The three-storey Oasis of Gabes agroforestry system, where shallow tillage is practiced. Here there are palm trees (highest level), pomegranate and other fruit trees (middle level), and vegetables below. (Wiem Haouari)

Shallow tillage (15-20cm) (突尼斯)

In arabic (حراثة خفيفة (بعمق 15-20 سم)،

描

Shallow tillage involves disturbing the upper layer of soil without deep ploughing. It aims to provide a good seedbed, incorporate manure, control weeds, and enhance water infiltration while minimizing soil erosion and compaction. A machine tiller has recently replaced animal traction for this purpose.

Shallow tillage (15-20cm deep) involves disturbing the upper layer of soil and avoids deep ploughing. It aims to provide a good seedbed, while incorporating manure, controlling weeds, and enhancing water infiltration. Soil erosion is minimised, compaction is reduced and because deeper layers are not disturbed, less soil organic matter is oxidised.

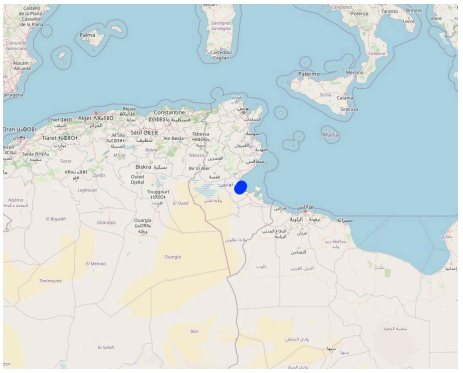
Shallow tillage - sometimes called “superficial” or “light” tillage – disturbs only the topsoil and brings several benefits. These include:

* Soil Structure Preservation: Maintains the underlying soil structure, reducing the risk of compaction and erosion.
* Moisture Conservation: Helps retain soil moisture by reducing evaporation from deeper layers.
* Reduced Erosion: Minimizes soil erosion by maintaining residues.
* Increased Microbial Activity: Promotes beneficial microbial activity in the topsoil, enhancing soil health.
* Nutrient Management: Allows for targeted application of fertilizers and amendments, as it primarily affects the upper soil layer.
* Time and Labour Efficiency: Generally, requires less time and fewer resources compared to deep tillage methods.

Smallholders in Gabes, South-East Tunisia practice shallow tillage and were interviewed to gain extra insights into this technology. They were welcoming and happy to share their knowledge while gaining information about enhancing their own production systems.

These smallholders farm in “The Oasis of Gabes” where there is a specific design of multi-storey agroforestry with trees, shrubs and vegetable crops. This requires specific agronomic practices. One of these practices is shallow tillage. A machine tiller has recently replaced animal traction for this purpose. They would prefer a no-till technique, however this would be more costly because it requires extra manure and soil cover by mulching or sand backfill. This may be possible for another category of farmers.

地点



地点: Gabes, Gabes, 突尼斯

分析的技术场所数量: 2-10个场所

选定地点的地理参考

- 10.00213, 33.79214
- 10.09221, 33.90435

技术传播: 均匀地分布在一个区域 (approx. < 0.1 平方千 10 公)

在永久保护区？: 否

实施日期: 50多年前 传

介绍类型

- [ ] 土地使用 的创新
- [x] 作为传 的一 50年
- [ ] 在实 /研究期
- [ ] 外 目 干

This is tilled land that will be used for vegetable cropping. The tillage has been carried out by a semi automated tiller (minimum tillage), Owner of the land is Hedia Brahimi. (Wiem Haouari)

A second plot where the farmer has freshly applied light tillage in order to incorporate sheep manure. The farmer is Youcef Rehouma (Wiem Haouari)

技术分

主要目的

- [x] 改 生产
- [x] 减少、 、恢复土地 化
- [ ] 保护生态
- [ ] 合其他技术保护流域下游区域
- [x] 保持/提 生物多样性
- [ ] 低灾害
- [x] 应气候变化/极 天气及其影响
- [ ] 减 气候变化及其影响
- [x] 创 有益的 济影响
- [ ] 创 有益的社会影响

土地利用

同一土地单元内混合使用的土地 是 - 农牧业 包括农牧 合

农田

- 多年一作 木材 用、 、杀- 多植物植物
- 乔木与灌木的种植

每年的生 季 ：2数
 用 作制度了吗是
 用 作制度了吗是

水道、水体、湿地 - 主 产品服务: Drainage, it is the main traditional canalisation to drain excessive irrigation water from the oasis.

不毛之地 - 具体 明Because of the raise of salinity amount ,lands are in degradation and many of them become unproductive

供水

- [ ] 养
- [x] 混合 水灌溉
- [ ] 充分灌溉

土地退化相关的目的

- [ ] 止土地 化
- [x] 减少土地 化
- [ ] 修复/恢复严 化的土地
- [x] 应土地 化
- [ ] 不 用

解决的退化问题

土壤水蚀 - Wt 土流失 侵, Wm 块体/滑坡

土壤风蚀 - Et 土流失

化学性土壤退化 - Cn 力下 和有机 含 下 , Cp 土壤污染s 盐化/碱化

物理性土壤退化 - Pc 压实Ps 有机土壤沉 土壤沉

生物性退化 - Bc 植 盖的减少 栖息地丧失Bl 土壤寿命损失

水质恶化 - Ha 干旱化Hs 地 水 ，Hp化 地 水水 下

SLM组

- 改 的地/植 盖
- 最小的土壤扰动

SLM措施

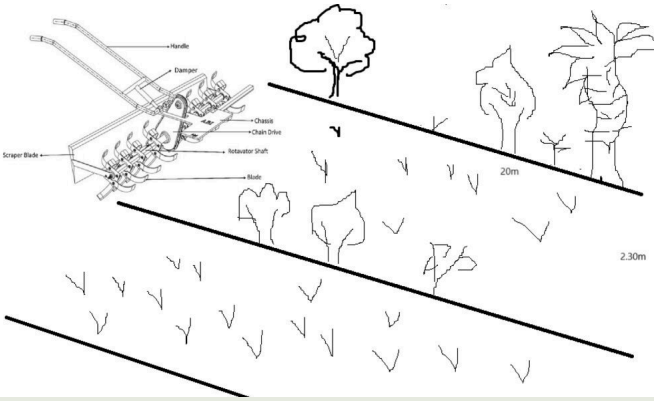
- 土壤 力 合 理

农艺措施 - A1 植 和土壤 ，A2 盖层 有机/土壤 力A3 土壤 处理 (A1.2: Reduced tillage (> 30% soil cover))

技术图

技术规范

The figure is showing the main components of the rotavator. It is the mechanised tool used by oasian farmers. This type of tillage is the only one adapted to oasian ecosystem and small spaces. The boarders of every cultivated interculture space is bordered by trees, shrubs or palm trees.



Author: Wiem Haouari

技术建 与 护 活动、投入和 用

投入和成本的计算

- 的成本为 每个技术区域 寸和 积单位 are 换 1公 为 的换 数 **公顷 = 1are = 100square meter**
- 成本 使用的 TND
- 汇率 换 为 元 元 3.07 TND
- 用劳工的每日平均工 成本 30-40

影响成本的最重要因素

The most important factors affecting the costs are: the need to keep more moisture in the soil, good aeration for roots, improvement of soil texture and increase in organic matter.

技术建立活动

n.a.

总技术建立成本（估算）

150.0

技术维护活动

1. Exposing the soil to the sun to kill pathogens (时 / 率uly-August)
2. Keeping the soil dry and more stable (时 / 率he mid final August)
3. Contracting with labour and machinery (时 / 率August)
4. Making the minimum tillage (it depends on the surface) (时 / 率September-October)
5. Tillage (时 / 率wice a year)

总技术维护成本（估算）

350.0

然环境

年平均降雨量

- [x] < 250毫
- [ ] 251-500毫
- [ ] 501-750毫
- [ ] 751-1,000毫
- [ ] 1,001-1,500毫
- [ ] 1,501-2,000毫
- [ ] 2,001-3,000毫
- [ ] 3,001-4,000毫
- [ ] > 4,000毫

农业气候带

- [ ] 潮湿的
- [ ] 半湿润
- [x] 半干旱
- [ ] 干旱

关于气候的规范

以毫 为单位 的年平均 159.0

Gabès has dry periods in January, February, March, April, May, June, July, August, September, November and December.
On average, October is the wettest month with 26 mm of precipitation.
On average, July is the driest month with 0 mm of precipitation.
A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Gabès varies throughout the year.
气 名称stitut national de météorologie
In Gabès, the summers are hot, muggy, arid, and clear and the winters are cool, dry, windy, and mostly clear. Over the course of the year, the temperature typically varies from 46°F to 91°F and is rarely below 40°F or above 99°F.
A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Gabès varies throughout the year.

斜坡

- [ ] 水平 0-2%
- [x] 3-5%
- [ ] 平 6-10%
- [ ] 滚坡 11-15%
- [ ] 崎岖 16-30%
- [ ] 峭 31-60%

地形

- [x] 原
- [ ] 山
- [ ] 山坡
- [ ] 山地斜坡
- [ ] 坡
- [ ] 底

海拔

- [x] 0-100 m a.s.l.
- [ ] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [ ] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.

.....应用的技术

- [ ] 凸形情况
- [ ] 凹 情况
- [x] 不相关

- [ ] □ 常□ 峭50%□

- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

土壤深度
- [ ] □ 常浅□0-20厘□ □
- [x] 浅□ 21-50厘□ □
- [ ] 中□ 深度51-80厘□ □
- [ ] 深□ 81-120厘□ □
- [ ] □ 常深▹ 120厘□ □

土壤质地（表土）
- [x] □ ⁄□ □ 砂□ □
- [ ] 中□ □ 壤土、□ 土□
- [ ] □ ⁄□ □ □ □ 土□

土壤质地（地表以下>20厘米）
- [x] □ ⁄□ □ 砂□ □
- [ ] 中□ □ 壤土、□ 土□
- [ ] □ ⁄□ □ □ □ 土□

表土有机质含量
- [ ] □ ▹3%□
- [x] 中□ 1-3%□
- [ ] 低□ <1%□

地下水位
- [ ] □ □ 上
- [ ] < 5□
- [x] 5-50□
- [ ] > 50□

地表水的可用性
- [ ] □ □
- [ ] 好
- [ ] 中□
- [x] 匮乏/没有

水质（未处理）
- [x] □ 好□ 用水
- [ ] 不□ □ 用水□ □ □ 处理□
- [ ] 仅供农业使用□ 灌溉□
- [ ] 不可用

水□ □ 参□地□ □ 水

盐度是个问题吗？
- [x] 是
- [ ] 否

洪水发生
- [ ] 是
- [x] 否

物种多样性
- [ ] □
- [x] 中□
- [ ] 低

栖息地多样性
- [ ] □
- [x] 中□
- [ ] 低

应用□ 技术的土地使用□ 的特征

市场定位
- [ ] 生□ □ □ □ □
- [x] 混合□ 生⁄商业□
- [ ] 商业/市场

非农收入
- [ ] 低于全□ 收入的0%
- [x] 收入的10-50%
- [ ] > 收入的50%

相对财富水平
- [ ] □ 常□ 瘠
- [ ] □ 瘠
- [x] 平均水平
- [ ] 丰富
- [ ] □ 常丰富

机械化水平
- [x] 手工作业
- [x] 畜力牵引
- [ ] 机械化/电动

定栖或游牧
- [x] 定栖的
- [ ] 半游牧的
- [ ] 游牧的

个人或集体
- [x] 个人/家庭
- [ ] 团体/社区
- [ ] 合作社
- [ ] 员工□ 公司、政府□

性别
- [x] 女人
- [x] 男人

年龄
- [ ] 儿□
- [x] □ 年人
- [x] 中年人
- [x] □ 年人

每户使用面积
- [ ] < 0.5 公□
- [x] 0.5-1 公□
- [ ] 1-2 公□
- [ ] 2-5公□
- [ ] 5-15公□
- [ ] 15-50公□
- [ ] 50-100公□
- [ ] 100-500公□
- [ ] 500-1,000公□
- [ ] 1,000-10,000公□
- [ ] > 10,000公□

规模
- [x] 小□ 模的
- [ ] 中□ □ 模的
- [ ] 大□ 模的

土地所有权
- [ ] 州
- [ ] 公司
- [ ] 社区/村庄
- [ ] 团体
- [x] 个人□ 未命名
- [x] 个人□ 有命名

土地使用权
- [ ] □ 由□ 入□ 无□ □ □
- [x] 社区□ 有□ □ □
- [ ] 租□
- [x] 个人

用水权
- [ ] □ 由□ 入□ 无□ □ □
- [x] 社区□ 有□ □ □
- [ ] 租□
- [ ] 个人

进入服务和基础设施的通道

健康	□ 疼	✓ 好
技术援助	□ 疼	✓ 好
就业□ 例如□ 农□	□ 疼	✓ 好
市场	□ 疼	✓ 好
□ 源	□ 疼	✓ 好
□ □ 和交□	□ 疼 ✓	好
□ 用水和卫生□ 施	□ 疼	✓ 好
□ □ 服务	□ 疼	✓ 好

影响

社会经济影响

作物生产

□ 作 ✓ 增加

The farmer adopts rotation in crop systems, we can't then make a comparison for different yield of diffrent crops

作物□ □

□ 作 ✓ 增加

Farmers notice less pest attacks and better sweetness in vegetable tasting.

□ 料生产

□ 作 ✓ 增加

Farmers noticed better revenues in producing the main fodder specie of the Oasis, namely alfafa (Medicago sativa).

料

增加

The leaves were developed generously and there was more concentration of chlorophyll in leaves. We assumed this to higher concentration of soil nitrogen and phosphorus held in the soil.

畜牧生产

增加

As there is abundance of weed intercrops, animals are taking enough fodder from grazing.

社会文化影响

品安全

减少 改

Better self supply and self sufficiency

文化机会 如 神、审 以及其他

减少 改

By using animal tillage, farmers have a myth that it is a sign of fortune for good agricultural season.

SLM/土地 化知

减少 改

Farmers need more direct contact with SLM specialists and agriculture engineers. The indicators mentioned before could be enhanced if combined by other synchronised measures.

生态影响

土壤水分

增加

We noticed better retaining of water in the soil

土壤 盖层

减少 改

Farmers are more aware about the importance of covered soil in order to avoid water and wind erosion.

土壤流失

增加 低

By keeping the soil covered,soil loss has decreased.

土壤堆积

增加

土壤 密封

增加 减少

The intervention to make tillage is minimum and there is a recovery of the lost soil,that's why

场外影响

旱季稳定可 的水流 包括低流

减少 增加

The management of water resource referring to water availability is assured by the groupement de développement agricole Gabes centre

成本效益分析

与技术建立成本相比的效益

短期回报 常消极 常积极

期回报 常消极 常积极

与技术维护成本相比的效益

短期回报 常消极 常积极

期回报 常消极 常积极

气候变化

渐变气候

年温度 增加 常不好 常好

季 性温度增加 常不好 常好 季 夏季

年 减少 常不好 常好

气候有关的极端情况（灾害）

热带 暴 常不好 常好

当地沙尘暴/尘暴 常不好 常好

局地 暴 常不好 常好

热浪 常不好 常好

极 冬季条件 常不好 常好

干旱 常不好 常好

流 病 常不好 常好

昆 / 侵扰 常不好 常好

其他气候相关的后果

海平 上升 常不好 常好 案 未知

用和 应

采用该技术的地区内土地使用者的百分比

- [ ] 单例/实
- [ ] 1-10%
- [x] 11-50%
- [ ] > 50%

在所有采用这种技术的人当中，有多少人在没有获得物质奖励的情况下采用了这种技术?

- [ ] 0-10%
- [ ] 11-50%
- [x] 51-90%
- [ ] 91-100%

户数和/或覆盖面积

120

最近是否对该技术进行了修改以适应不断变化的条件？

- [x] 是
- [ ] 否

The technology was adapted through design and material - specifically the type of machine use for tillage.

什么样的变化条件？

- [x] 气候变化/极 气候
- [ ] 不断变化的市场
- [ ] 劳动力可用性 例如 由于 移

和吸取的教

长处: 土地使用者的观点

- The technology has several virtues for Oasis ecosystem. Since it is a specific agriculture system, it requires constant interventions and various techniques. The technology allow farmers to care about their lands sustainably.
- The technique is not costly affecting the farmer
- The technique is adapted to the oasian ecosystem and the bioeconomy circumstances.

长处: 编制者或其他关键资源人员的观点

- The technique is not costly. Agriculture costs affect the decision of farmers in this area
- It is a revenue incoming for cultivator owners
- The timing adapted by farmers to till is very important. The technique enhances the manure and incorporation of fallen leaves. This enhances the amount and stability of organic material in the soil.

弱点/缺点/风险: 土地使用者的观点如何克服

弱点/缺点/风险: 编制者或其他关键资源人员的观点如何克服

- It is a limited technique because of small plots of land expanding the cultivated area
- it requires physical effort encouraging precision mechanisation

参 文献

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WOCAT数据库中的完整描述
https://qcat.wocat.net/zh/wocat/technologies/view/technologies_7348/
https://player.vimeo.com/video/1027738539

链接的SLM数据
不 用

文件编制者

机构
- FAO Tunisia (FAO Tunisia)

目
- Groupement de développement agricole Oasis centre Gabes (GDA Oasis centre Gabes 2024)

主要参考文献
- https://www.laboasis.org/oasis-traditional-water-systems/:

链接到网络上可用的相关信息
- Les eaux de drainage de l'oasis de gabes: https://www.eyrolles.com/Litterature/Livre/les-eaux-de-drainage-de-l-oasis-de-gabes-9783841663160/