



Earth Observation for Agricultural Monitoring and Food Security.
Tunisian case studies



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Grand Food Security Challenges in Africa

Increasing population = incr. demand for food

80% of the production increases are projected to come from

Increasing damage to ecological foundations:
water, bio-diversity, climate and sea level

intensity

Urban growth = food security needs increase

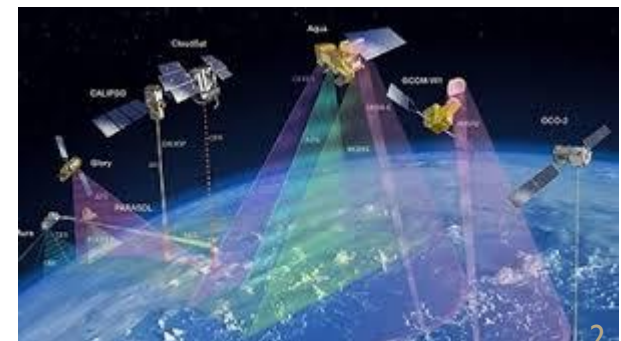
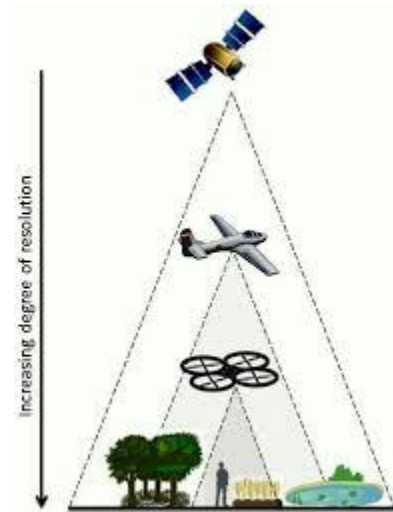
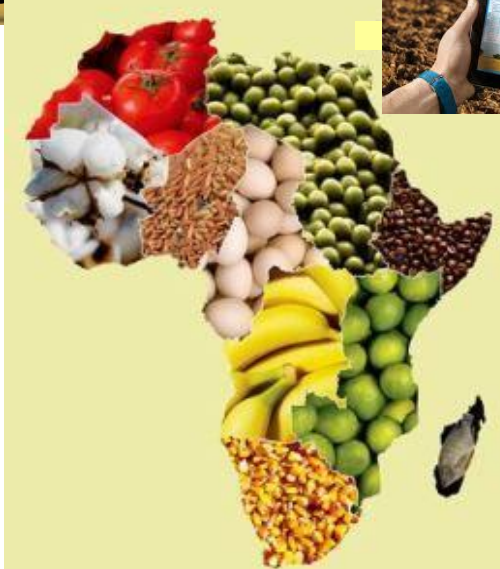
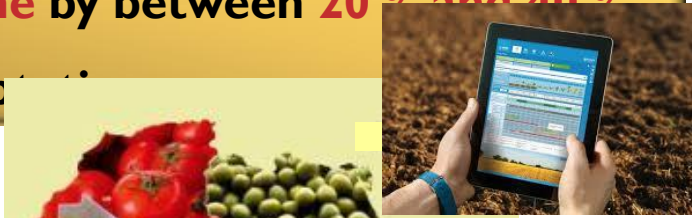
is limited.

Decline food production = low yield per hector
compared to other regions

Africa

Yields could decline by between 20% and 40%

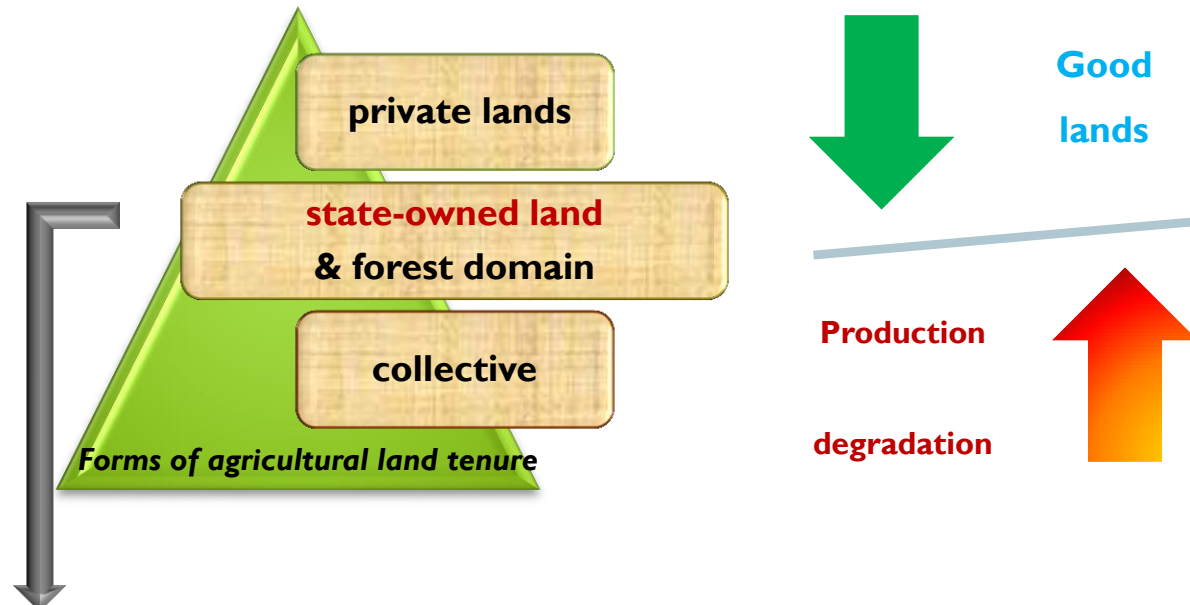
No more adaptation



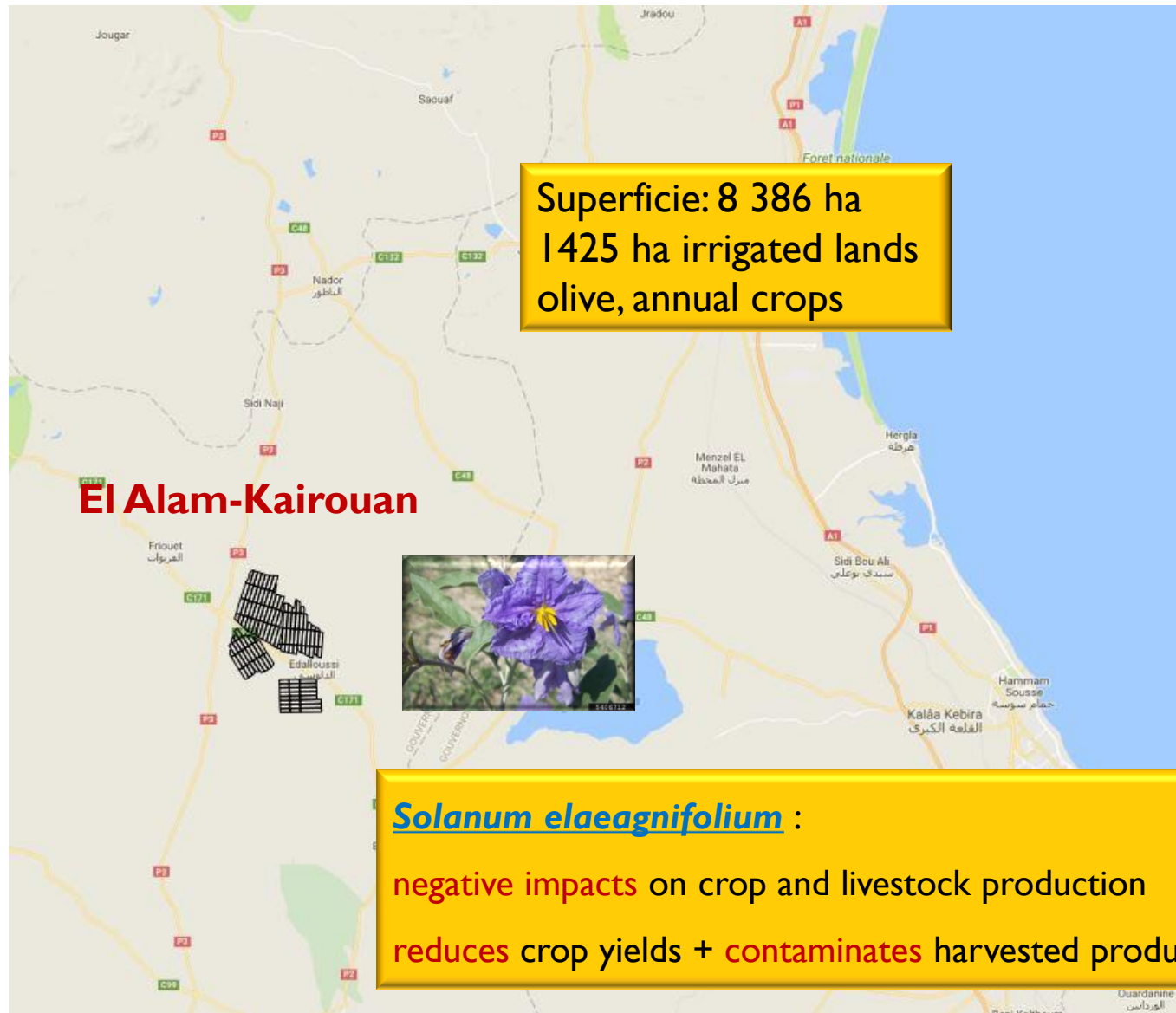
To **sensitize decision-makers** to the importance of using new technology in the management of production systems



Tunisia : 16 million hectares
50 % : agricultural production



- Management of the State Lands
- Diversification of agricultural production
- Introduction of new farming techniques...



***Solanum elaeagnifolium* :**

negative impacts on crop and livestock production

reduces crop yields + contaminates harvested products

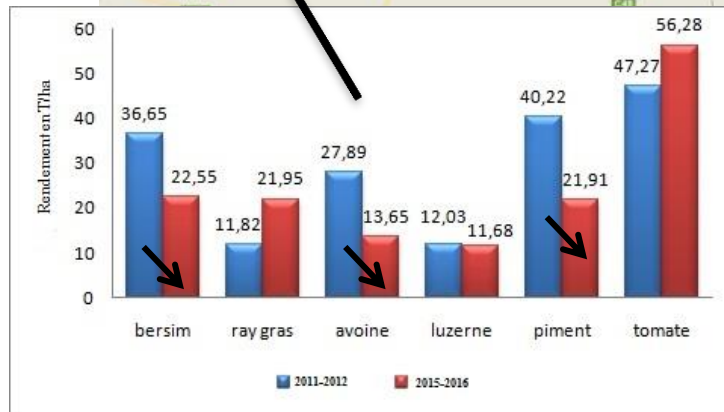
Specific challenge



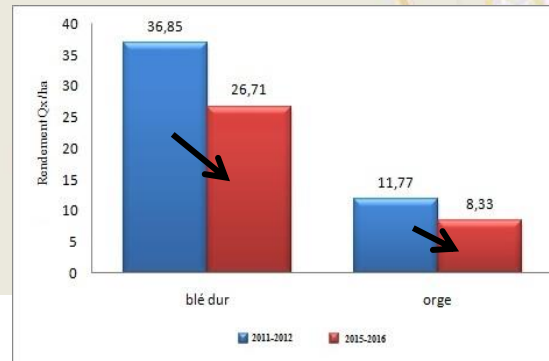
necrotic oats

Superficie: 8 894 ha
323 ha irrigated lands:
olive, annual crops

Enfidha-Sousse



**Decrease in annual crop yields
between 2011 and 2016**



Decision-makers solutions

State Owned Land Office

Enfidha-Sousse

El Alam -Kairouan

Strategic plan in 2020



Decreasing **annual crop** superficies



Increasing **olive** superficies



It is the better solution ?

Chemical treatment

Solution: integrated management

Role of EO in resolving challenges

Earth observation is the gathering of information about the Earth's physical, chemical and biological systems

Agriculture and Food security

Early warning systems through monitoring

- climate and soil moisture
- lakes and reservoir levels
- vegetation growth
- vegetation stress

Precision Agriculture

- seed application
- water and pest control
- fertiliser

Mapping disease events

Seed quality evaluation

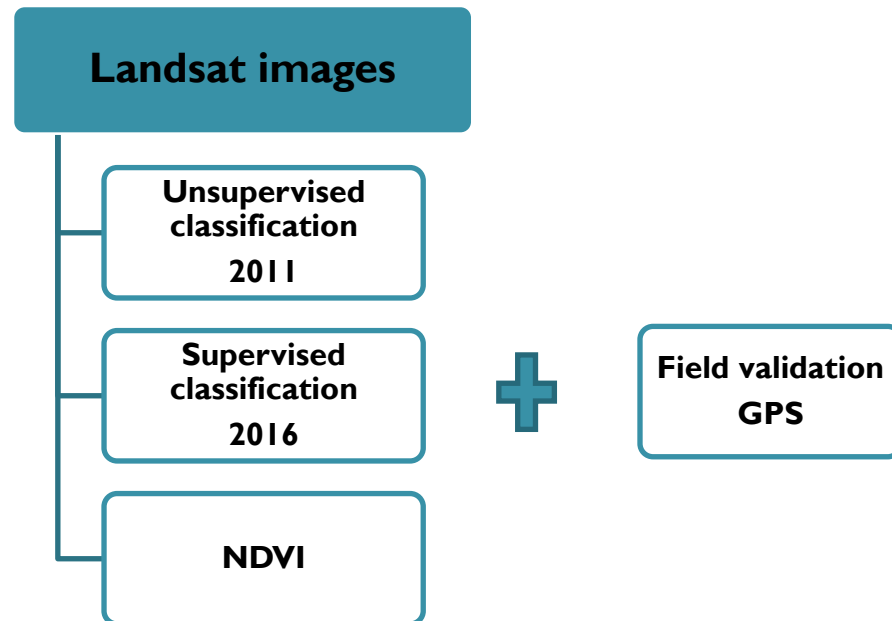
Crop change mapping

Space technologie solution N°1

Enfidha-Sousse

Land Use – Land Cover Monitoring

The knowledge of **spatial distribution of LU/LC** of large area is of great importance to regional planners and administrators.

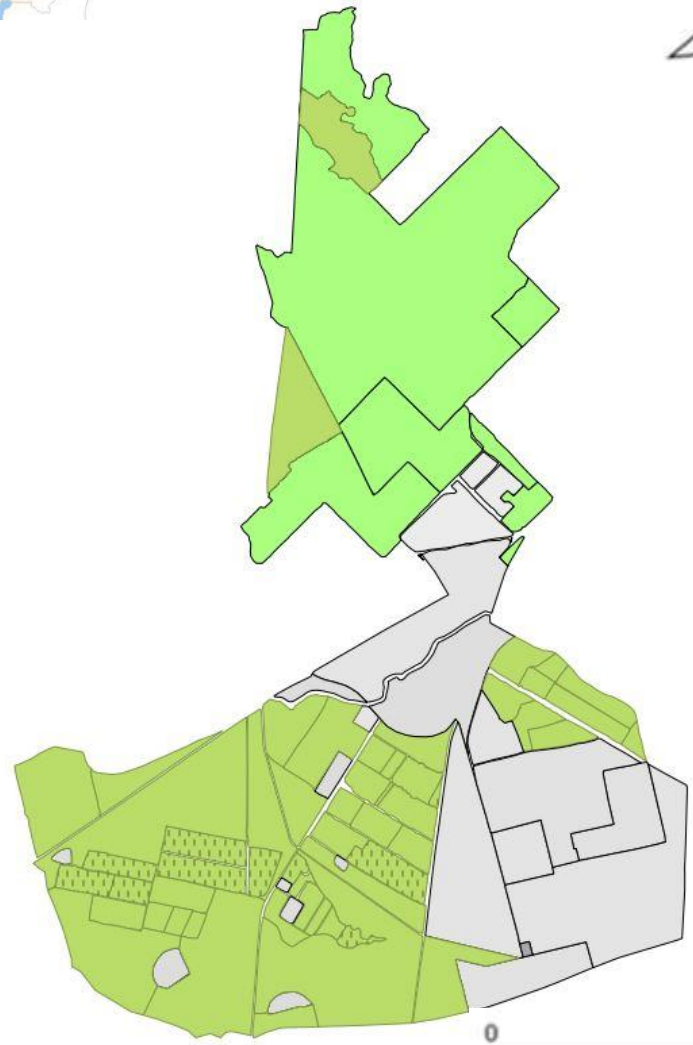


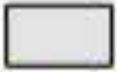

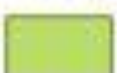



LU/LC MARS 2011

Enfidha-Sousse

UNSUPERVISED



-  constructions
-  annual crops+grazing
-  follow
-  olive groves and almond





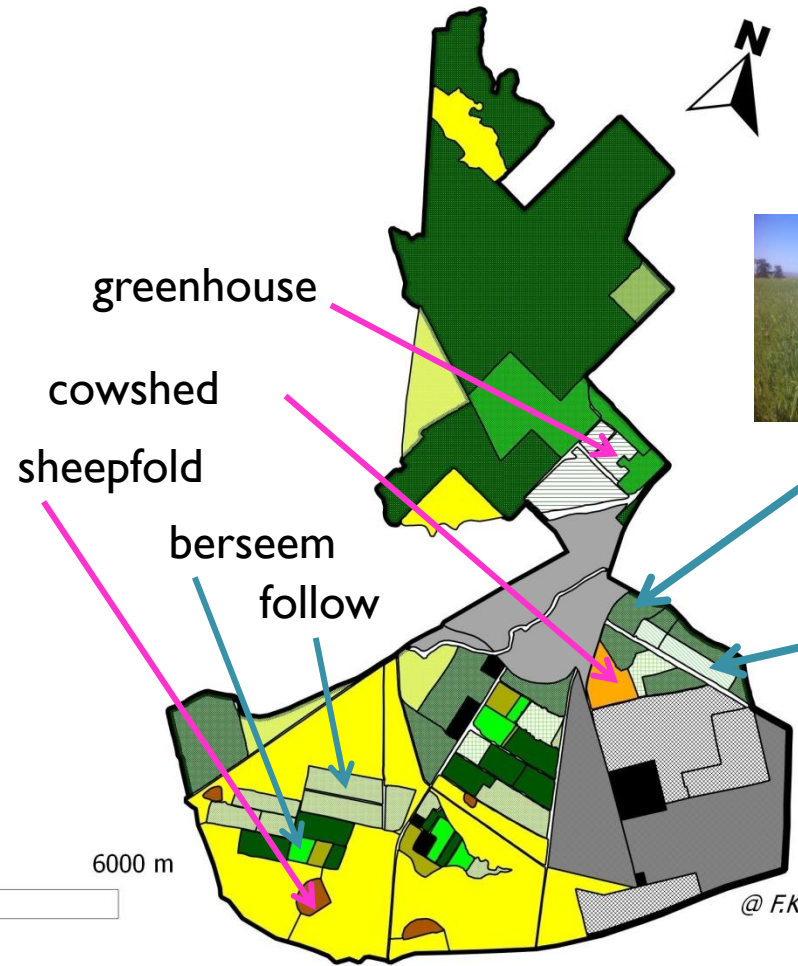
- Olivier
- Olivier en irrigué
- Amandier
- Parcours naturels
- Parcours améliorés
- Jachere
- Serres
- Avoine
- Bersim
- Luzerne
- Orge
- Raygras
- Triticale
- Bergerie
- Etable et silos
- Batiment
- Zone urbaine
- Zone privée
- Zone industrielle
- Limite de la zone d'étude



LU/LC MARS 2016

Enfidha-Sousse

SUPERVISED



barley

oat

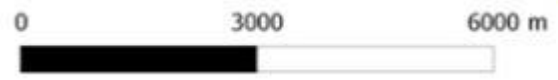
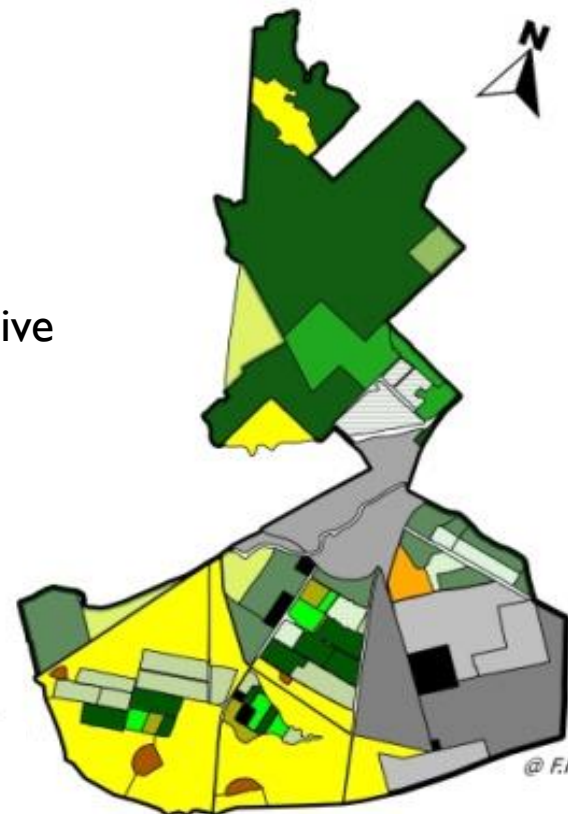
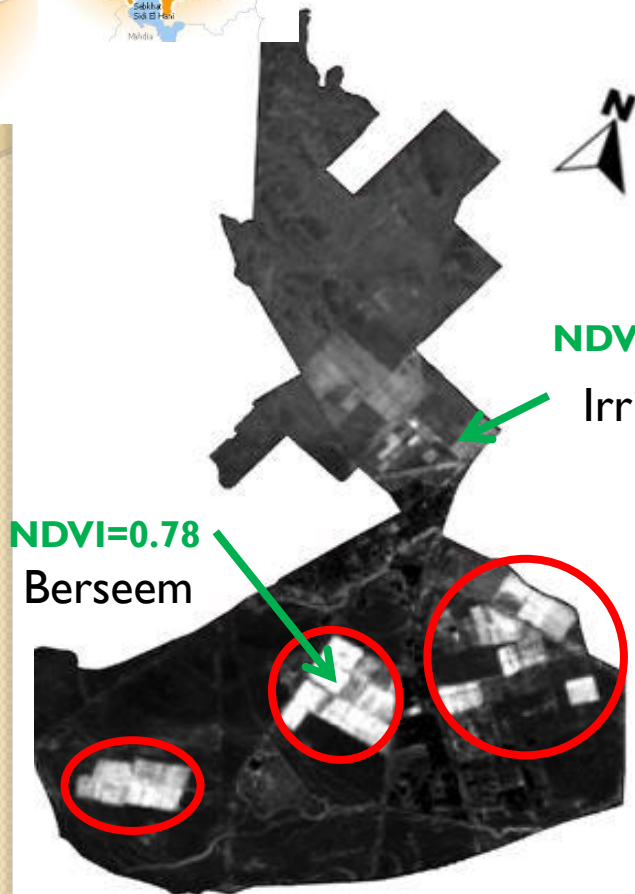
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NDVI index

LU/LC



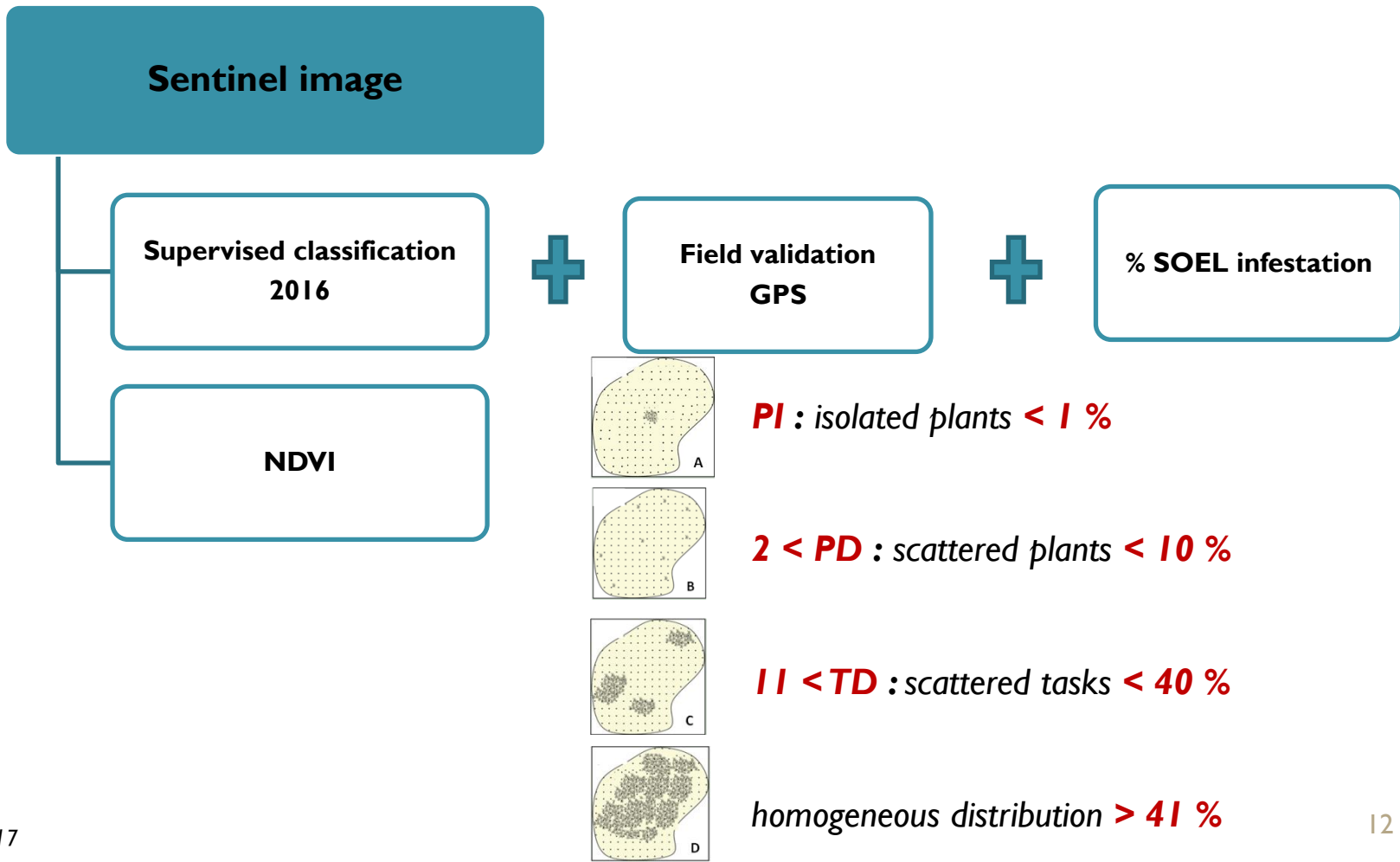
@ F.K. Allouche & A. Romdhane, 2017

Space technologie solution N°2



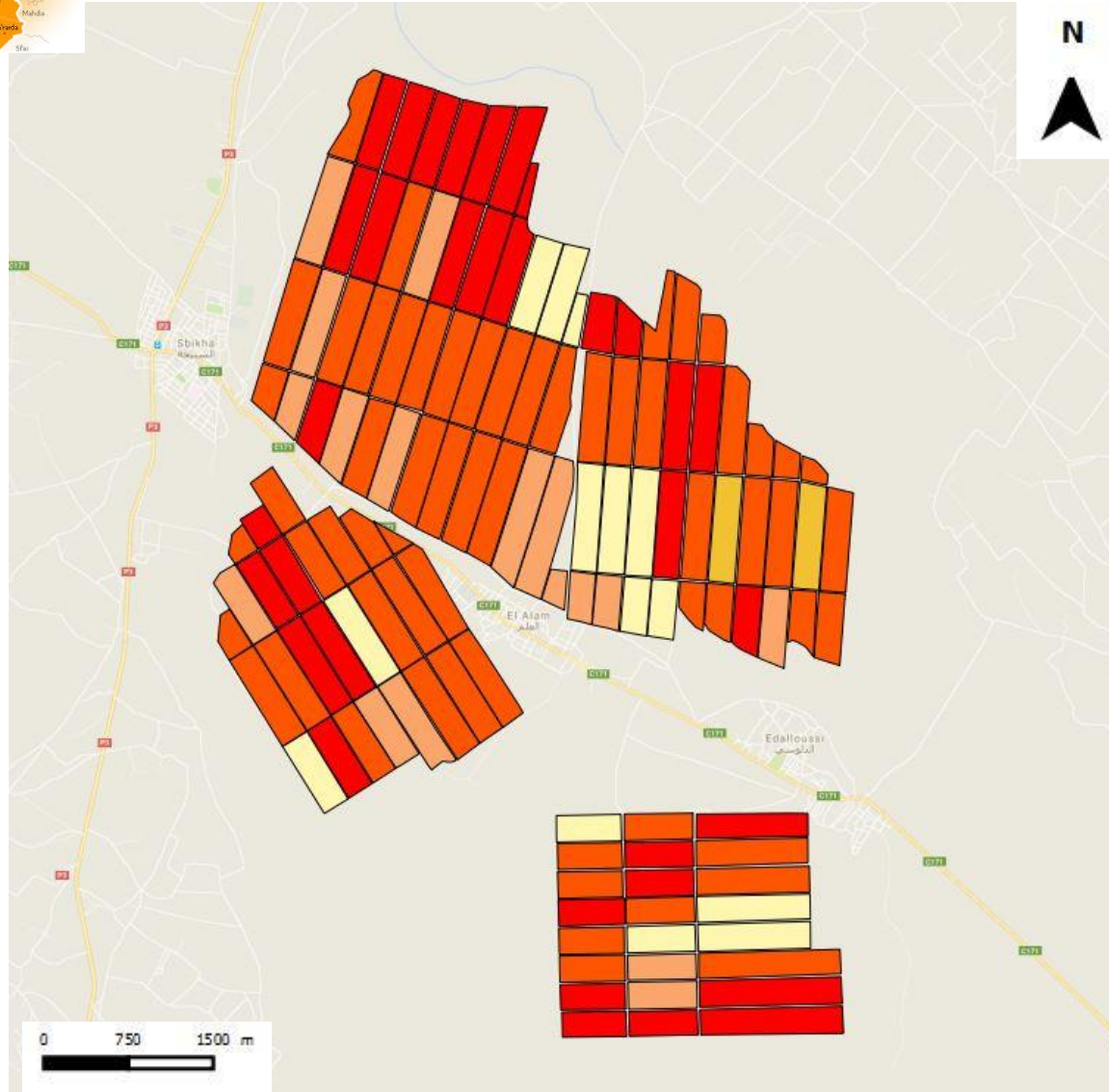
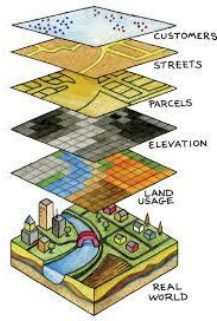
El Alam-Kairouan

Mapping the spatial distribution of SOEL

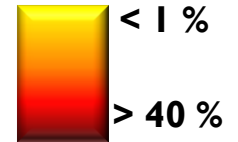


Spatial distribution of SOEL - 2016

El Alam-Kairouan



% SOEL infestation



Space technologie solution N°2



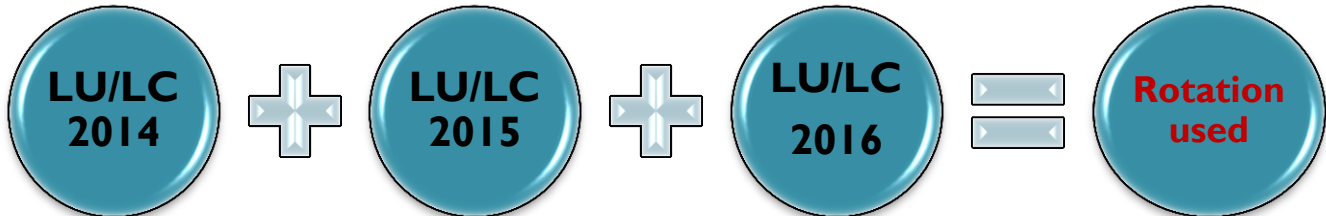
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Monitoring LU/LC

Data base-
Decision maker



GIS-data base



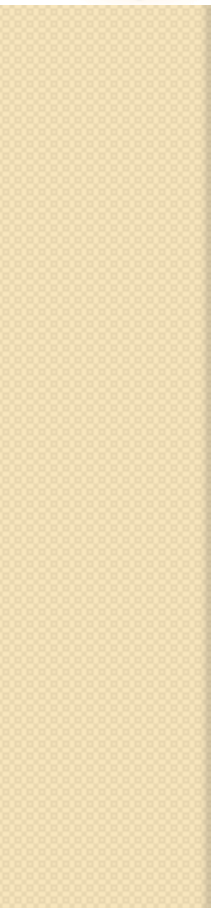
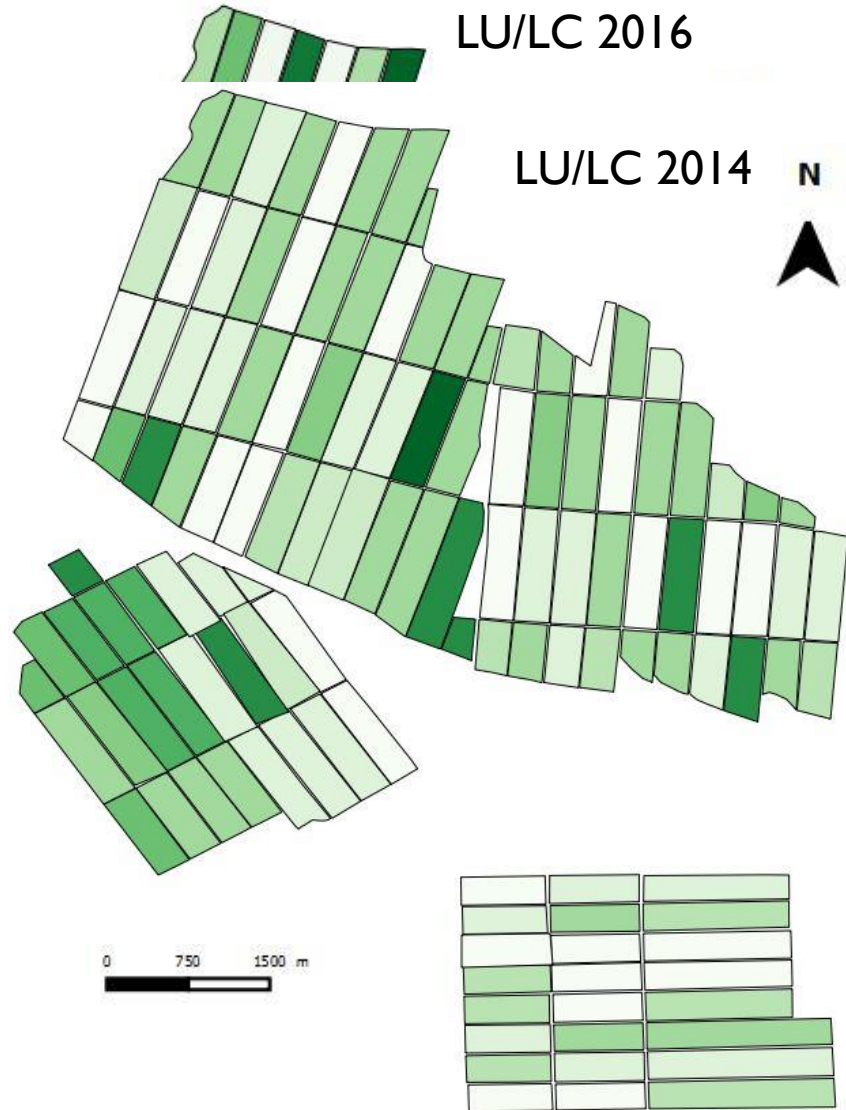
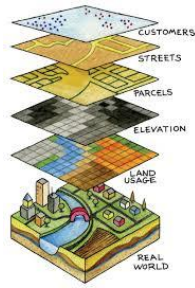
forage crop/grain farming/fallow

forage crop/forage crop/fallow

Grain farming/grain farming/fallow

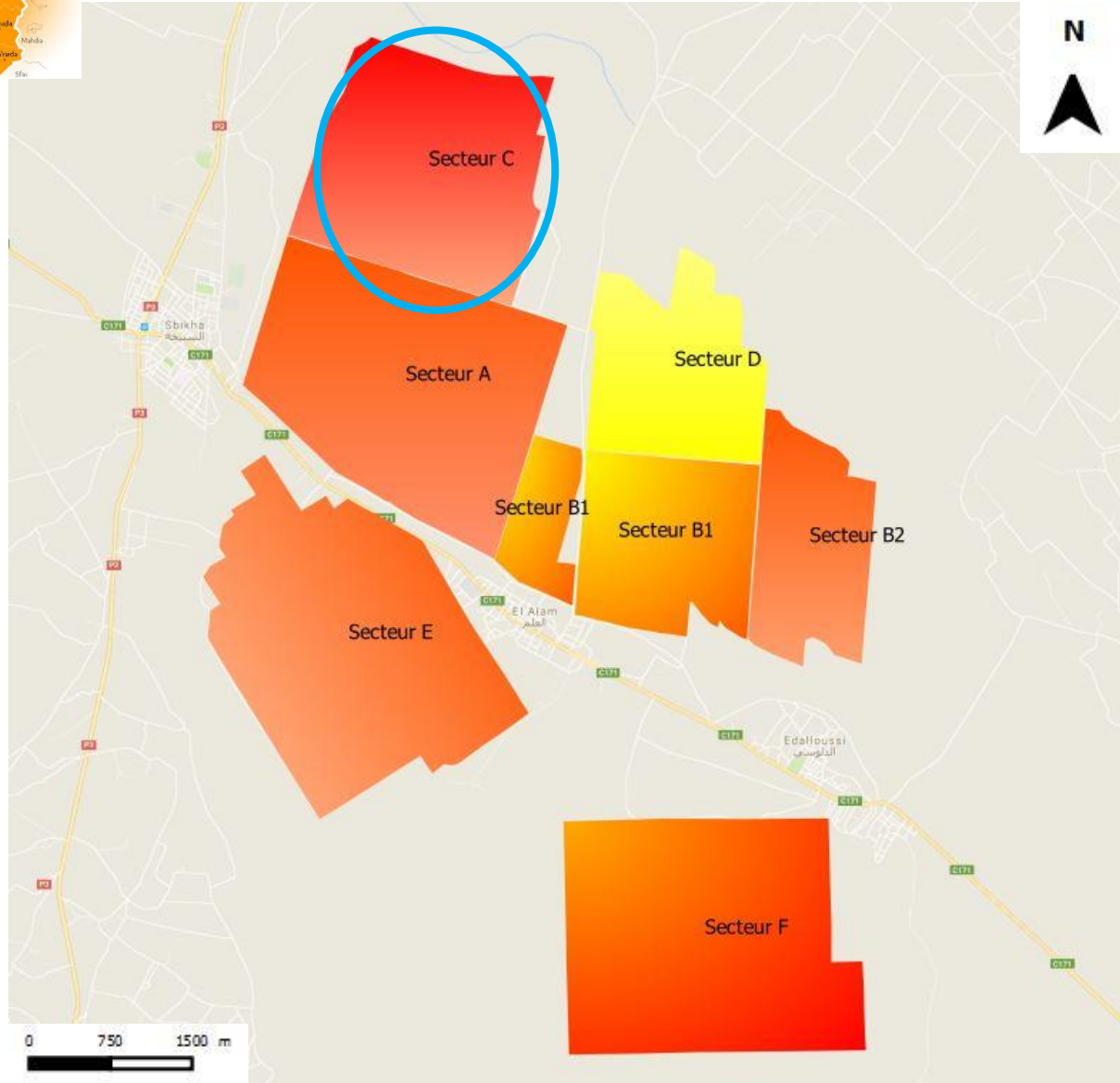
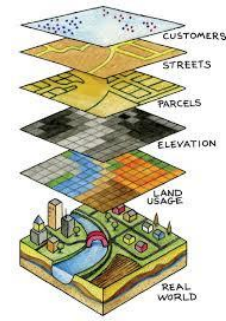


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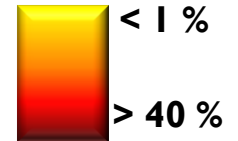


Spatial distribution of SOEL per sector - 2016

El Alam-Kairouan



% SOEL infestation



CONCLUSION

Earth Observation allow better monitoring and management of field data and rapid identification for the challenge solution.

Agricultural maps are a key baseline input for crop monitoring, early warning, spatial distribution knowledge, statistics crop monitoring and early warning activities.

Spatial information use inventory, monitoring and surveillance of the territory is considered us a ressource management tool.

Agriculture is one of the sectors that EO can provide valuable support for ITS management and decision-making.

The rapid progress of EO services requires continuous knowledge gain and scientific know-how

Geographic Information Systems and Databases, have the capacity for spatial analysis and the implementation of future scenarios.



THANK YOU