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Technology dissemination workshop organized by the **Lebanese Agricultural Research Institute (LARI)** within the **LIVINGAGRO** project activities (Activity 4.3.2)

"Intercropping in olive orchards: Assessment of the effect of soil management and different cover crops on soil characteristics"

















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«Assessment of the effect of soil management and different cover crops on soil characteristics »

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- Olive growing is a very important historical practice in almost all Lebanese villages
- Table olives as well as olive oil are considered vital components of the Lebanese diet
- The Lebanese olive orchards are considered as traditional rainfed orchards
- The traditional "Baladi" variety described as highly alternate bearing variety





















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«Assessment of the effect of soil management and different cover crops on soil characteristics »

- Studies have focused on the effect of cultivar, irrigation, harvesting and processing systems on the quality of olive oil.
- Fertilization practices still restricted to the minimum
- No studies have been conducted on the effect of fertilization and especially green fertilization on the:
 - Tree productivity
 - Olive oil quality
 - Alternate bearing of the olive tree











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- It is necessary to provide the best fertilization system at the minimum cost
- The objective of this experiment will be to assess the effect of combining







Field experiment:

The field comprises originally 70 trees from the "Baladi" variety, planted in 1996, in 7 columns and 10 rows with a spacing of 6.5m between rows and columns









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The experiment consisted of two field trials over two consecutive years.

First year included three intercrops:

- Common vetch (Vicia sativa) •
- Barley (Hordeum vulgare) •
- Mixture of vetch and barley •
- Unplanted control





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Second year consisted of three treatments, one negative control and one positive control. Each of the treatments and controls were represented by six replications (Trees)

- Faba beans (Vicia faba)
- Broccoli (Brassica oleracea var. italica)
- Barley (Hordeum vulgare) with common vetch (Vicia sativa)











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Studied parameters:

Soil T0 (Dec) & Tf (Apr) from two depths (0-20 cm and 20-40 cm) to measure:

- ≻ pH
- > Texture
- Calcium carbonate
- Organic matter









Nitrate

Ammonium

Phosphorus





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Studied parameters:

Leaf samples at T0 (Dec) ar d Tf (May) to determine the level of:







Studied parameters:

- Plant height and yield of faba plants
- Broccoli fresh and dry biomass weight
- Vetch, barley and weeds proportion and dry weight
- Weeds dry weight in the negative control treatment
- Plant nitrogen content
- Soil mineral nitrogen

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Results:

- Soil was sandy clay with pH 7.15
- EC 0.09 mS/cm
- Calcium carbonate 19%
- Organic matter 3.4 %

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«Assessment of the effect of soil management and different cover crops on soil characteristics » Results:

- Season 2019-2020 was wetter and cooler than 2021-2021, with a biomass of 272 g/m2 compared to 461 g/m2 in the latter year for the control
- In 2019, weeds biomass represented 32% in the vetch-barley mixture, against





«Assessment of the effect of soil management and different cover crops on soil characteristics » <u>Results:</u>

- Faba yield of 100 kg \rightarrow 600 g/m2 pods (10 pods/plant)
- Fresh mass production was 2169 g/m2 for faba shoots
- Fresh mass production was 2031 g/m2 for the mixture
- Fresh mass production was 2261 g/m2 for the control
- Moisture contents ranged between 77% and 81%. Fresh material could be dried down to a moisture close to 15%, and used as dry fodder

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Results:

- 44% Vetch, 28.2% Barley, 27.8% weeds on fresh weight basis resulting in 58% less weeds than the control
- Broccoli plants mean fresh weight 170 g and produced 12% DM

















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Results:

· [15 April 2019		20 April 2021		
	Treatment	Mineral N (mg/kg soil)	Treatment	Mineral N (mg/kg soil)	
	Control	15.75 ± 1.62	Control	24.32 ± 1.99	
	Barley	12.25 ± 2.80	Faba bean	31.37 ± 3.81	
	Vetch	16.04 ± 1.23	Herbicide	26.67 ± 2.12	
	Barley &Vetch	14.29 ± 1.23	Faba > Control	l	
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<u>Results:</u>

- No difference was observed between faba bean and the others in mineral N
- This lack of differences could be linked to environmental conditions, especially the lack of rainfall and the availability of soil moisture. As the rain comes back in late fall, the soil nitrate may rise again under faba bean and other legumes











Project funded by the

EUROPEAN UNION















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Results:

 ANOVA analysis showed that there was no significant difference in the variation of the concentration of the leaf nutrients between the TO and Tf for all of the six measured elements





















«Assessment of the effect of soil management and different cover crops on soil characteristics » <u>Conclusion:</u>

- The sowing of a legume-cereal cover crop mixture resulted in a higher net biodiversity effect and a higher nitrogen yield in the above-ground parts
- The stalks of faba bean had 81.4% moisture content and below 10% ash content, indicating how fresh and green these were and making those immature stalks suitable as feed for small ruminants



















«Assessment of the effect of soil management and different cover crops on soil characteristics » <u>Conclusion:</u>

- The adoption of a cover crop as a soil management practice can be a feasible way to reach sustainability in many olive-cropped soils on a long-term basis
- Intercropping could provide olive growers with an additional source of income especially if managed to improve soil moisture and mineral nitrogen capture. Overall, the results suggest that intercropping with legumes and cereals could be a promising strategy for improving olive orchards production in Lebanon



















Thank you



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This publication has been produced with the financial assistance of the European Union under the ENI CBC Mediterranean Sea Basin Programme. The contents of this document are the sole responsibility of the Lebanese Agricultural Research Institute (PP3-LARI) and can under no circumstances be regarded as reflecting the position of the European Union or Programme management structures.









