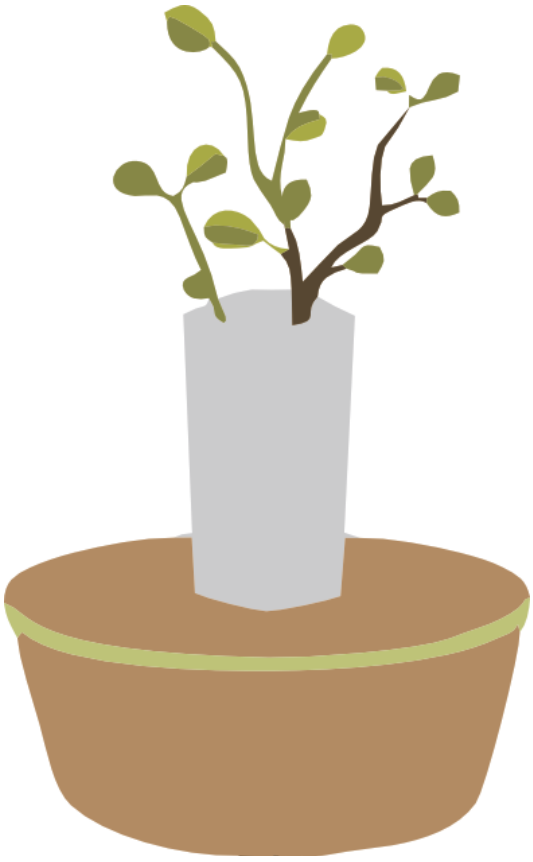
Food and Agriculture Organization of the United Nations

Climate-smart

farmer field school catalogue

Cocoons



Heat tolerance | Water saving | Extreme weather event | CO_2 | CH_4 | Energy saving | Increased productivity

Adaptation | Mitigation | Productivity

Funded by

UNDP

GREEN CLIMATE FUND

ADAPTATION

Cocoon technology moderates soil temperature and provides consistent moisture, reducing heat stress on young trees.

Cocoons dramatically reduce water use by delivering water directly to the root zone and minimizing evaporation loss.

Cocoons offer some protection against short-term flooding and wind damage, enhancing the resilience of young trees.

MITIGATION

Cocoons increase tree survival rates, leading to greater carbon sequestration potential over the long term.

Cocoons are unlikely to have any significant effect on methane emissions.

Cocoons lower energy consumption by reducing the frequency and volume of irrigation needed.

PRODUCTIVITY

Cocoons boost tree establishment success and optimize water use, leading to potentially higher yields in the long term.

Description

Cocoons are an innovative, biodegradable planting technology designed to revolutionize tree establishment in challenging environments. They function as a doughnut-shaped structure made of recycled cardboard or similar materials, which surrounds the base of a young sapling. At the core of the cocoon is a water reservoir that holds a significant amount of water. Fabric wicks extend from this reservoir into the surrounding soil. The cocoon works by slowly releasing water through the wicks, providing targeted moisture to the tree's roots. It also acts as a protective cover, minimizing evaporation and creating a beneficial microclimate. This system dramatically increases tree survival rates, especially in drought-prone areas, reducing the need for frequent irrigation. Ultimately, cocoons help young trees develop robust root systems and become self-sufficient. As a bonus, they are biodegradable and leave no harmful residue in the environment.

Benefits

- Cocoons create a microclimate that protects young saplings from harsh weather conditions, extreme temperatures, and water stress. Studies have shown that cocoons can increase tree survival rates by up to 85 percent, especially in arid and semi-arid regions[1].
- Cocoons help retain moisture around the roots, minimizing water loss through evaporation. This can reduce irrigation needs by up to 90 percent, making them valuable in water-scarce areas compared to traditional methods[1].
- The cocoon buffers against harsh heat and cold, improving young tree resilience.
- The cocoon acts as a physical barrier, helping the sapling outcompete weeds for resources.
- The cocoon breaks down naturally, leaving no waste footprint.
- Successful tree establishment can contribute to restoring degraded land and increasing soil carbon storage.
- Delivers water directly to the root zone, minimizing waste compared to traditional irrigation methods.
- The slow-release reservoir extends the time intervals between watering.
- The consistent moisture encourages the tree to develop strong, deep roots.

1 https://landlifecompany.com/updates/the-cocoon-a-breakthrough-in-sustainable-tree-planting

Field school learning experiments

(Select at least two options for comparison)

Option 1	Option 2	Option 3
Cocoons provided by the project (up to 20 plants or 1 dunum)	Self watering container made with local materials (up to 5 plants or ¼ dunum)	Conventional planting of fruit plants (up to 5 plants or ¼ dunum)

Source: Authors' own elaboration

Key requirements

- Proper placement and coverage in soil.
- Regular watering to activate and maintain hydration.
- Protection from extreme weather conditions.
- Monitoring for damage or punctures.
- Correct alignment and spacing for effective water distribution.
- Compatibility with specific crops and soil types.
- Adherence to manufacturer guidelines for installation and usage.
- Regular monitoring and maintenance

Challenges

- Cocoons may be less effective in extremely harsh environments
- May be unsuitable for certain tree species
- Cocoon could be damaged by animals or extreme weather event
- Cocoon is meant to kickstart the tree's establishment, young trees may still need additional care after the cocoon degrades, especially in arid regions.

Adoption feasibility

High because of:

- Water scarcity mitigation
- Tree survival in harsh climates
- Sustainable planting methods
- Addressing critical needs
- Simple in use
- Potential cost-effectiveness
- Potential for significant water savings

Why this has not been practiced?

- Upfront barrier, requires long-term cost-benefit analysis
- Not suitable for all trees or climates
- Understanding limitations is crucial
- Transportation complexity in remote areas
- Lack of awareness
- Traditional farming practices prevail
- Initial investment may deter adoption
- Limited access to materials or resources

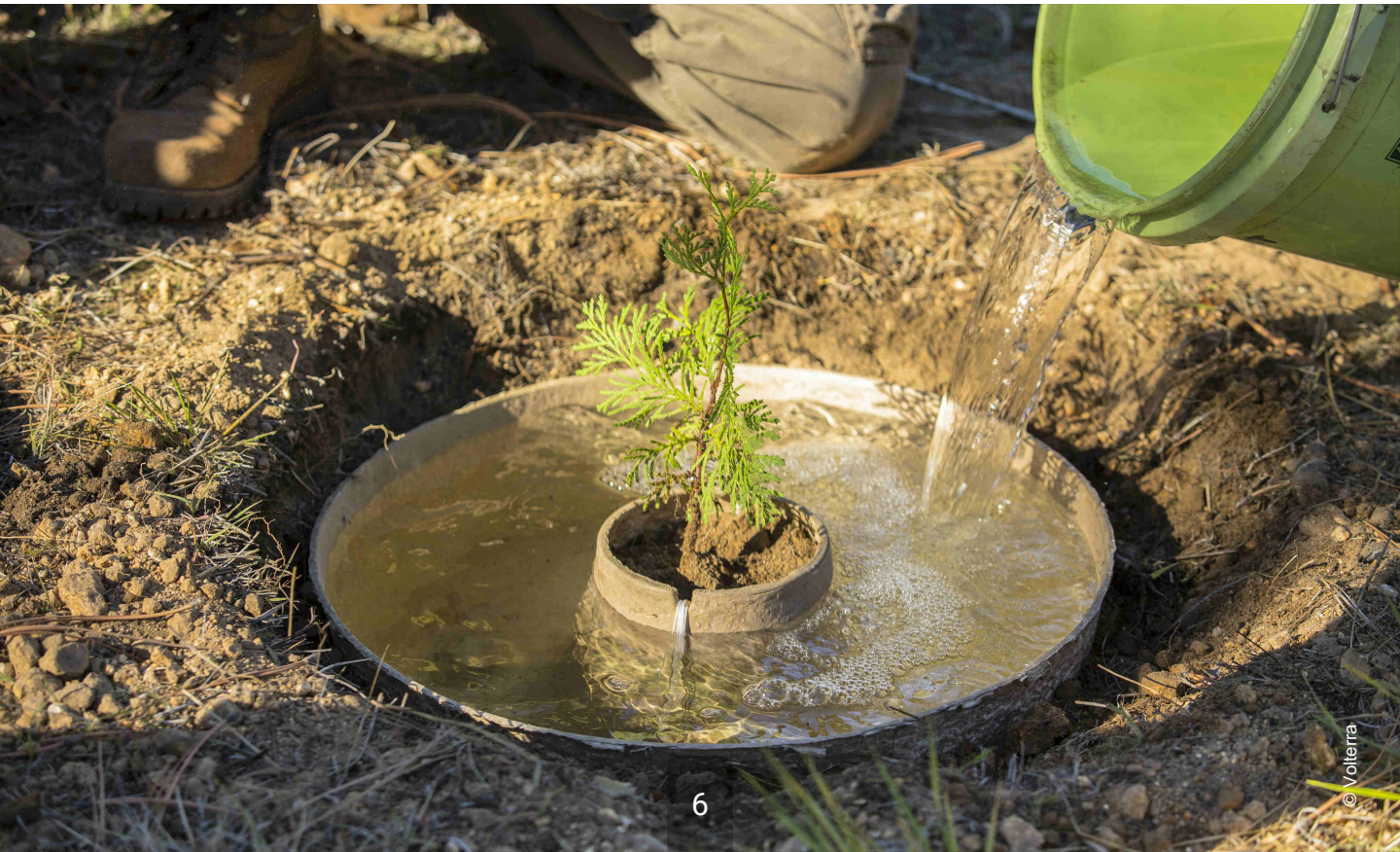
Other complimentary practices

- Composting
- Mulching
- Resilient species

Enabling services

Agreement of climate smart agriculture community with the local (public and private) service providers for quality service provision for:

- Quality cocoons
- Quality plants saplings



Cocoons design theory

Doughnut shape

- It accommodates a central water reservoir.
- It covers a significant area of soil to minimize evaporation.
- It provides a small degree of physical support and protection for the young tree.

Material science

The choice of cardboard or other biodegradable materials is crucial:

- These materials must be strong enough to hold their shape and the water for an extended period.
- They must break down over time without leaving harmful residues.

Water dynamics

The wicking system is based on capillary action, a well-understood physical phenomenon. The design has to optimize slow water release for optimal tree benefit.

References

1 https://landlifecompany.com/updates/the-cocoon-a-breakthrough-in-sustainable-tree-planting

Project

Building resilience to cope with climate change in Jordan through improving water use efficiency in the agriculture sector

Partners

Ministry of Agriculture, Jordan
Ministry of Environment, Jordan
Ministry of Water and Irrigation, Jordan
United Nations Development Programme

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Ma'an, Tafileh, Karak and Madaba Governorates

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