

Regional workshop to kick-start implementation of plans and establishment of communities of practices: Bridging Knowledge Creation and Sharing for Natural Resource Management and Climate Resilience

Rabat, November 14-15, 2019



Crop-Livestock Integration under Conservation Agriculture (CLCA) in North Africa Region



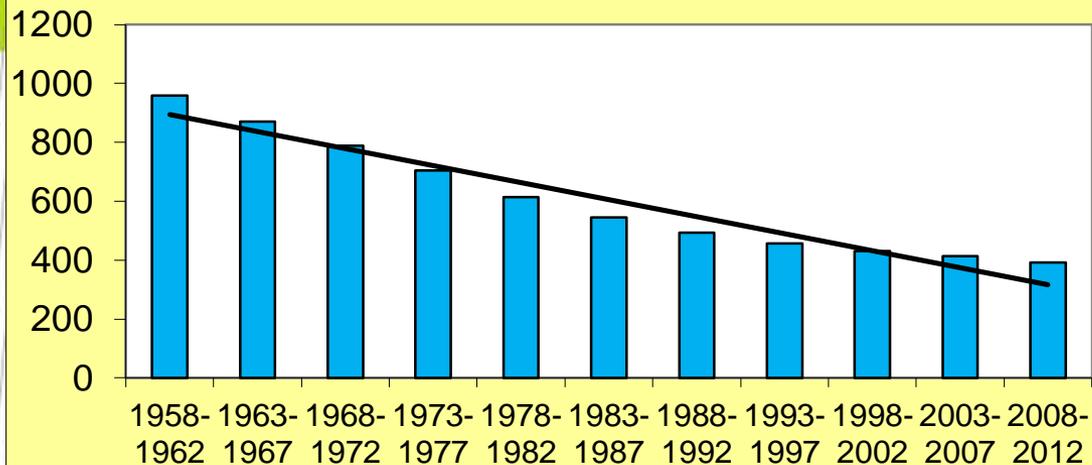
Hatem CHEIKH M'HAMED, PhD

hatemcheikh@yahoo.fr

National Institute of Agricultural Research of Tunisia

Water scarcity and soil degradation (erosion)

m³ / inhab / yr



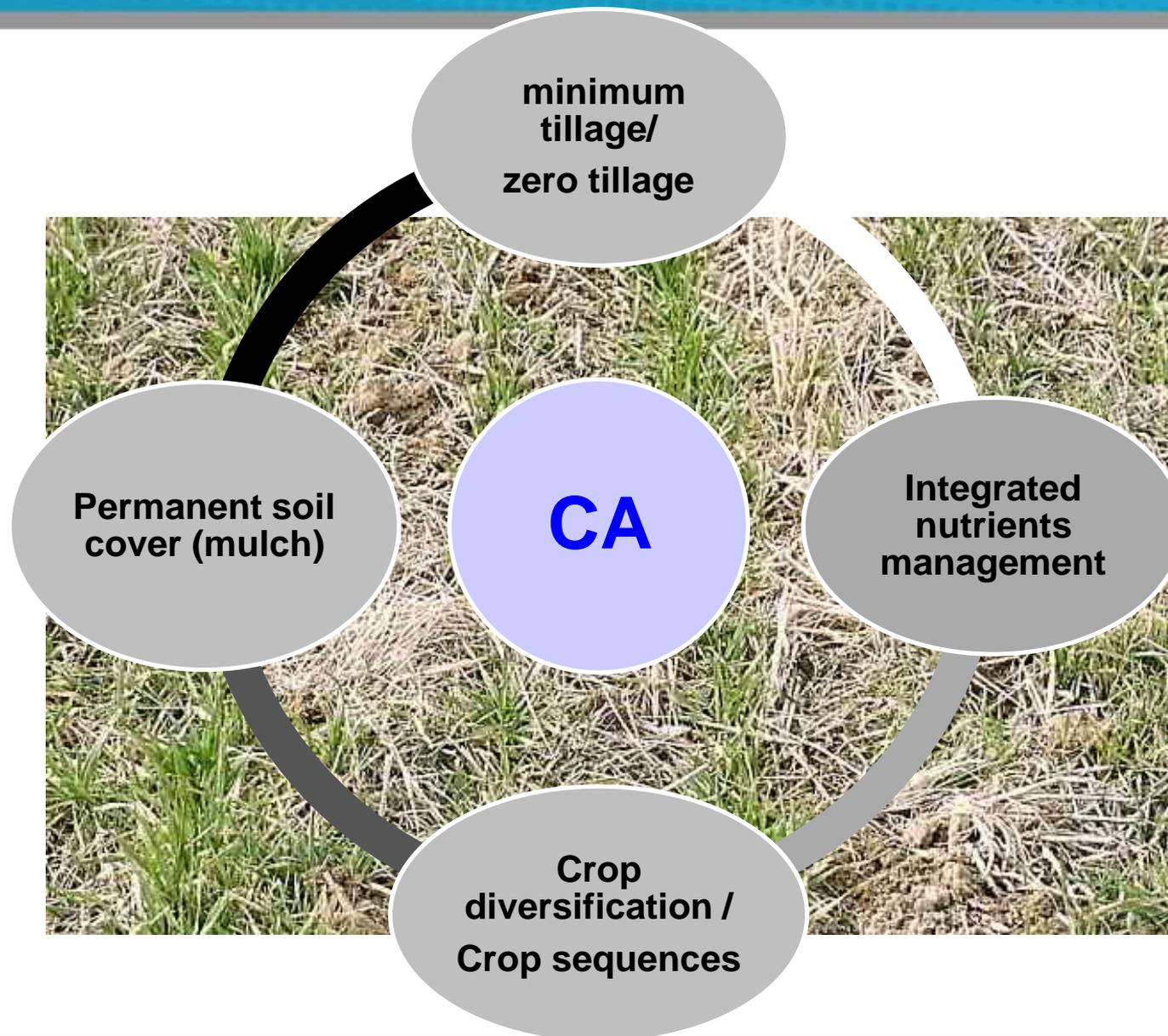
- Water resources in Tunisia are considered among the lowest in Mediterranean basin and in MENA region
- Internal water resources below the threshold of 500 m³/inhab/yr decrease from year to year

✓ 3 millions ha of land subject to erosion (60 % of arable land)

✓ 25 million m³ of sediment eroded from slopes

✓ 10.000 to 15.000 ha of land lost annually

Principales of Conservation Agriculture



Main constraints of adoption of CA in Tunisia

- ❖ Conflict between stubble grazing and permanent soil cover (summer period)
- ❖ High cost of NT seeder
- ❖ Crop diversification are limited
- ❖ Adapted species as cover crops are limited
- ❖ No specific support by government

“To understand the soil organic matter in no-tillage system you have to think as a crop residue”

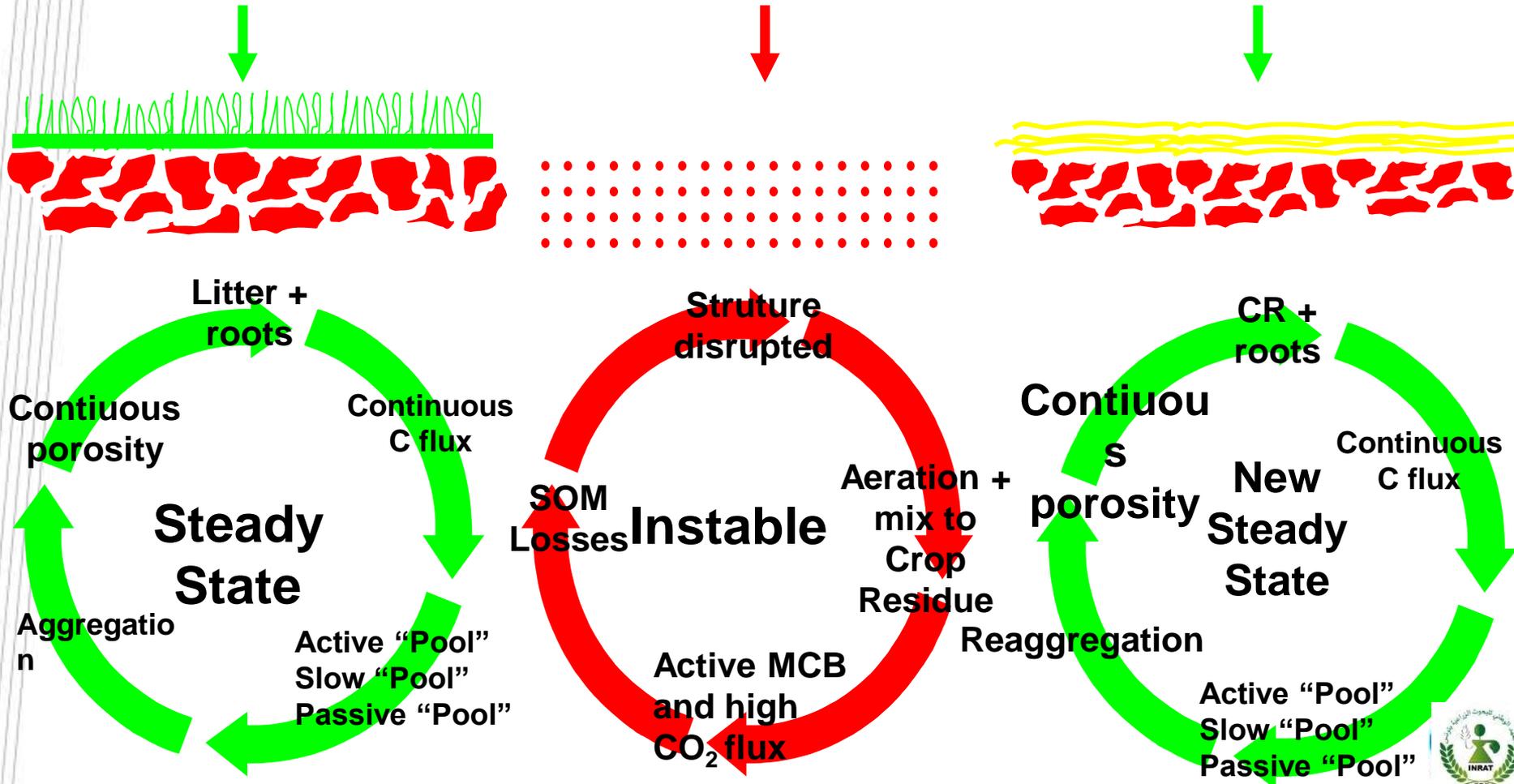


Natural
Vegetation

Conventional
Tillage

Conservation
agriculture

Basic differences among of the land use systems

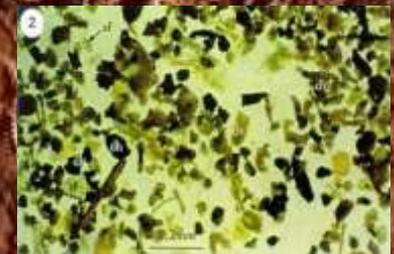


Impact of crop residues on Soil Organic Matter



C and N Stock

Particle size



> 212 μm
53 to 212 μm
< 53 μm



Importance of livestock (small ruminant) in North Africa

In semi aride region production systems are mainly based on cereals production (wheat and barley) combined with ruminant livestock.

- i) Livestock make to producers the possibility to diversification of the income and represent a savings mobilized of money at any time of the year,
- ii) Cereals provide much of the animal's needs throughout the year.
- iii) The grain and straw of cereals are provided during the fall and winter and stubble during the summer season.

These residues are an important food source for livestock in the summer period



Importance of grazing stubble

The period of the disponibility of stubble coincid with the gestation period of ewes/goats : July – Augest – September

Stubble grazing is a common/traditional practice in the region, despite the low nutritional value of stubble.



❖ A conflict of interest exists between mulch for covering soil and grazing.



❖ Tradeoffs between the use of stubbles for livestock feeding or to cover the soil have to be resolved, particularly in drylands where fodder potential is low.

 Challenges for rapid adoption of CA in NA region





FAD-ICARDA- PROJECT “Use of Conservation Agriculture in Crop-Livestock Systems (CLCA) in the Drylands for Enhanced Water Use Efficiency, Soil Fertility and Productivity in NEN and LAC Countries”. (CLCA II, 2018 - 2022).



Main Achievements on CLCA



National Partners



International Partners



Reasonable grazing during summer period under CA system **(30/30 Model developed)**

On Farm Trial

❖ Experimental design

- Animals: 30 ewes .
- 1 ha of stubble of bread wheat cultivated under CA system using a stocking rate of 30 ewes/ha.

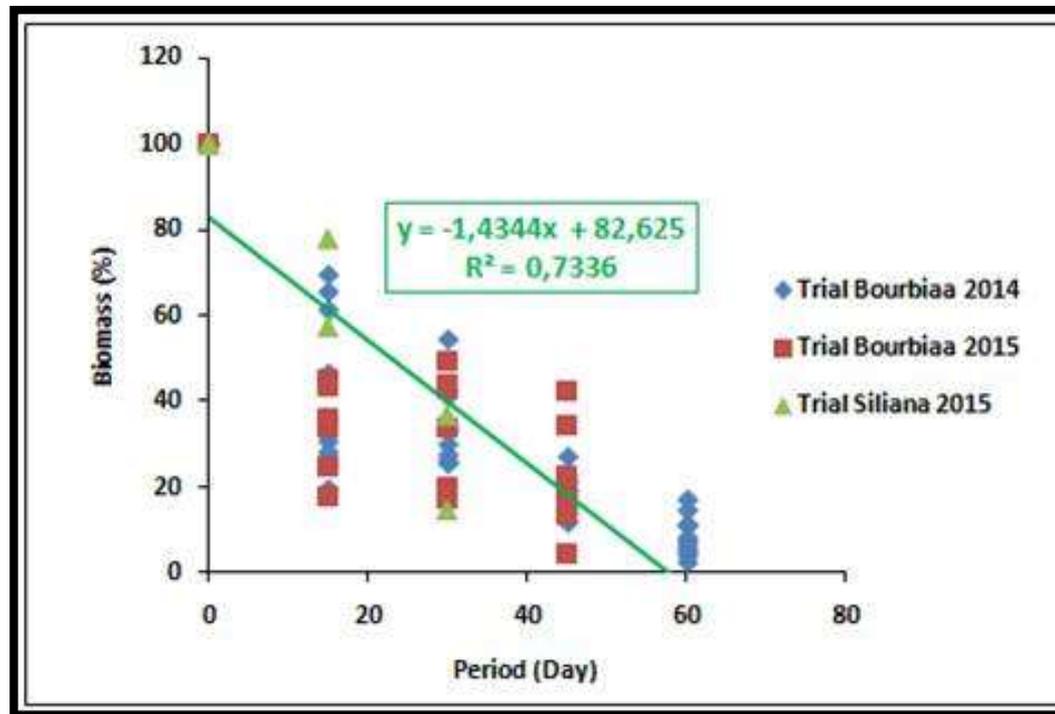
❖ Measurements

- Stubble biomass dynamic (every 15 days).
- Live weight and body condition scoring (BCS) every 10 days.



30/30 Model developed, calibrated and validated in the on-farm

Biomass of residues (mulch) is not limited until the end of the experiment and more than 40% of crop residues was preserved on soil.



Relation between biomass and grazing period in CA

At the same time ewes were accomplishing their end gestation stage normally, with increased live weight.



Introduction a new forage species for
crop diversification and for enhancing
forage production
(300 - 400 mm)



Introduction of new forage species in crops rotation (Vetch)



- 300 balls / ha
- 6-7 T/ha
- 14 % protein

Mixture Vetch*triticale and Vetch*Oats

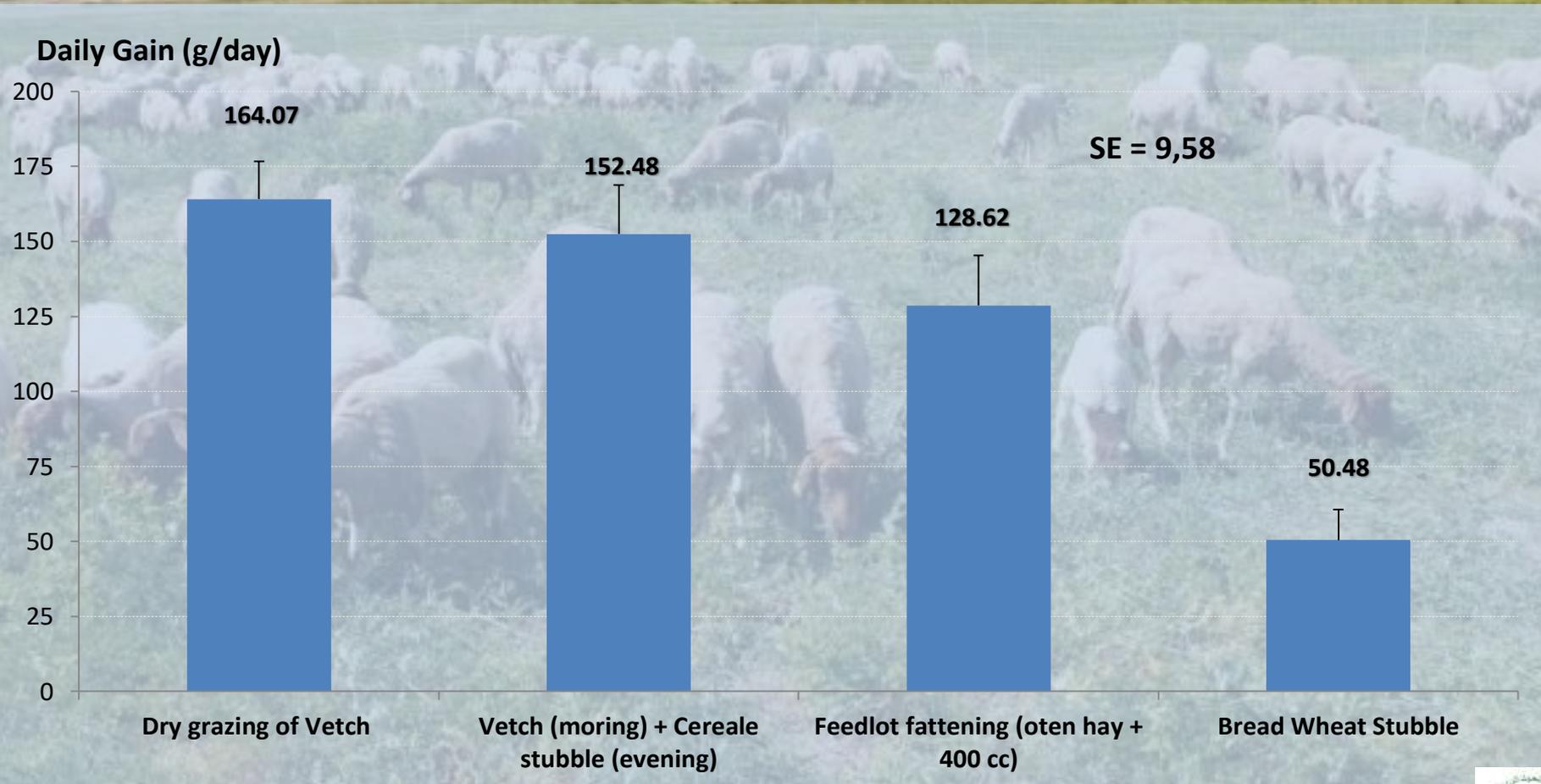


- More success for the mixture vetch * triticale than for vetch * oats
- % of vetch > triticale
- Best mixture (70 % of vetch with 30 % of triticale)



Introduction of new forage species in crops rotation

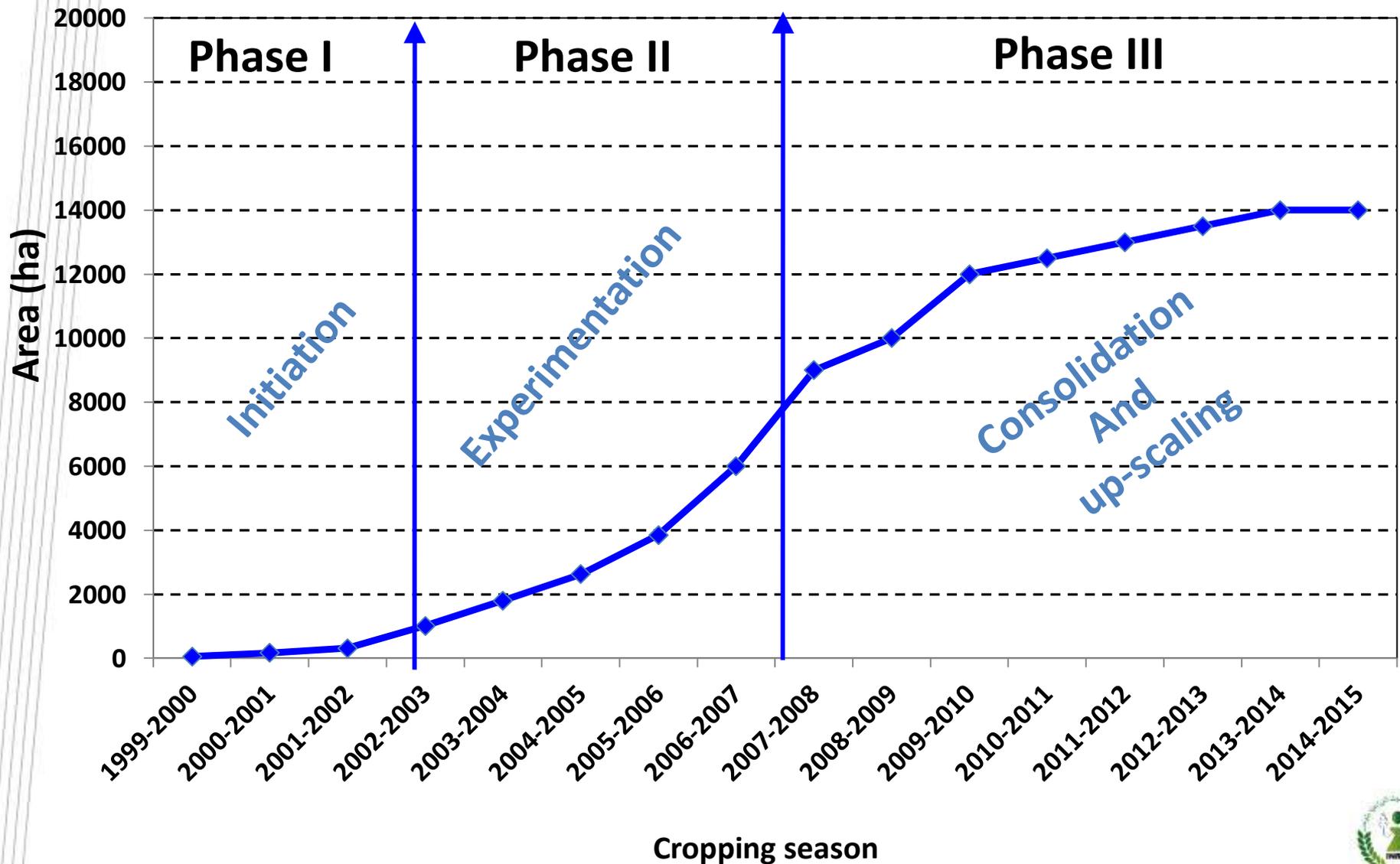
Dry grazing of vetch: where vetch is left to mature aboveground and then grazed by growing animals. Several diets were compared.



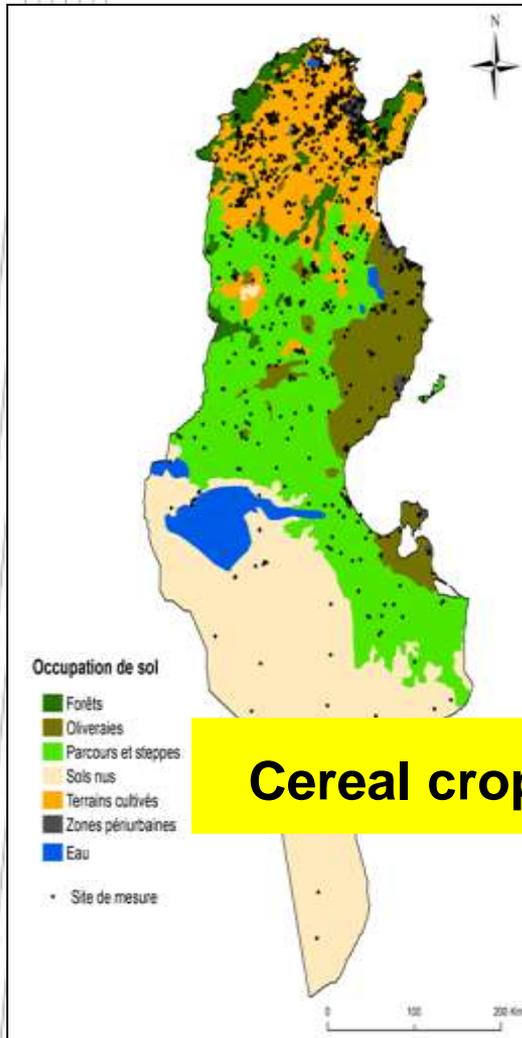
Scaling Road map of CLCA in Tunisia



Historical of Conservation Agriculture in Tunisia

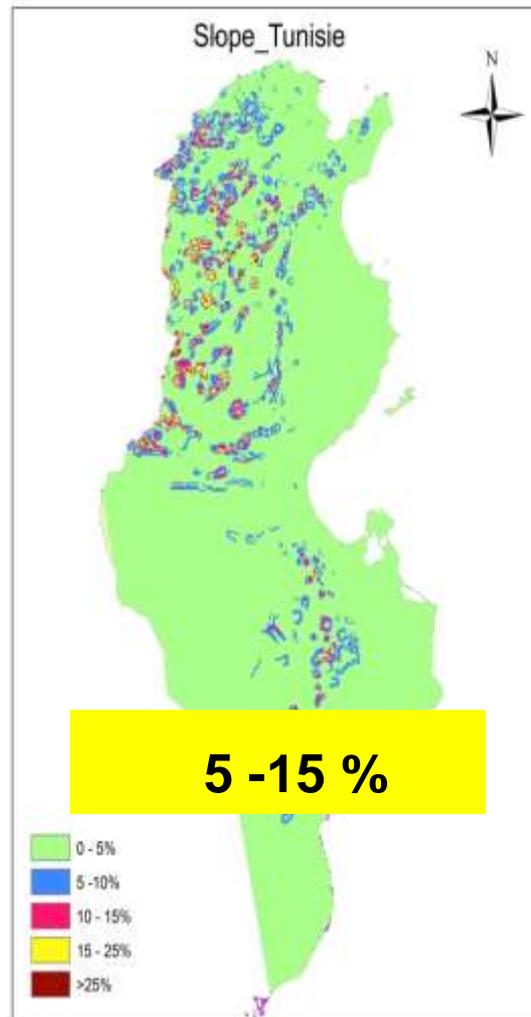


Where to promote adoption of CA ? (Urgent suitable area for CA)



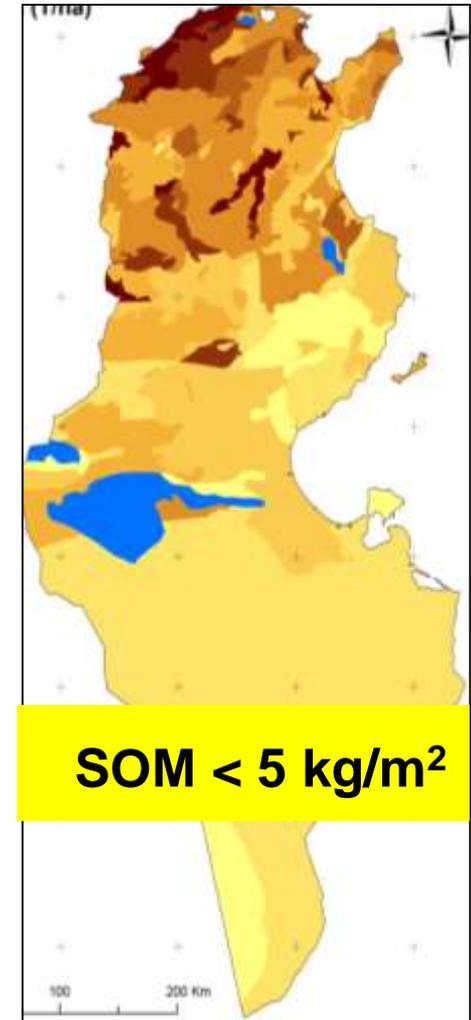
Cereal crops

+



5 - 15 %

+



SOM < 5 kg/m²

Land use map

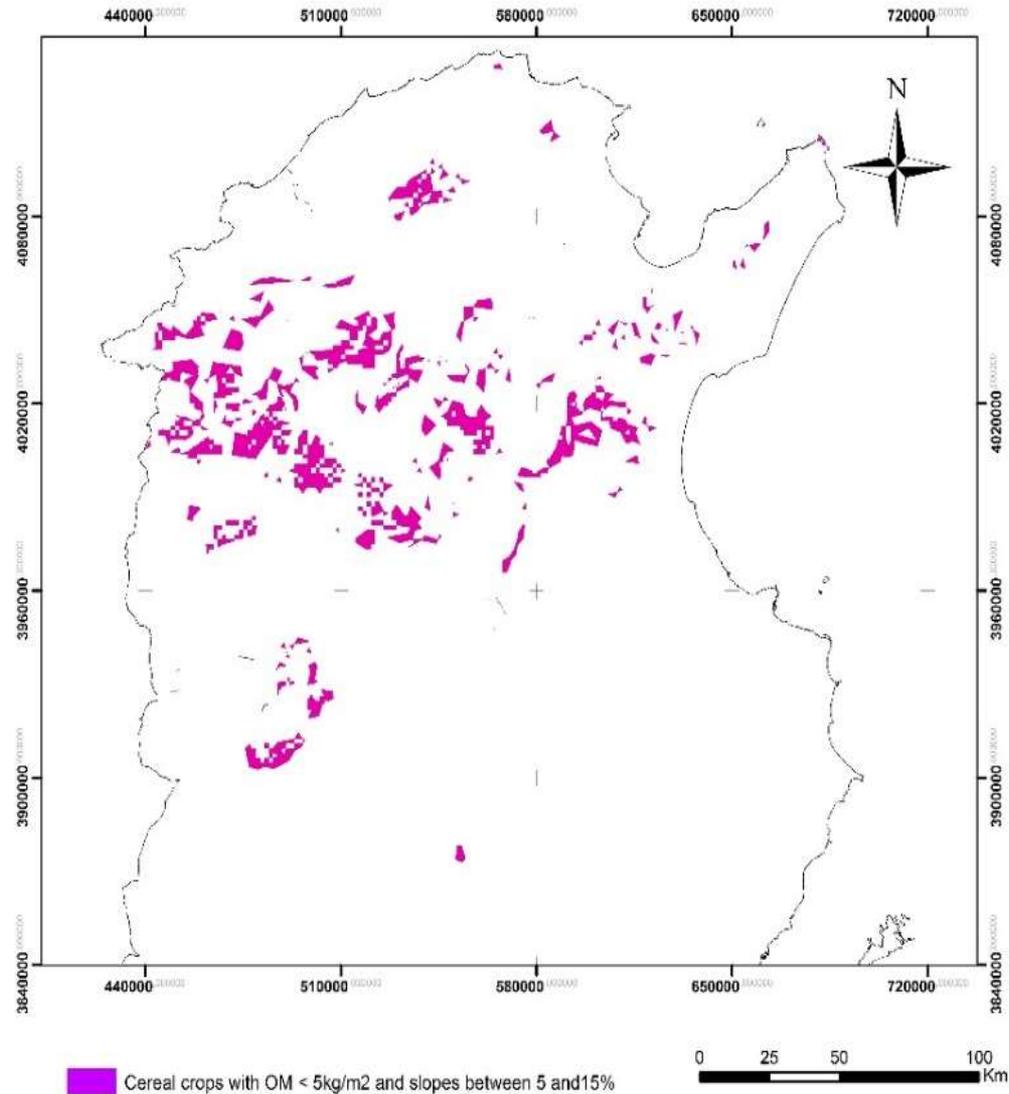
Slope map

SOM map



Urgent suitable area for CA adoption

Σ 260 000
ha



Problem definition

- **Natural resources degradation, especially soil, and water scarcity exacerbated by climate variability.**
- **Low income from farming.**
- **Limited crop diversification**
- **Model of dissemination for technologies is not adequate especially for dynamic systems (rain variability, market, seed availability)**
- **High feeding cost for livestock and rangeland degradation**
- **High reliance on cereal stubbles leading to significant erosion yet with limited nutrition benefits (low quality) especially during summer period.**
- **Forage seeds especially for legumes are not available (not available in the market)**



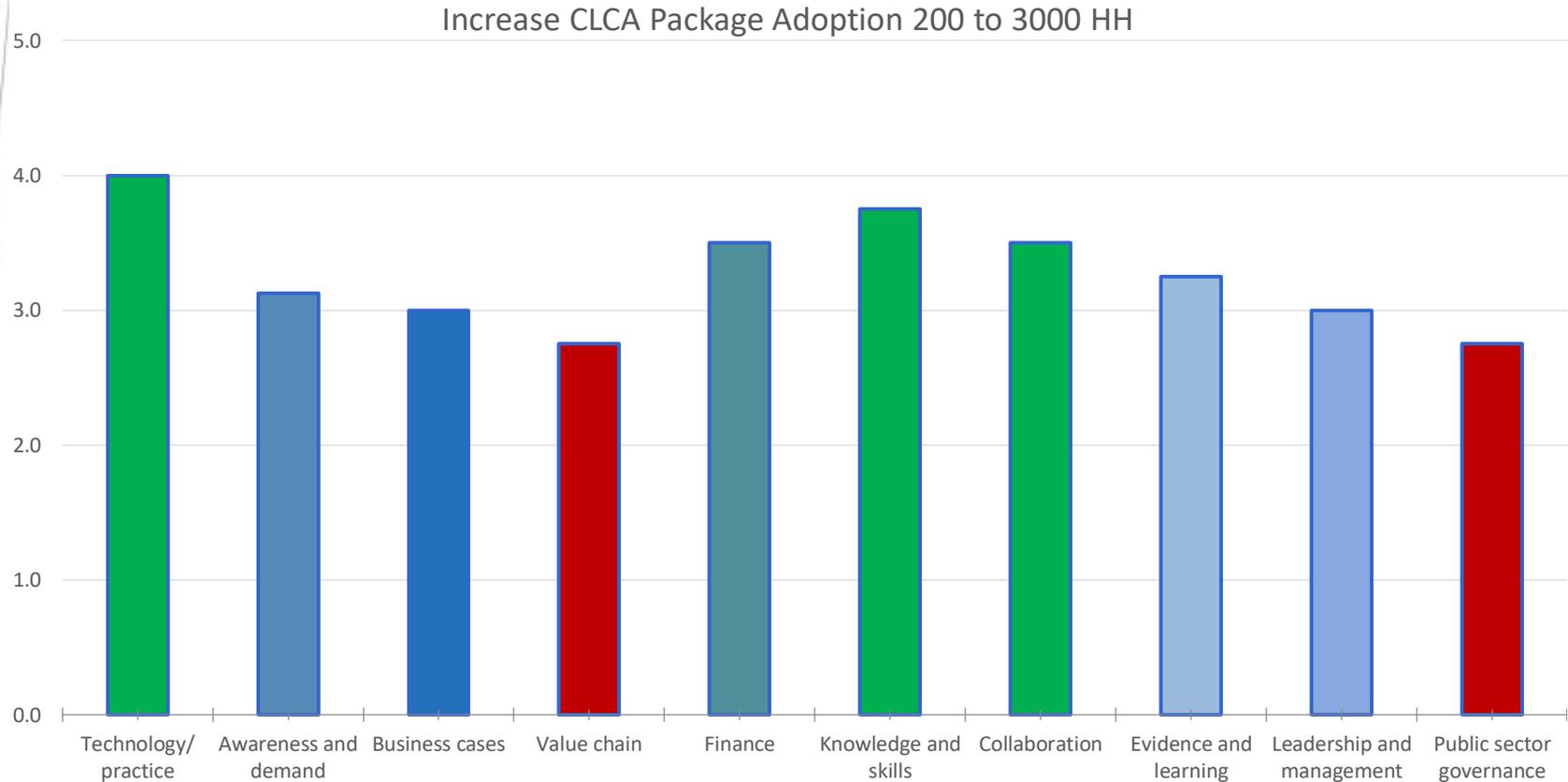
Responsible and realistic scaling ambition

- **By 2022, OEP, INGC, INRAT, AVFA, and Private company want to increase adoption of CA-based on zero tillage with small ruminant integration through forage legume based crop rotation and enhanced feeding systems from 200 HH to 3000 HH of small farmers (< 10 ha) in semi-arid region of Tunisia (cereal-sheep belt) for increased production sustainability and HH livelihood with consideration of gender equitable benefits.**



Identification of Strengths and Weaknesses

The scaling barrel/Scoring



Weaknesses

Value chain is the lowest score because there is a gap in many technologies. There was no study on value chain analysis in CLCA system. There is seed, forage, cereal, feed system, crop diversification. As such, there is a need to study the value chain of the CLCA systems and technology analysis.

Governance is also weakest. In national strategy for agricultural production, CLCA technology is not included under the ministry of agriculture. However, some technology components of the CLCA package are included in the strategy of public institutions.



Strengths

Technology

Provide evidence to drive policy change by raising awareness of policy makers and showcasing impact.

Consolidate and adapt CLCA packages as per the local contexts (not the same from Siliana to Beja).

Knowledge and skills

Better knowledge that identifies all stakeholders that should be involved and supported

And also to provide evidence for policy change



Collaboration

Lobbying to push decision-makers to include our technological packages in the national strategy of livestock and field crop extension

Establish a national network with all stakeholder on CLCA package for improved communication that would be also connected to an international network (like ACT, African Conservation Tillage, Network of FAO on CA led by Ameer Kassam, etc.)

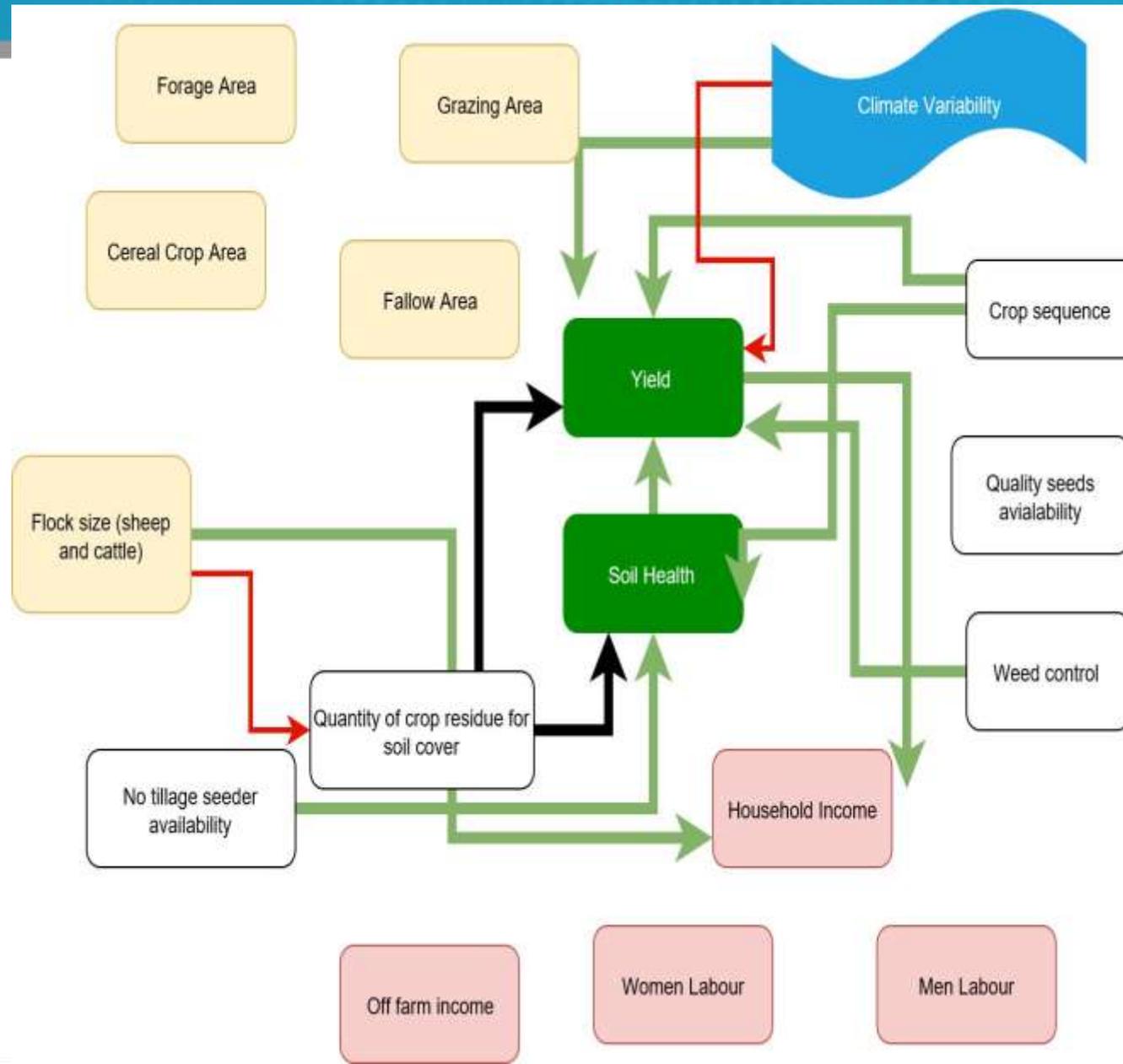
Identify champions in the farming and policy community to be ambassadors for out CLCA packages

Key Challenges

- **No till seeders are a bottleneck**
- **Quality forage seeds production and availability (especially legumes)**
- **Convince policy makers to include CLCA packages in national strategy of agriculture ministry**
- **Limited coordination at the local level by regional institutions for CLCA dissemination**
- **Value chain of CLCA package is not assessed for clear action points**



CLCA System in Tunisia



Action Points

- **Collaborate with Algeria for the manufacturing of the seeder**
- **Train the local institutions (CTV, OEP, AVFA and INGC) and other potential stakeholders (NGOs, farmer groups, input provider) on CLCA package (knowledge-intensive)**
- **Involve OEP in seed pre-multiplication and extend the 30% subsidization of seeds to CLCA forages (vetch, forage legumes, crop mixture)**
- **Access and engage with committee of agriculture in parliament**



Action Points

- **Establish a national network with all stakeholders on CLCA package for improved communication that would be also connected to an international network (like ACT, African Conservation Tillage, Network of FAO on CA led by Ameer Kassam, etc.)**
- **Identify champions in the farming (women and men) and policy communities to be ambassadors for out CLCA packages**



Knowledge management component of CLCA project (2018-2019)

- ❖ Field days
- ❖ Round table on WUE
- ❖ Information day on forage crops
- ❖ training on CA for extension institutes (CRDAs of Zaghouan, Siliana, Béja, Kef)
- ❖ Contribution on field school for student
- ❖ Participation on radio broadcast



Awareness Day:

Conservation agriculture for limiting soil degradation and ensuring sustainable intensification of agricultural production systems in the context of climate change

Friday, April 19, 2019, Bourouiss-Siliana

Participation of members of the agriculture committee in the Assembly of the Representatives of the People



Objectives:

- ❖ Convince decider markers to the importance of crop-livestock integration under CA system to mitigate climate change and to ensure sustainable intensification of agricultural production systems
- ❖ Push decider marker to adopt CA in the national strategy of agriculture.



Thank You For Your Attention



Welcome to Tunisia