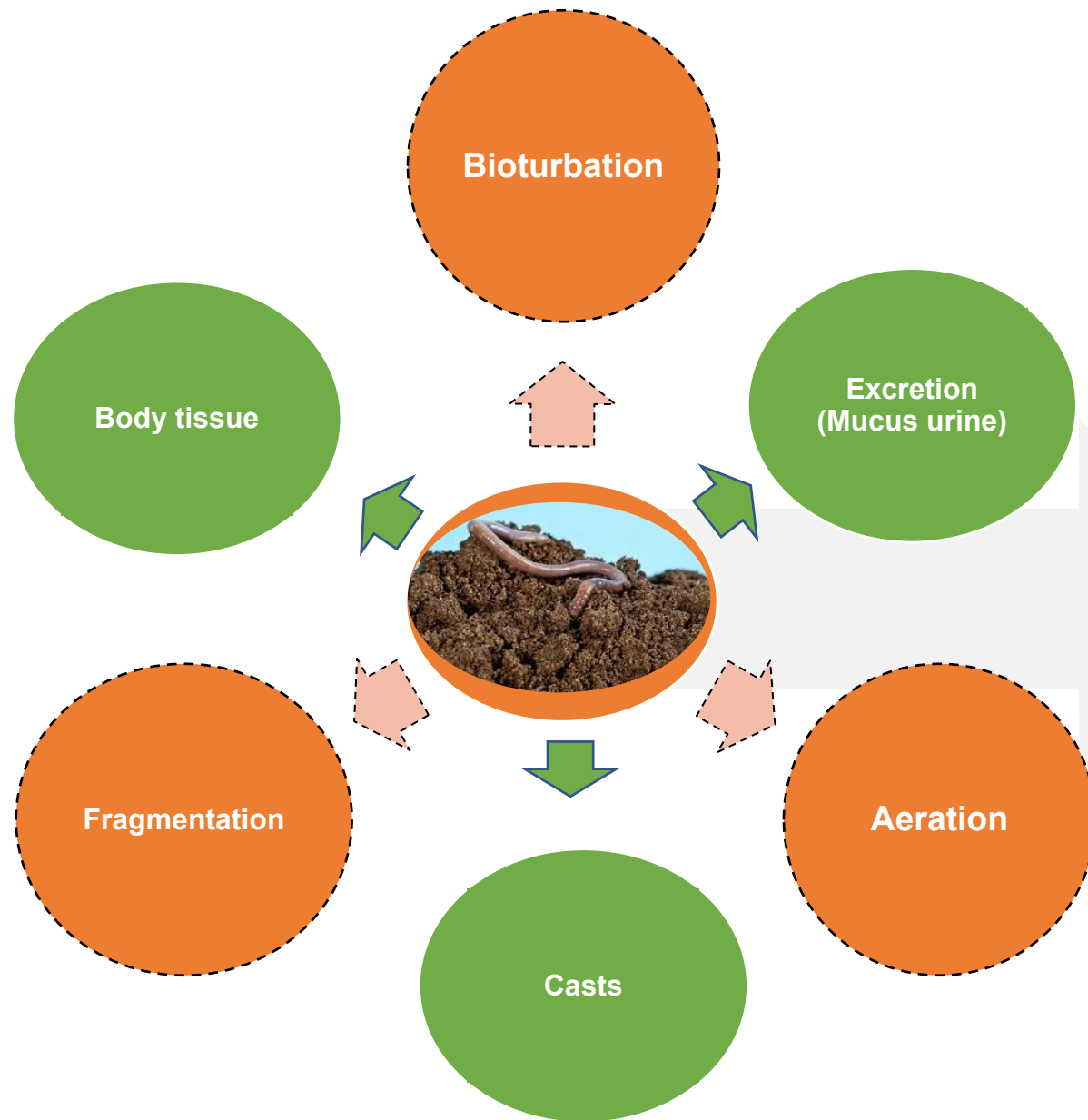




Lavelle (2012)

-Ecosystem Engineer
-Actor and indicator
of soil health

Earthworms & Soil functions

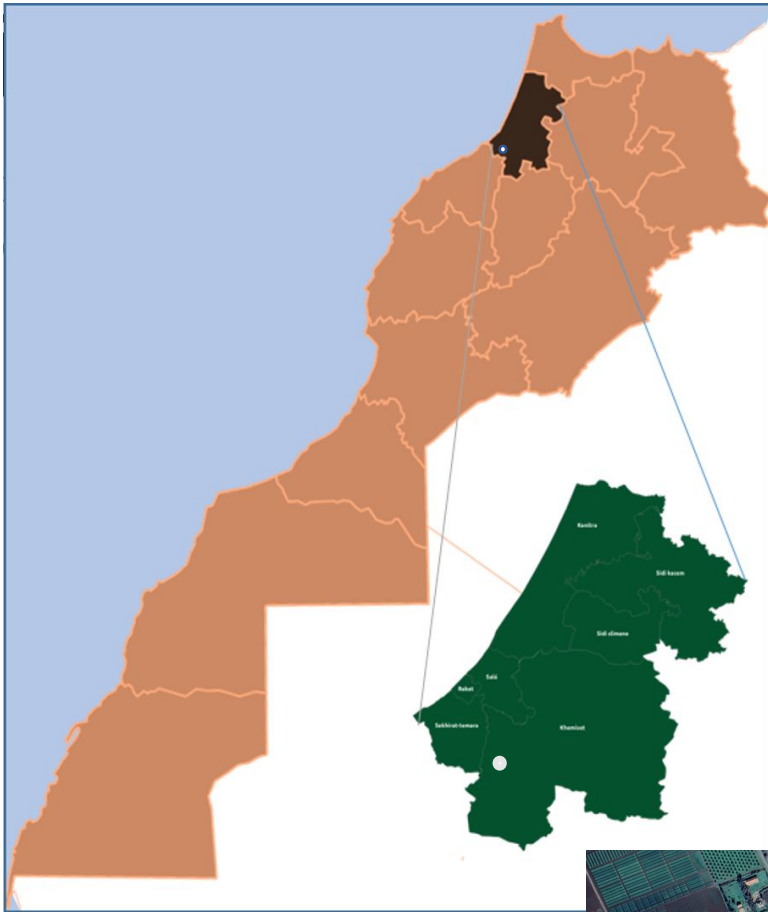


Increase by 20-25 % of crop production

To examine the effect of CA on earthworm population under wheat-chickpea rotation in the central region of Morocco

Study site

- Experimental Station of Merchouch (Province of Khemisset)
- Mediterranean climate (Mean annual rainfall of 450 mm)
- Two adjacent plots : Conservation vs. Conventional
 - ✓ Established since 2004
 - ✓ Haplic vertisol
 - ✓ Each plot divided into 5 sup-blots
 - ✓ Conventional subplots: ploughed according to farmers' practice
 - ✓ Conservation subplots: no-tillage with residue retention
 - ✓ Both plots under wheat-chickpeas sequence during the study period



- Five sampling points for each plot (1 point/subplot)
- February 2022 and 2023



- ✓ Earthworms handsorted from soil blocks 25 cm x 25 cm at 25 cm depth and preserved in ethanol solution.
- ✓ Soil samples adjacent to earthworm sampling points.



Species identification & measurement of biomass and abundance

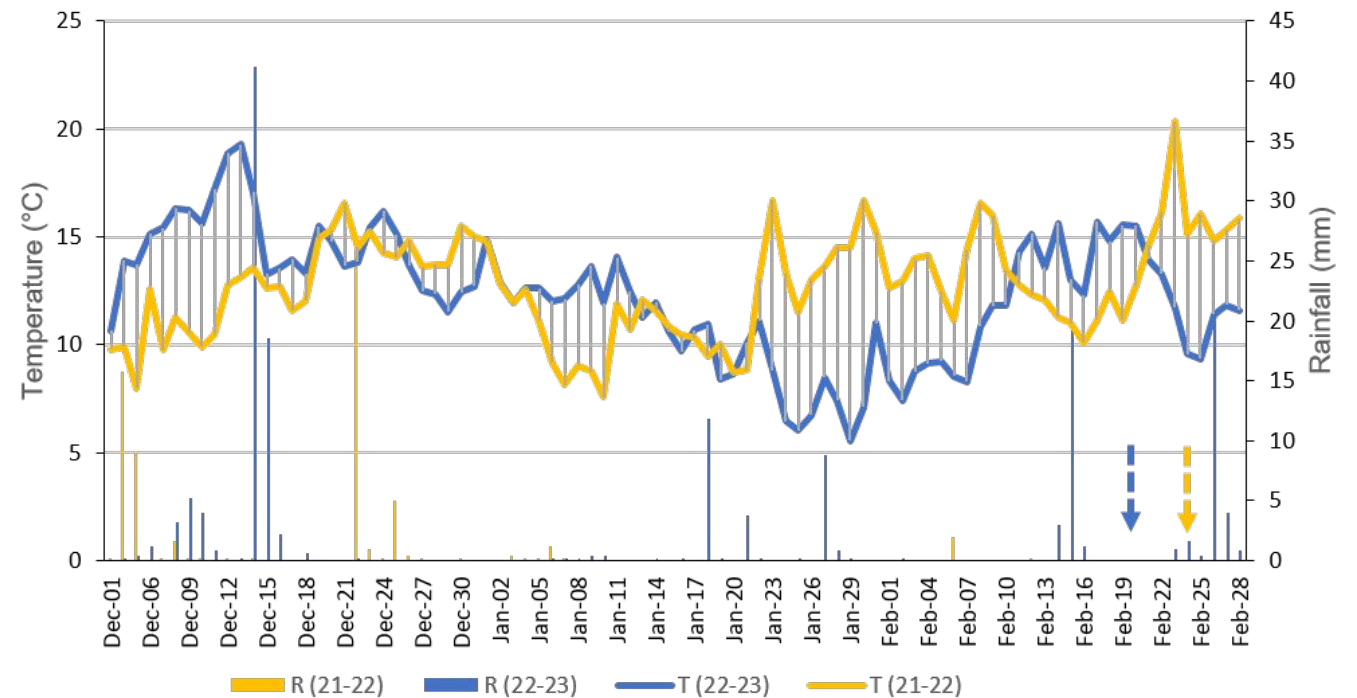


Bulk density, soil moisture and organic matter

Climate conditions at sampling events

- Mean daily temperature (Dec-Feb):
 - 2021-22: 12,6 °C
 - 2022-23: 12,3 °C
- Total rainfall (Dec-Feb):
 - 2021-22: 65 mm
 - 2022-23: 129 mm

Temperature and rainfall at the field site
(Merchouch Research station)



Soil conditions at sampling events

		2022 (Chickpea)	2023 (Wheat)
Moisture (%)*	Conventional	9.0 ± 1.9	15.2 ± 0.6 b
	Conservation	13.3 ± 2.2	19.5 ± 0.6 b
Bulk density (%)	Conventional	1.2 ± 0.08	1.2 ± 0.06
	Conservation	1.2 ± 0.09	1.1 ± 0.06
Organic Matter (g Kg⁻¹)*	Conventional	20.3 ± 0.5	18.8 ± 0.8
	Conservation	20.9 ± 0.2	19.3 ± 0.9

**At 0-20 cm soil depth*

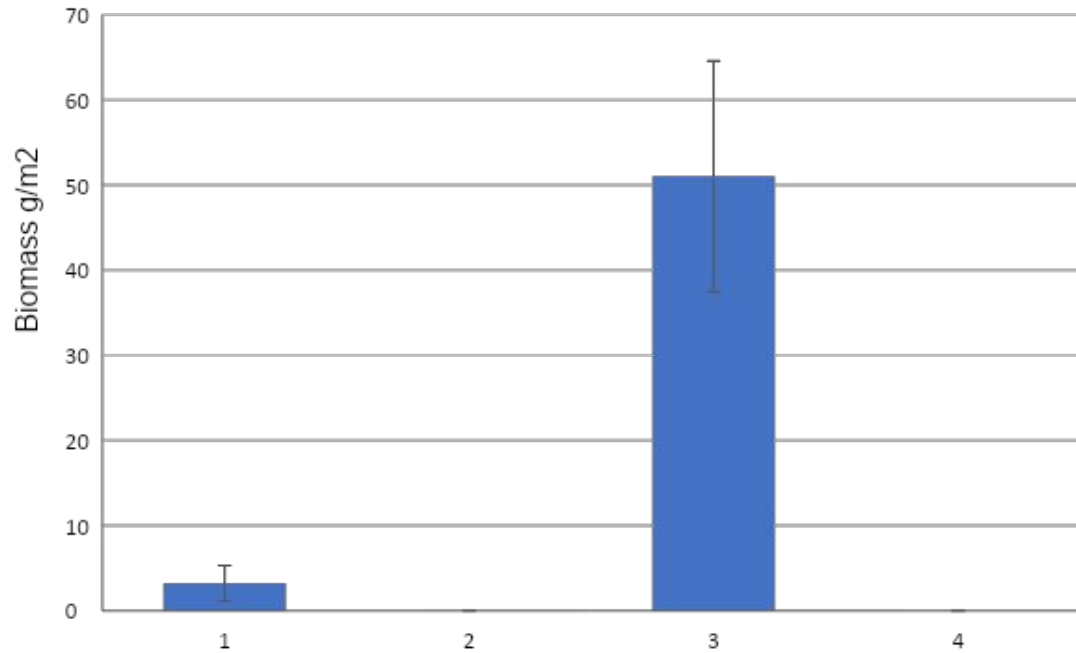
Earthworm & selected soil properties

- 2022:
 - Cv: 0 individuals
 - Cs: 7 individuals, 43% adults: *A. rosea*
- 2023
 - Cv: 0 individuals
 - Cs: 46 individuals, 65% adults: *A. caliginosa*, *A. rosea*

Earthworm/soil	Abundance	Biomass
		r_s
Moisture (%)	0.697**	0.781***
Bulk density (%)	-0.174	0.136
Organic Matter (g Kg ⁻¹)	0,220	0.122

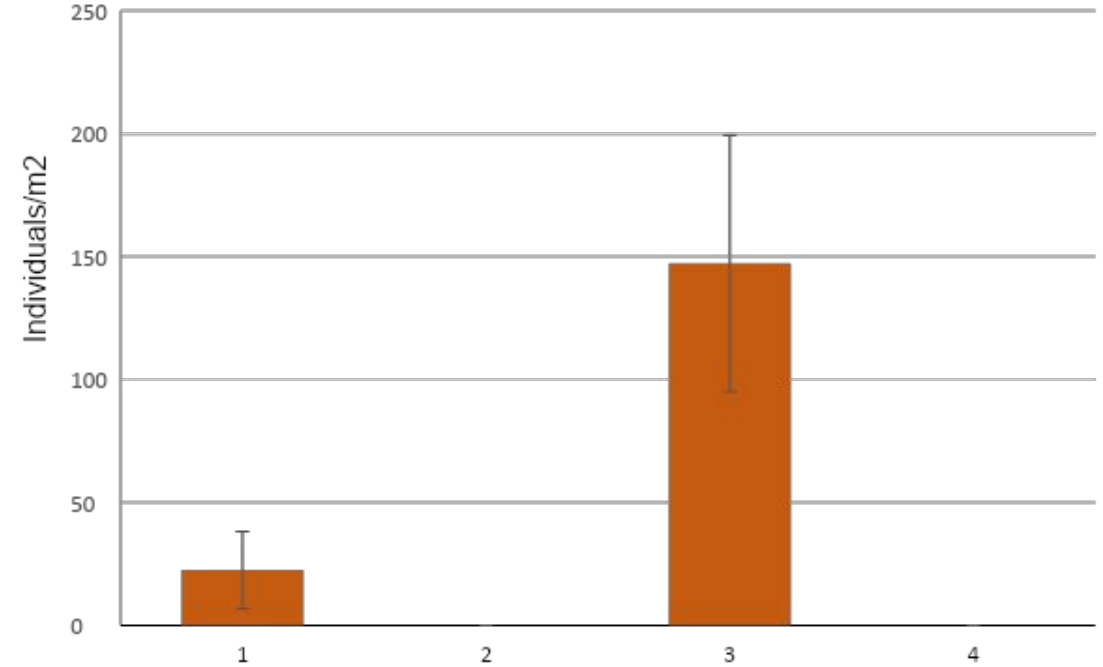
Earthworm abundance and biomass

Earthworm Biomass*



* Ethanol Preserved weight

Earthworm abundance



- This study provide further evidence on the positive effect of CA on earthworms under cereal-legume based cropping system in semi-arid regions of Africa.
- More studies are needed to monitor the activity of earthworms and other soil fauna under CA to better determine and quantify their real contributions on regulating soil functions.

“...Any financial and structural assistance and incentives needed by farmers can be justified by the recognition of the public goods’ value of environmental and socioeconomic benefits generated by CA-based land use. “

(Kassam & Mkomwa, 2018)

Acknowledgment

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Thank you for your Attention!

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