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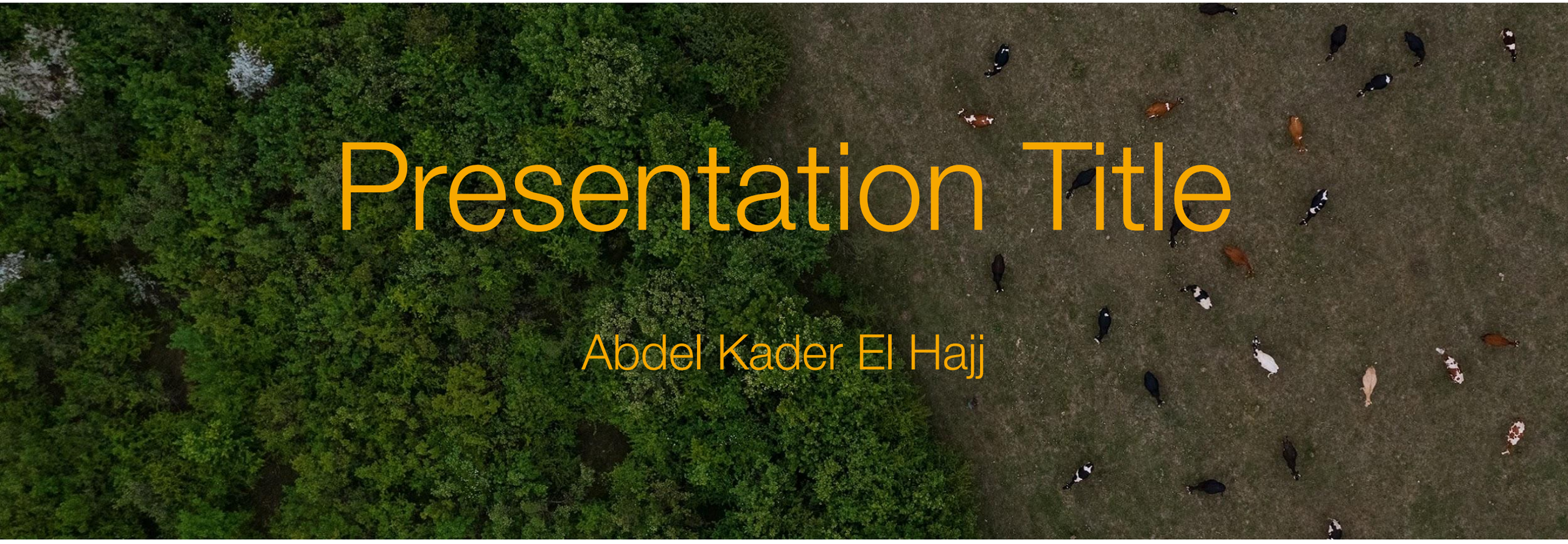

Presentation Title

Abdel Kader El Hajj

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Assessment of green manure and cover crop effects on soil characteristics and olive orchard productivity in South Lebanon

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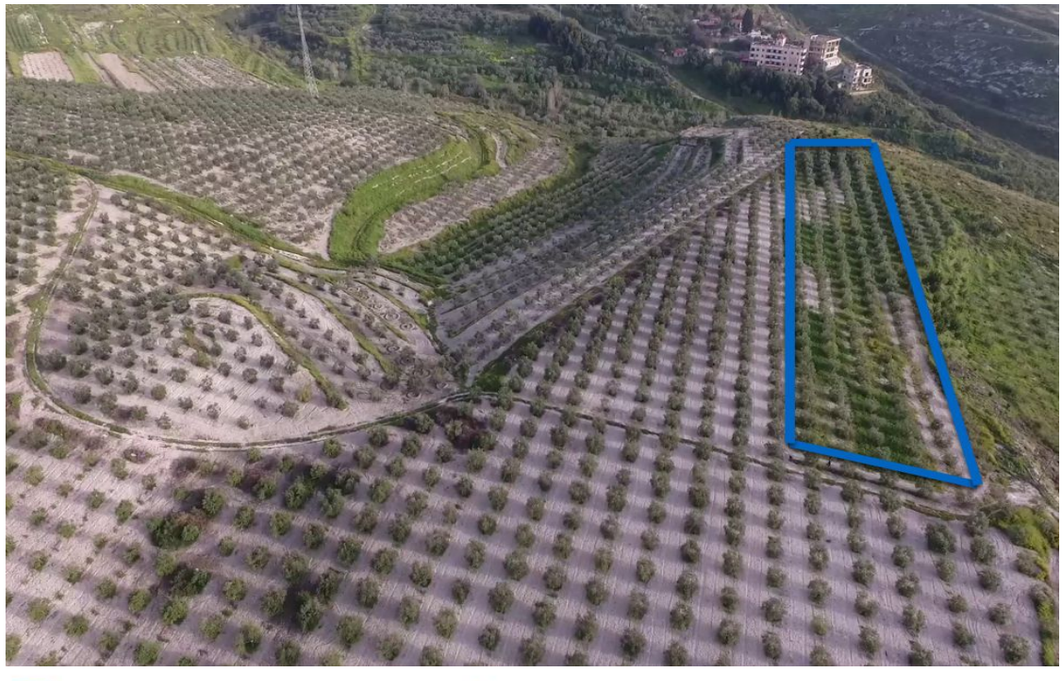
The experiment took place over a two-year period in a 12- year old olive grove in village of Abra, located in southern Lebanon.

The experiment was conducted within the olive grove on a 5.5 square meter plot with a moderate to steep slope.



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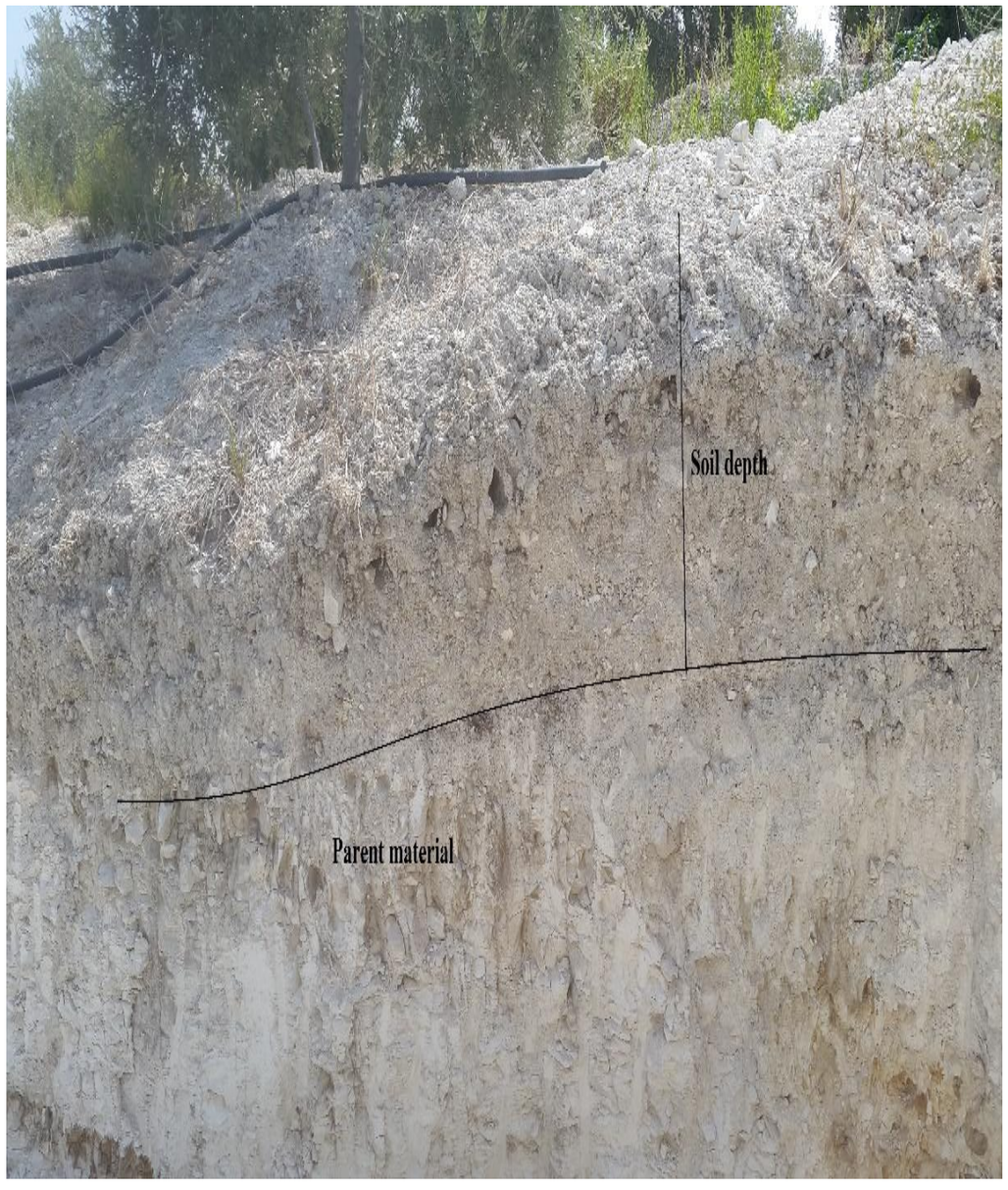
Characteristics of the location

- The orchard is located in the Abra region, covering an area of about 28 hectares
- Altitude: 160 m
- Rain fall: approximately 850 mm
- Olive varieties planted are non local.
- The soil is shallow, calcareous and poor in organic matter (2.2%).
- The orchard is plowed 2-4 times annually and receives a supplementary irrigation during summer.



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Looking for a solution

- All of these challenges (Sloppiness, shallow calcareous soil with low organic matter) necessitate the search for solutions that address environmental, economic, and social concerns.

- Our investigation eventually led us to explore the use of cover crops (Green manures and no tillage) as a solution to these concerns.

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Treatments

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The purpose of the innovation

The purpose of the study is to evaluate the impact of cover crop either as green manure or no tillage on olive grove and potential improvement of overall health, sustainability and productivity of the olive agroforestry.

This may include analyzing changes in soil fertility, nutrient content, water retention, and other soil characteristics, as well as studying the effects on olive tree growth, yield, and fruit quality.

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Which problem can this innovation solve?

- Erosion.
- Soil fertility.
- Weed control.
- Pest and disease management.
- Biodiversity degradation.
- Water management.
- Climate change.

Which is the geographical scale of interest/application?

- The geographical scale of interest for cover crops varies depending on the specific context and goals of the agroforestry system. Cover crops can be used on small scale, such as smallholder farms, or on large scale, such as commercial farms or even large-scale landscapes.

- Cover crops can be used in a variety of agro ecological zones, from tropical to temperate regions, and in different types of soils, from sandy to clay soils. Some cover crops are better suited to specific climate and soil conditions, so it's important to choose cover crops that are well-suited to the specific conditions of the location where they will be grown.

- Cover crops are especially valuable in areas where soil fertility is low, erosion is a problem, or where access to commercial fertilizers and pesticides is limited.

Who will benefit from this advancement?

- Olive farmers
- The environment
- Consumers
  - Low price
  - High quality products
- Local communities.
- Researchers and Scientists
- Policy makers

How much does the innovation cost for being adopted?

The cost of adopting innovation cover crops in olive agroforestry can vary depending on several factors:

- Type of cover crop used.
- Scale of the operation.
- Existing infrastructure and equipment available.

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How much does the innovation cost for being adopted?

Seed or planting material costs	Labor costs	Equipment costs
Irrigation costs	Management cost	Cost of research and development of new varieties of cover crops

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How much does the innovation cost for being adopted?

It is important to note that these costs should be balanced with the benefits of using cover crops in olive agroforestry.

Benefits

- Increased yield
- Improved soil health.
- Environmental and social benefits.

≥

Cost

- Seed or planting material costs
- Labor costs
- Equipment costs
- Irrigation costs
- Management cost

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What are the potential revenues and/or the potential savings from this innovation?

- Reduced input costs
- Increased yields
- Improved soil health
- Carbon sequestration
- Biodiversity conservation
- Water management.
- Market premiums.
- Increased sustainability

What are the potential revenues and/or the potential savings from this innovation?

Soil mineral nitrogen (kg/ha) as affected by the implementation of green manure and no tillage in olive grove in Abra Region

Treatments	Season			
	Spring 21	Autumn 21	Spring 22	Average
Vetch + Barley	81.4	13.6	22.5	39.2
No tillage	67.2	15.3	18.6	33.7
Vetch	99.0	31.1	41.4	57.2
Control	33.6	10.5	16.6	20.2
P	***<.0001***	***0.025***	***0.028***	***0.005***

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What are the potential revenues and/or the potential savings from this innovation?

Revenue

- 37.0 kg of mineral nitrogen gained from using vetch as a green manure/ha.
- These 37.0 kg of mineral nitrogen are equivalent to
  - 108 kg of ammonium nitrate (95.0$)
  - Or 80kg of urea (112$).

Cost

- The cost of vetch seeds at a seeding rate 140 kg/ha (1 kg of seed =1.1 $) = 154.0 $.
- The tilling cost of one hectare two times a year =400.0$
- Labor cost: manual broadcasting = 10$
- Total cost = 564.0$

The seeding rate depends on several conditions: Land topography; Soil type and fertility; Crop type; Climate and weather conditions.

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What are the potential social and environmental benefits of this innovation?

No-tillage and green manures can help to create more sustainable and resilient agricultural systems that provide multiple benefits for the environment, farmers, and local communities.

Environmental benefits

- Soil conservation
- Carbon sequestration
- Biodiversity
- Water conservation
- Reduced chemical use
- Pest and disease control

Social benefits

- Improved food security
- Improved livelihoods
- Enhanced employment opportunities.
- Education and training
- Community involvement

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Thank You

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