Organisation des Nations Unies pour l'alimentation et l'agriculture

ICARDA
Science for resilient livelihoods in dry areas

# Silvopastoral Systems and Climate Change Mitigation in Central Tunisia

## 24-27 July 2019

## OSU, OR - USA

Mounir Louhaichi et al.

CGIAR RESEARCH PROGRAM ON Livestock

CRDA ZAGHOUAN

OSU Oregon State UNIVERSITY

icarda.org
International Center for Agricultural Research in the Dry Areas

cgiar.org
A CGIAR Research Center

CGIAR

# Importance of silvopastoral production system

- Silvopastoral systems, a form of agroforestry, involve the interaction of woody perennials, forages, and livestock. The three components in the system are intentionally managed for optimal interactions aimed at augmenting agricultural production and environmental services (Sharrow, 1999).

# The Sbaihia pilot site
# Semi-arid site located in Central Tunisia

# Geographical location of the Sbaihia pilot site
# Governorate of Zaghouan, Northern Tunisia



# Objective

**Overall Objective:** Improve the livelihood of agro-silvopastoral communities through increasing community resilience, income and capacity of the local population

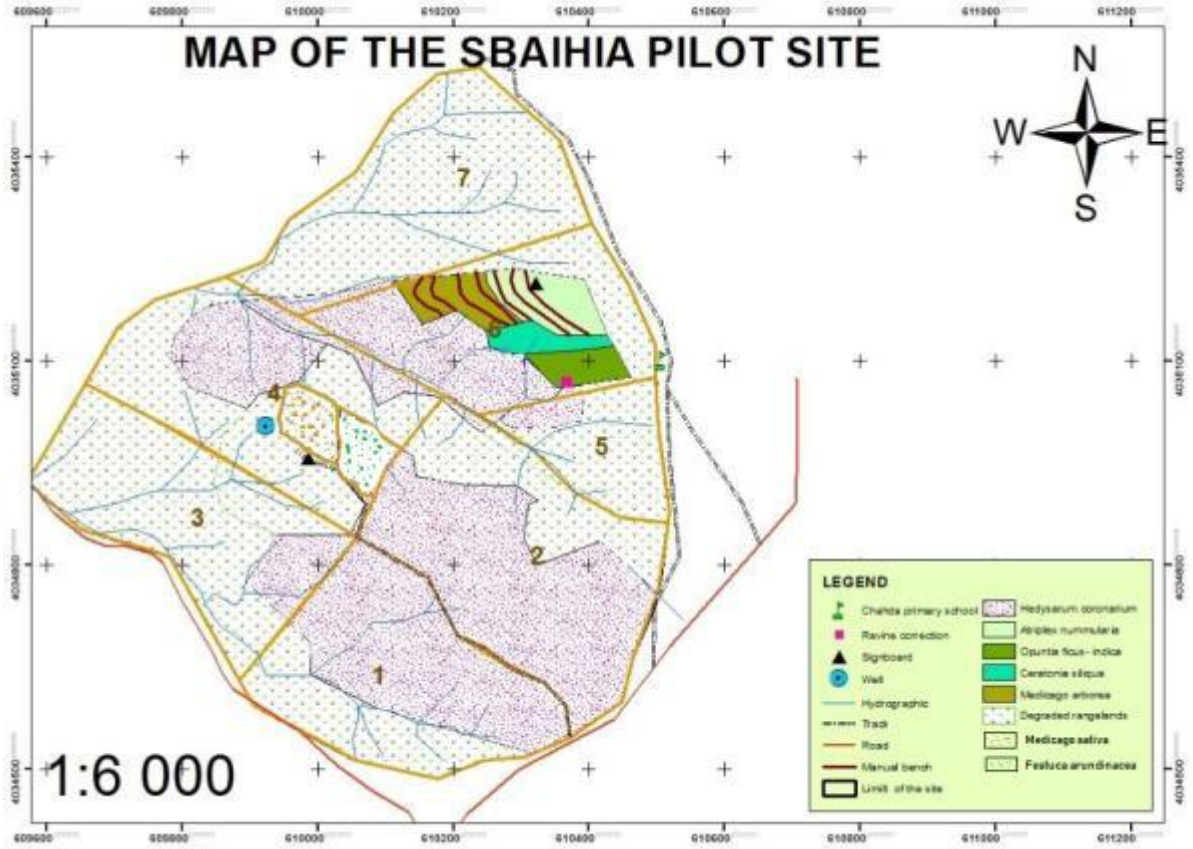
# Approach

To achieve this objective, the initiative is axed on the following pillars:

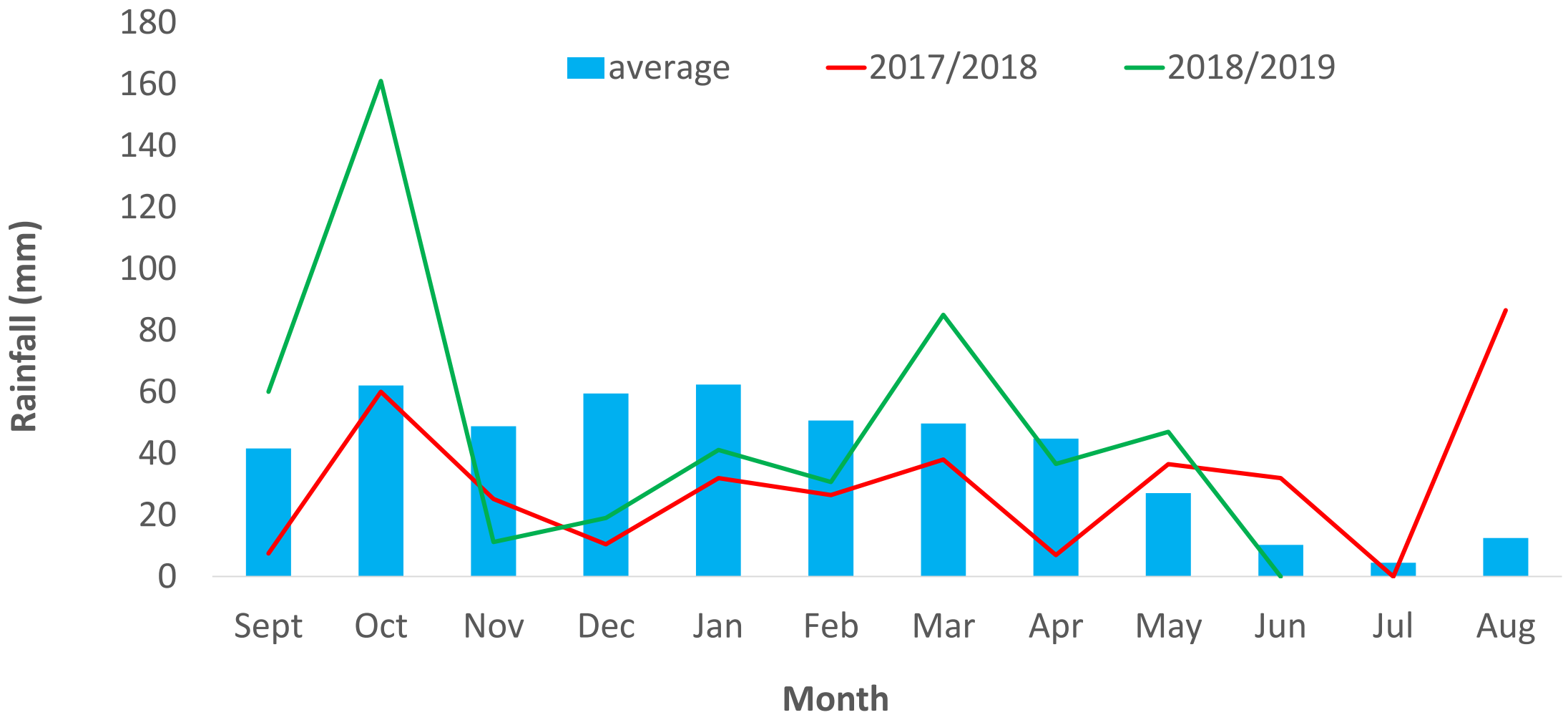
Adopt a participatory multidisciplinary approach

- Implement selected proven technology aimed at sustainable development/rehabilitation of the natural resource base
  - Climate change adaptation:
    - choice intervention,
    - choice of species, etc.
- Enhance capacity of all concerned parties including farmers, extension specialists, local authority, etc.

# Workplan


MAP OF THE SBAIHIA PILOT SITE
N
W
E
S
1
2
3
4
5
7
1:6 000
LEGEND
Chahda primary school
Ravine correction
Signboard
Well
Hydrographic
Track
Road
Manual bench
Limit of the site
Hedysarum coronarium
Atriplex nummularia
Opuntia ficus - indica
Ceratonia siliqua
Medicago arborea
Degraded rangelands
Medicago sativa
Festuca arundinacea

# Long term monthly average rainfall (20-year) and the rainfall received during the two growing seasons



# Type of Intervention

# Choice of Species

- Need assessment, investing on indigenous knowledge.
- Selecting species using participatory approaches with local communities and relevant stakeholders.
- Selecting multi-purpose species (trees, shrubs and herbaceous species) based on a combination of socio-economic and environmental criteria.

# Choice of Species

- Favoring as much as possible the use of native and adaptive species.
- Select species have  minimum caring and protection needs:
- Less capital and labor demand
- Social fencing versus  physical fencing
- Carefully considering the use of exotic species

# *Ceratonia siliqua*
# *Carob tree*

500 of *Ceratonia siliqua*

**Benefits:**

- Tolerates drought
- Grows on a wide range of soils
- Performs as a multipurpose tree
- Produces nutritious fruits (carob beans/ pods)
- Provides shades for livestock during summer

# *Medicago arborea*
# tree medic

500 of *Medicago arborea*

**Benefits:**

- Is excellent to feed livestock due to its high protein content
- High palatability
- Long lived (at least 25years)
- Improve soil fertility

600 seedlings of *Atriplex nummularia*

# *Atriplex nummularia* oldman saltbush

To get maximum profit from the runoff, seedlings were transplanted in constructed micro-catchments, with a spacing of least 1.5 m apart. Due to the steepness of the slopes, spacing between rows varied between 2 to 3 m. The micro-catchments were established using tools that are readily available and can be implemented on land slopes with variable soil depth.

## Benefits:

- Drought resistant
- Can grow in areas with high salinity (max 300 mM)
- Is a good maintenance feed when other feed sources are depleted
- Is grown in arid areas all over the world
- Adequate source of crude protein

# *Opuntia ficus indica*
(Cactus)

3200 cladodes of *Opuntia ficus indica*

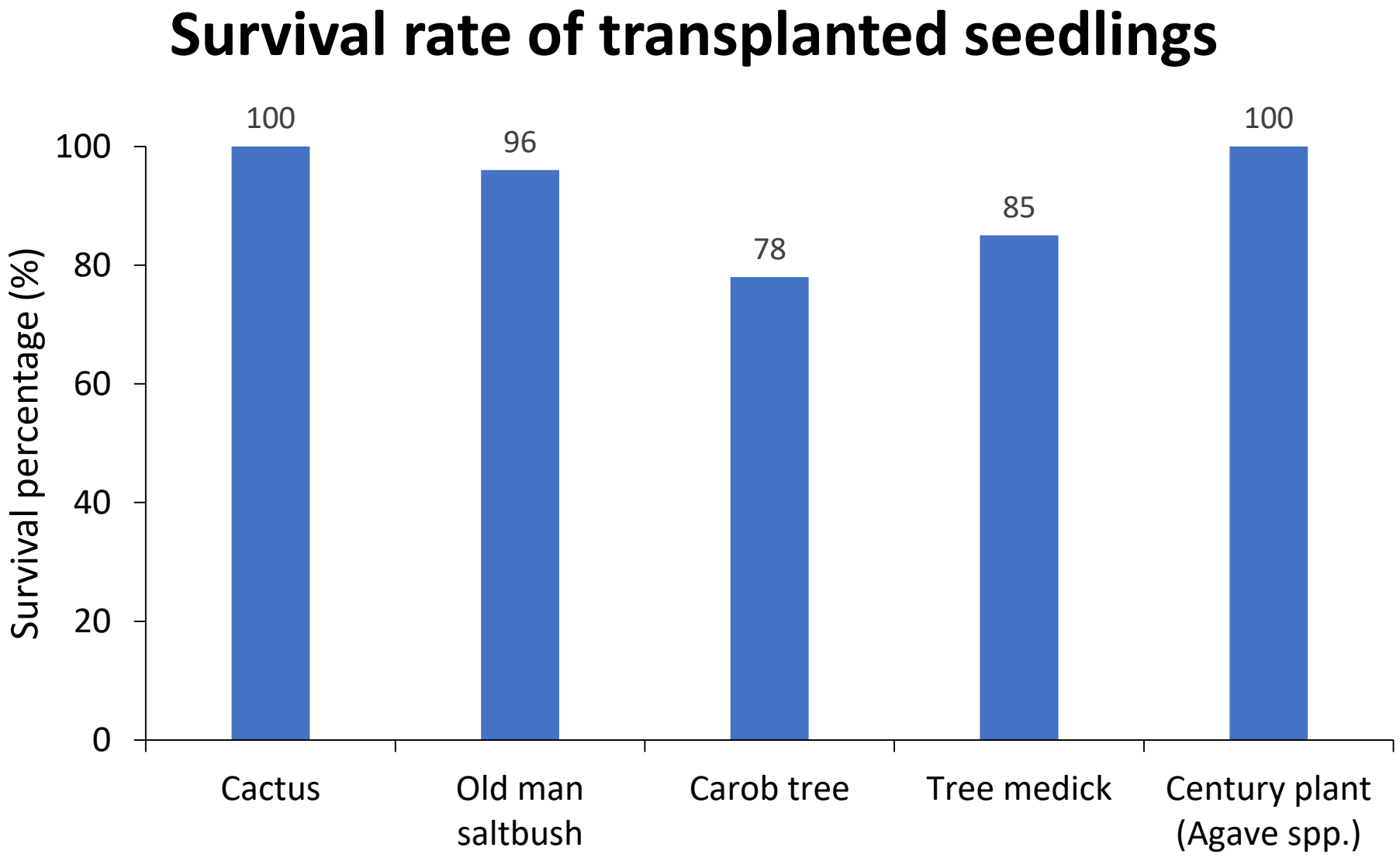
## Benefits:

- Drought-tolerant
- Evergreen plant
- Easy to establish, maintain, and use
- Multipurpose species
- High fodder potential
- Resolves livestock watering in the dry areas
- High palatability
- High in soluble carbohydrates

# *Agave americana*

## Agave

# Survival rate



# *Hedysarum coronarium* L.
# Sulla

## Benefits:

- Drought resistant
- Improves soil fertility and erosion control
- Prefers slightly acid to alkaline soils
- Highly palatable, nutritious, and productive forage
- High-protein forage crop

# Livestock Grazing
# Sulla reseeding

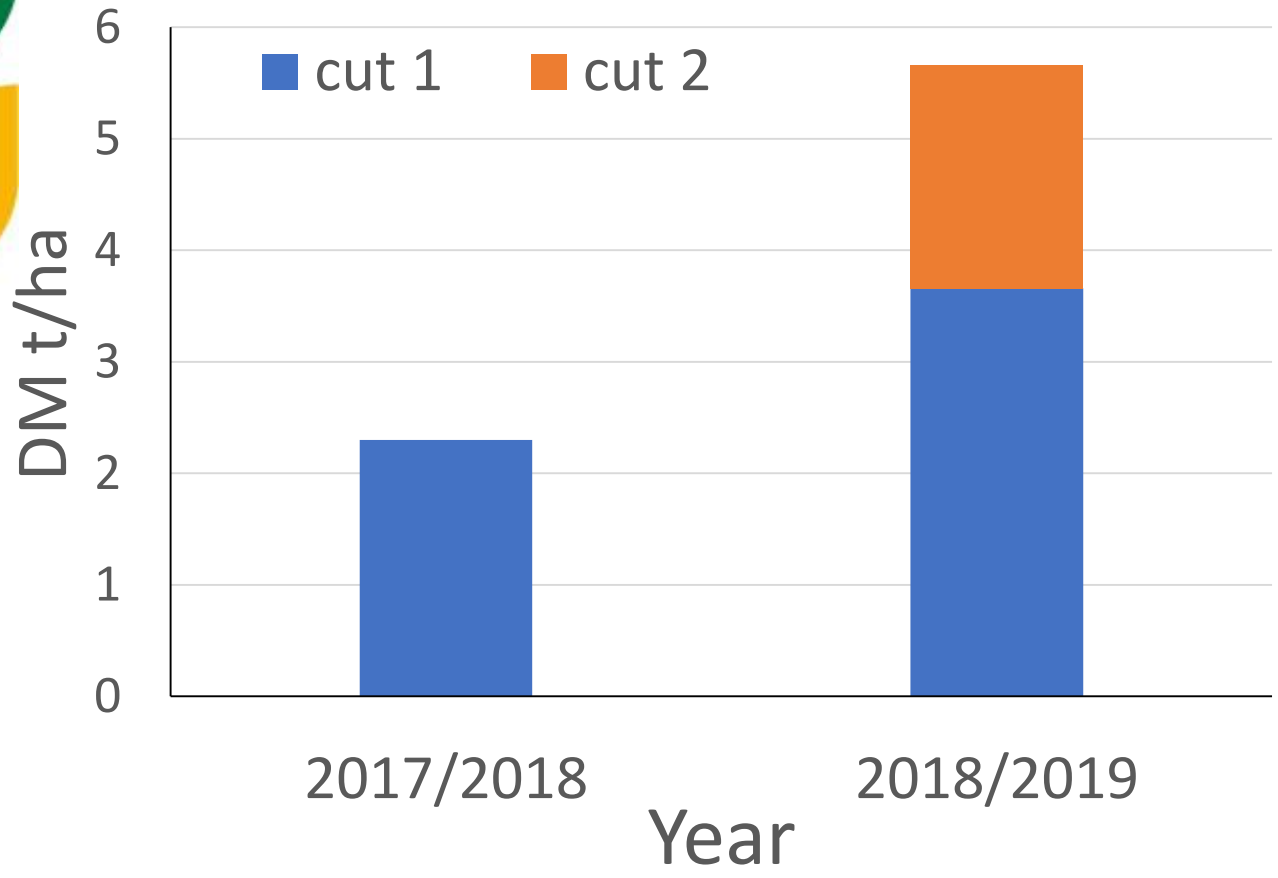
During dry season when there is nothing to graze the cost of feeding is estimated at 2.7 Tunisian Dinar (TD) per day per head (>1 USD/ sheep) to cover the cost of purchased hay and concentrates.

When livestock keepers let their animal graze on natural rangeland vegetation, they have to supplement their animal with hay and concentrates which is estimated at about 1.17 TD/day/head (equal to 0.44 USD).

For the improved rangelands (sulla reseeding) of Sbaihia pilot site, the cost of livestock feeding dropped to 0.75 TD per day per head (equal to 0.28 USD). Under this scenario, livestock keepers were able to **save almost 2 TD/day/head** compared to when they have to purchase feed. This is one of the main reasons behind the high adoption rate for sulla reseeding intervention by the community in Sbaihia as it was profitable in terms of feed cost reduction.

# *Hedysarum coronarium* L.
# Sulla

**Year 2**



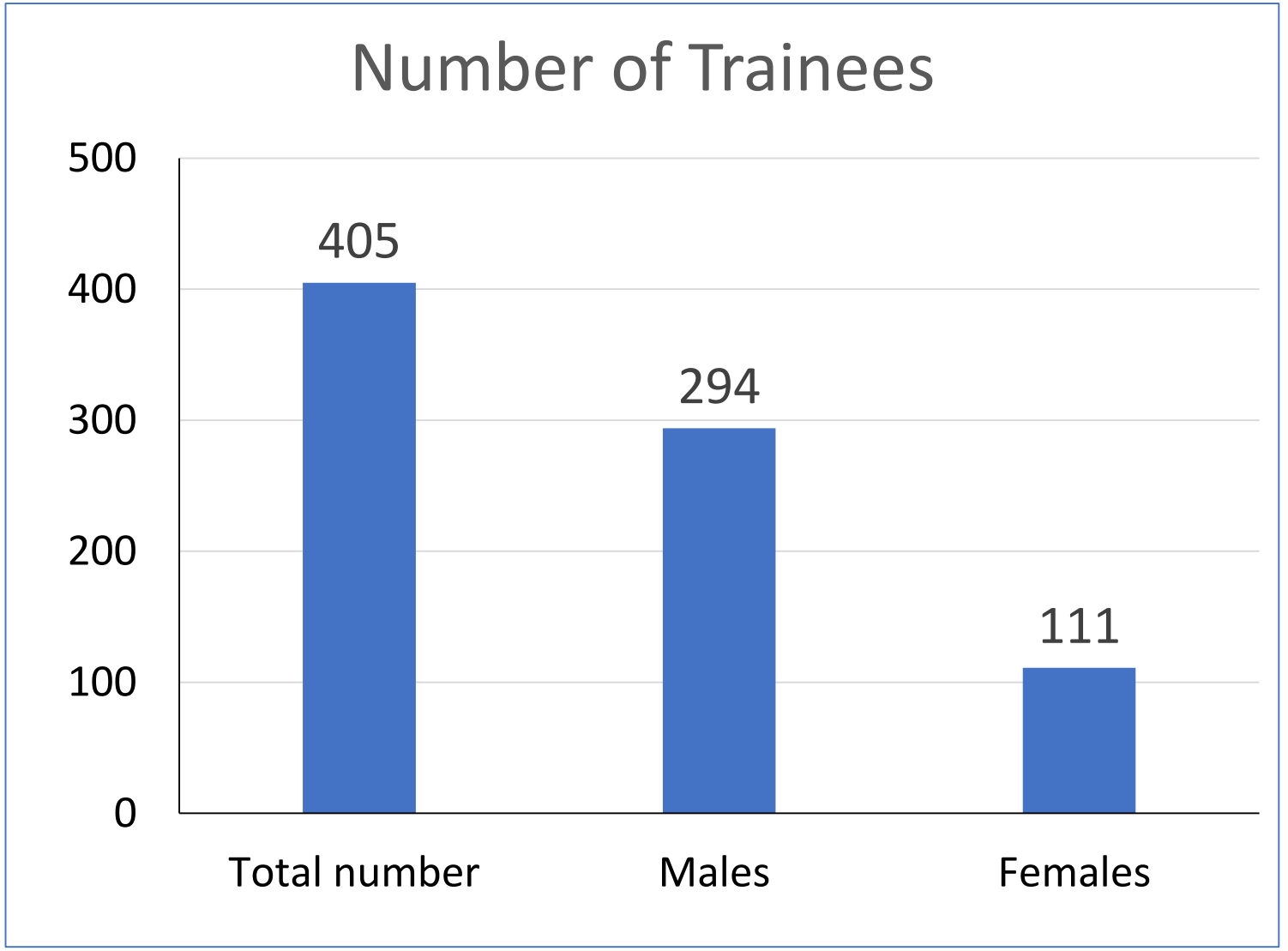

# Stone gabion constructed within the pilot site

The two gabions are expected to preserve at least 2,400T / ha / year from degradation

# Benches constructed manually at the pilot site

With a total distance of 700 m and a water retention capacity of 0.4$m^2$/m, a total estimated water harvesting is expected to be 280 $m^3$/year

# Capacity Development



# Summary

Use of a particular intervention in the restoration of degraded silvopastoral site is site specific – no one single rule to apply anywhere!!

The more time is invested in the planning phase – more chance for success of the programme.

# Thank you

ICARDA

Science for resilient livelihoods in dry areas

www.icarda.org

**icarda.org**

International Center for Agricultural Research in the Dry Areas

cgiar.org

A CGIAR Research Center

CGIAR