



AGROECOLOGY EUROPE  
FORUM 2023 IN HUNGARY  
CONVERGING MOVEMENTS  
FOR RESILIENT FOOD SYSTEMS

16-18 November 2023  
Gyöngyös, Hungary

# DEVELOPING A DECISION SUPPORT TOOL FOR SUSTAINABLE VITICULTURE: INSIGHTS ON THE AGROECOLOGICAL ASSESSMENT OF PRACTICES IN CRETAN VINEYARDS



**SOTIRIOS PILAFIDIS  
MAICH-CIHEAM  
CRETE, GREECE  
ECOVINEGOALS**

## SESSION 6: AGROECOLOGY AND DIGITALISATION

ORGANISED BY:

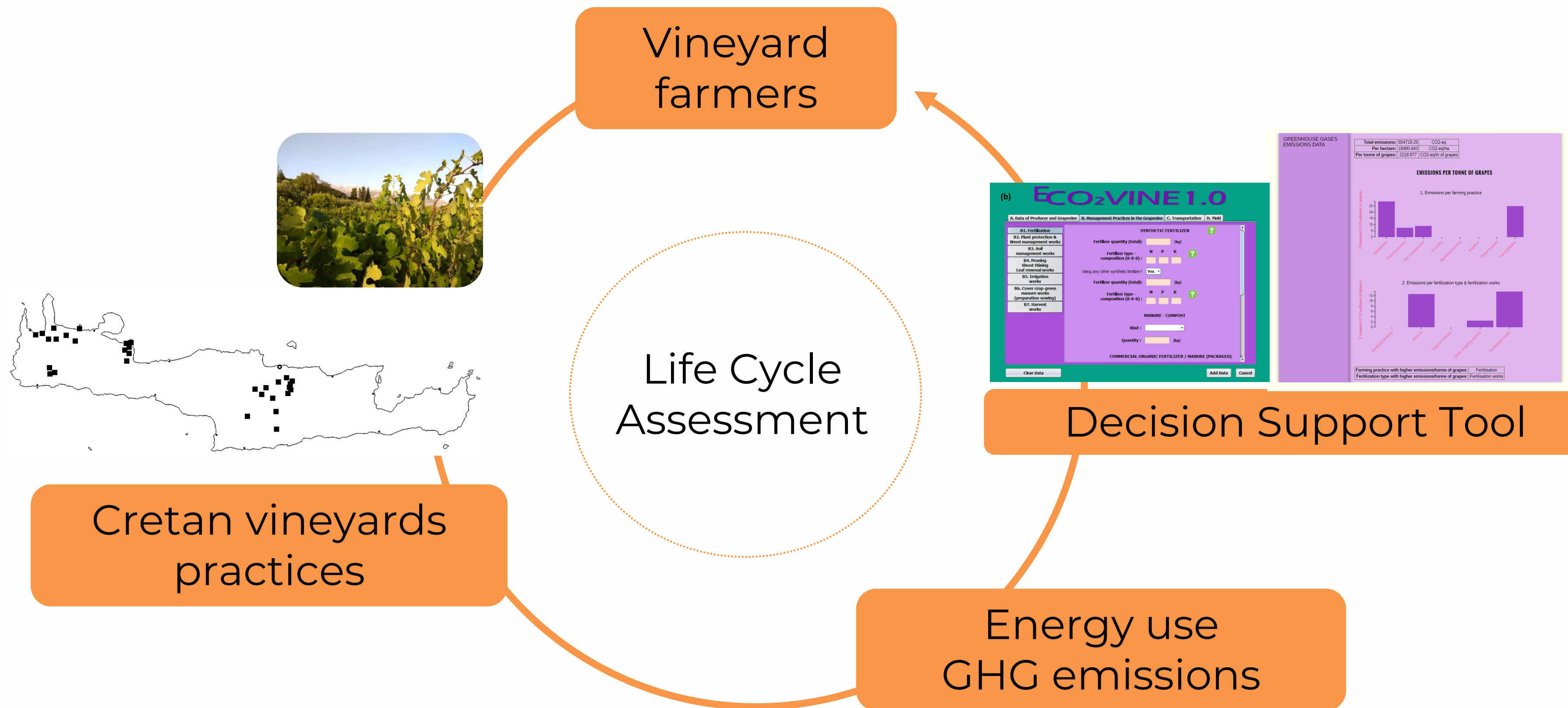


**#AEEUForum2023**

WITH THE SUPPORT OF:



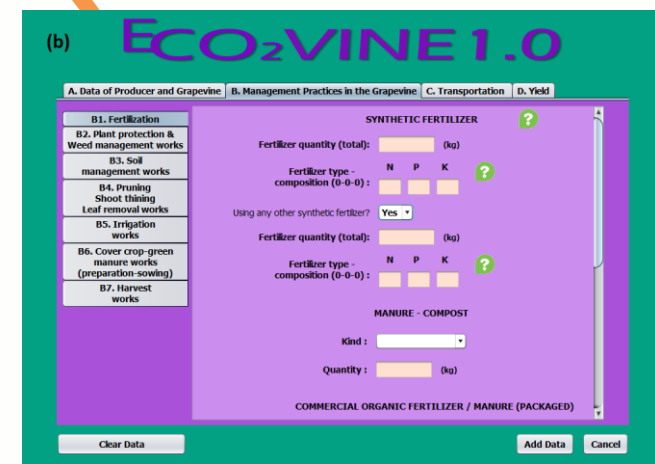
# Developing a Decision Support Tool for sustainable viticulture: Insights on the agroecological assessment of practices in Cretan vineyards



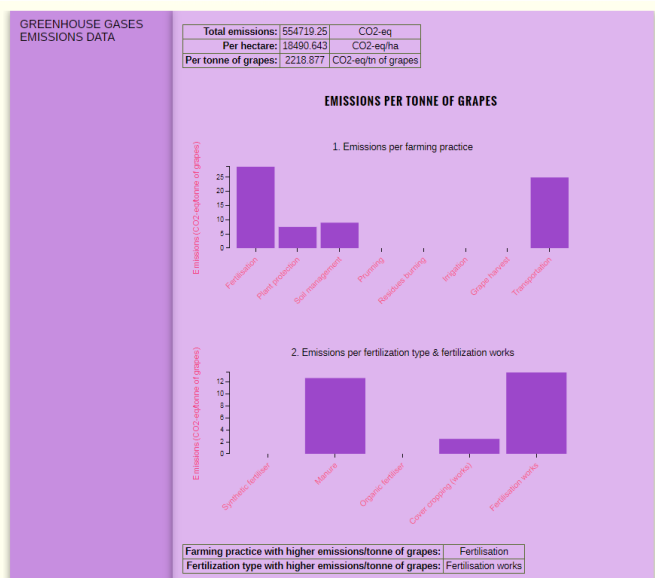
Vineyard farmers



Life Cycle Assessment

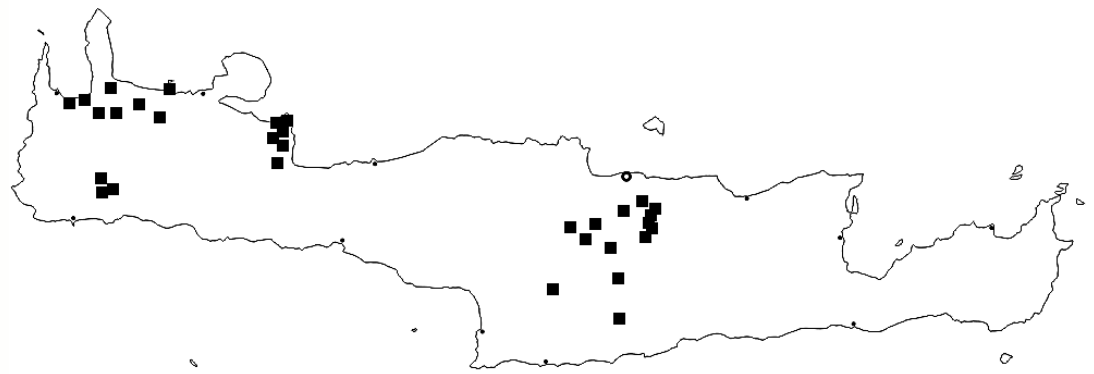


Decision Support Tool



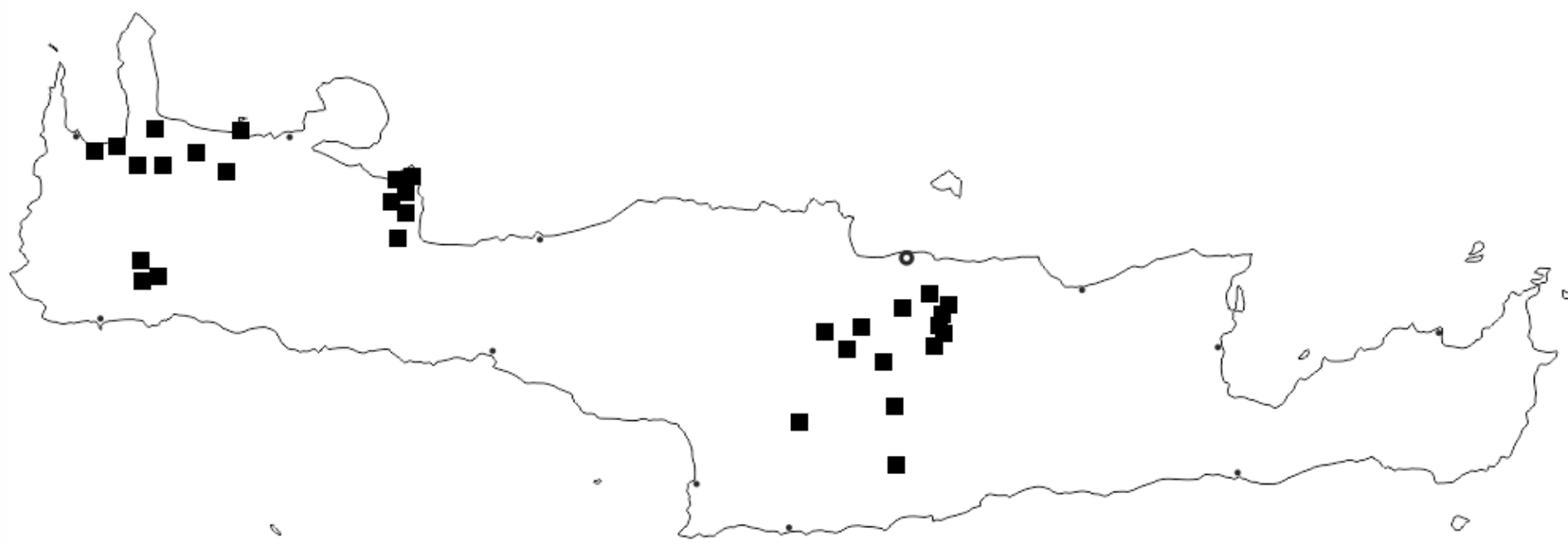
Energy use  
GHG emissions

Cretan vineyards practices



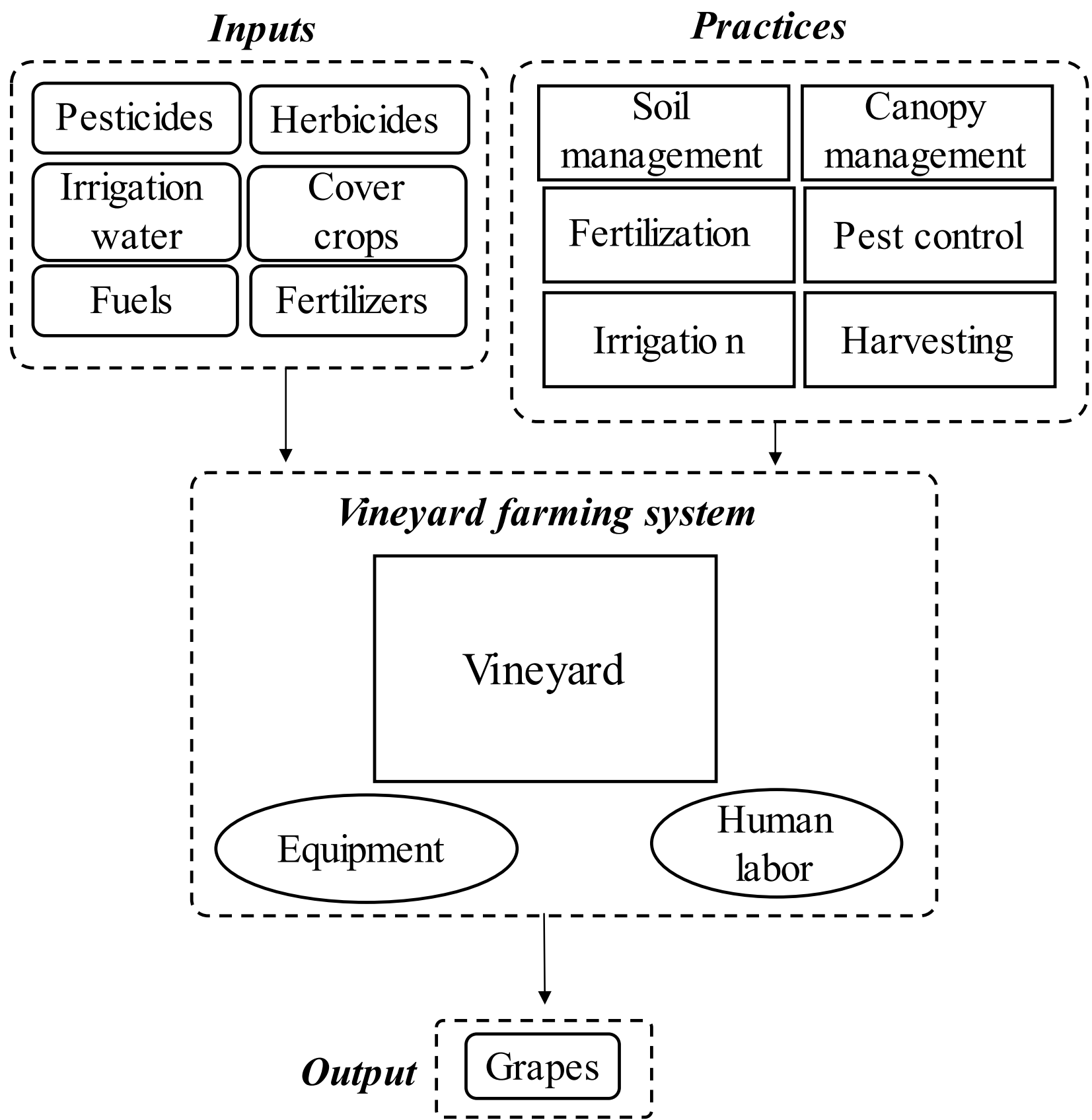
# Cretan vineyards in this study

- 30 vineyards
- 2 prefectures
- Altitude ranged from 0m - 800m.
- Vineyards under study total area: 122 ha average size was 4.1 ha
- Land fragmentation and ageing population problems



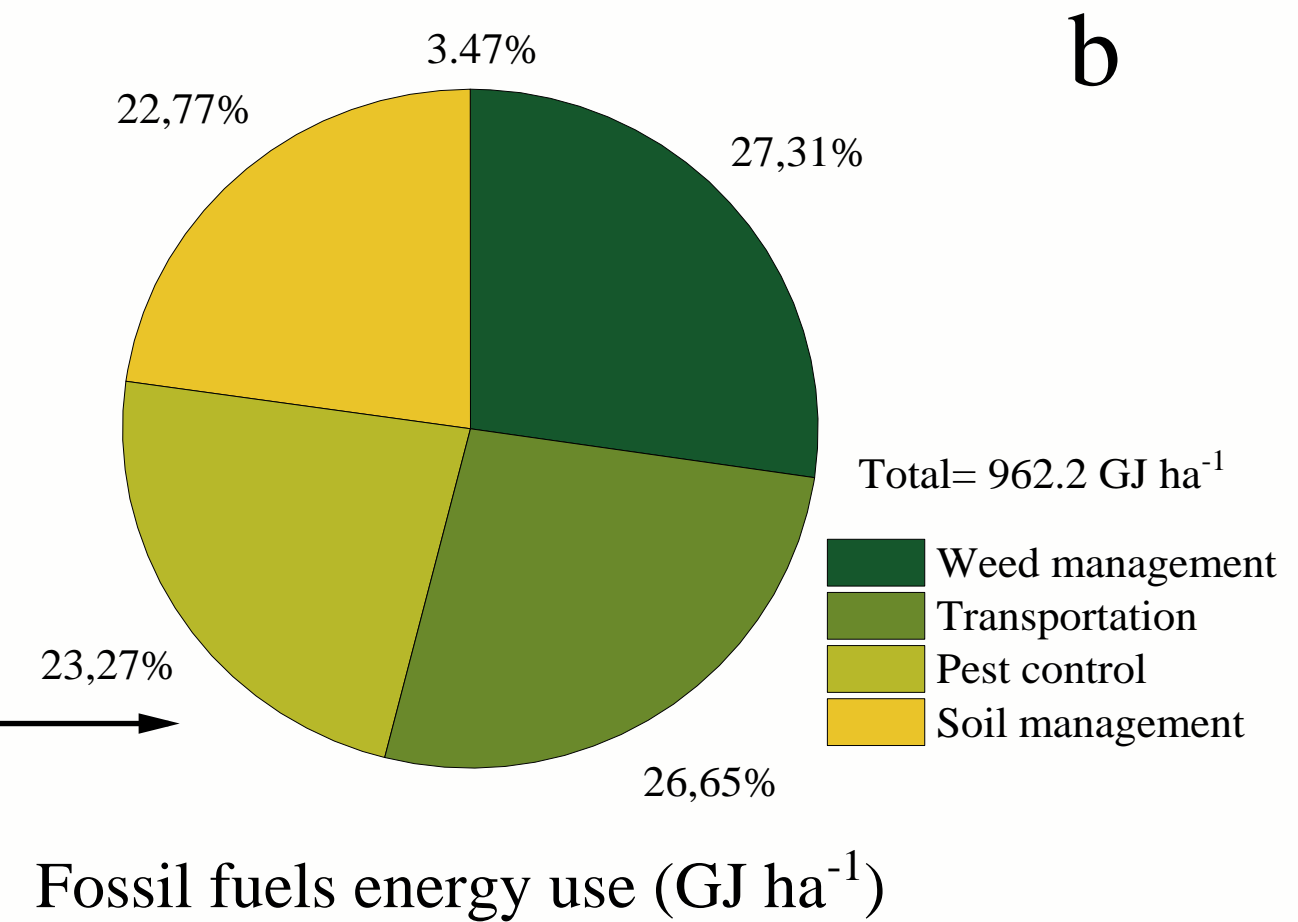
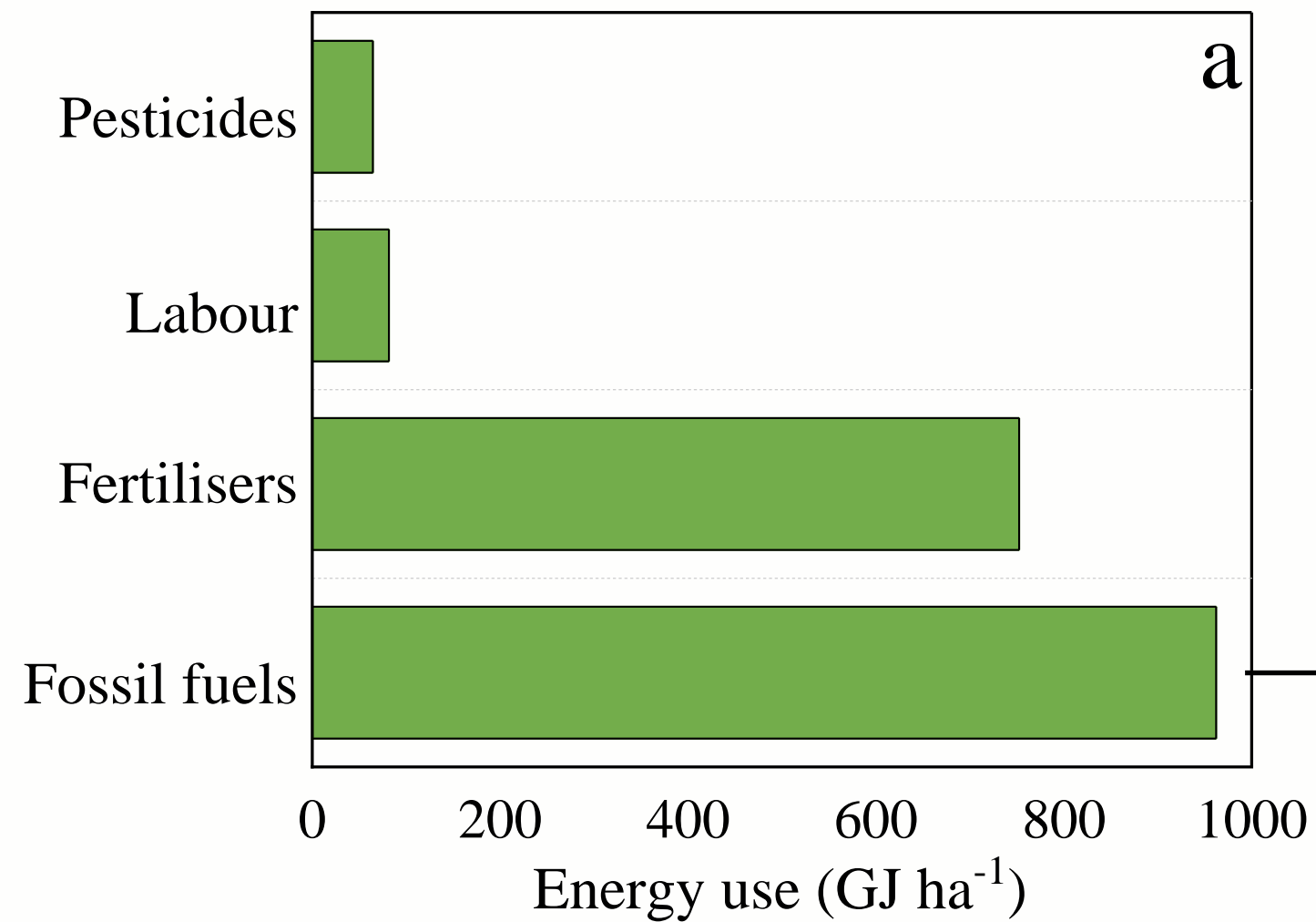
- **Syrah** was the most common variety
- Local varieties: **Romeiko, Vidiano**
- Other: Kotsifali, Cabernet Sauvignon, Sauvignon blanc, Chardonnay, Malagouzia, Razaki, Asyrtiko, Agiorgitiko, Liatiko, Moschato Spinas, Mandilari, Malvazia and Vilana.

# Life cycle analysis



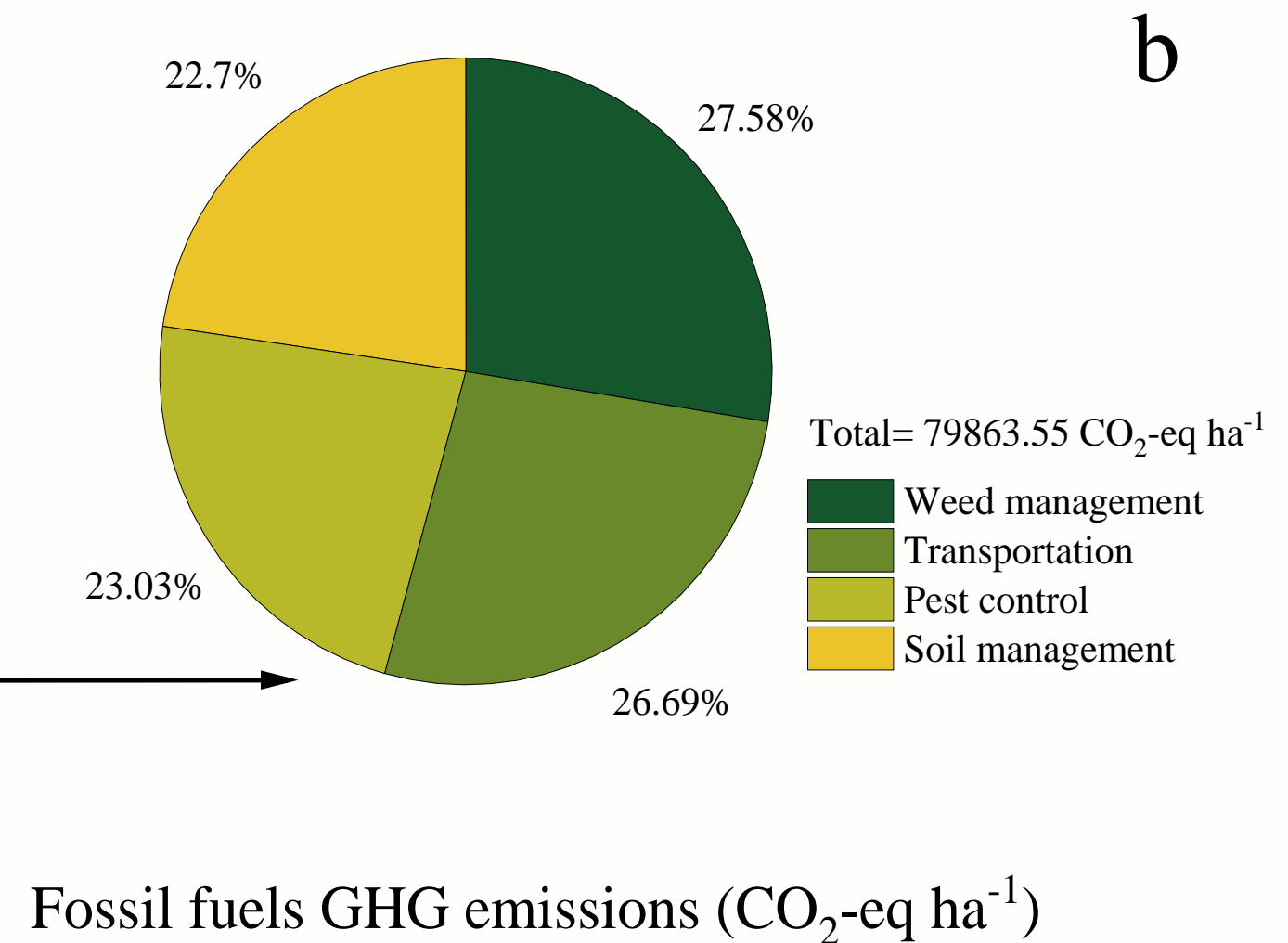
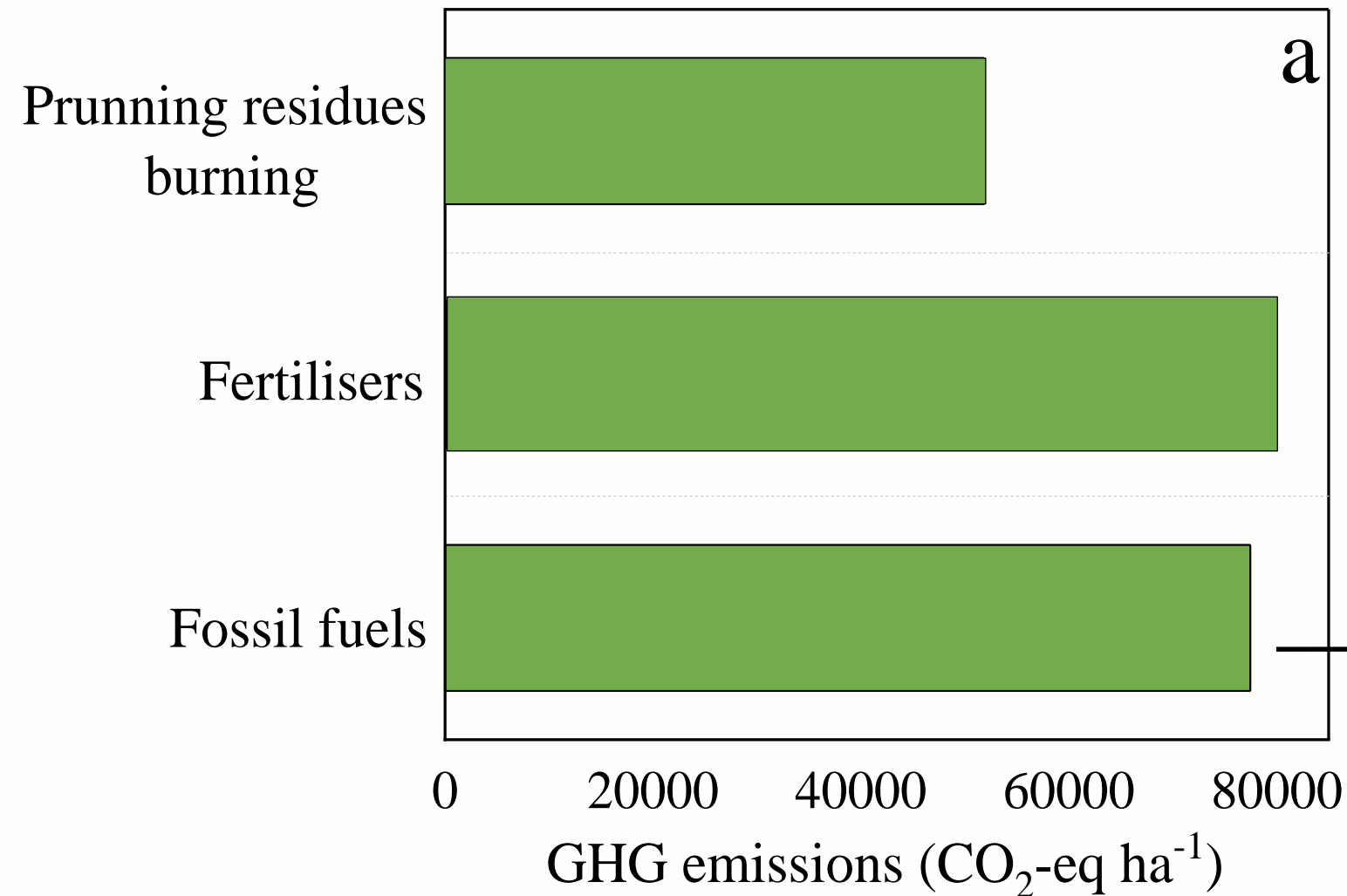
- Structured questionnaire
- 2 harvesting seasons (2019 and 2020)
- Key stages of viticulture: all practices, inputs and equipment use.
- Application rates, machinery owned, used, rented, operation hours, workers
- Simplified life-cycle approach, cradle-to-farm gate

# Results – Total energy use



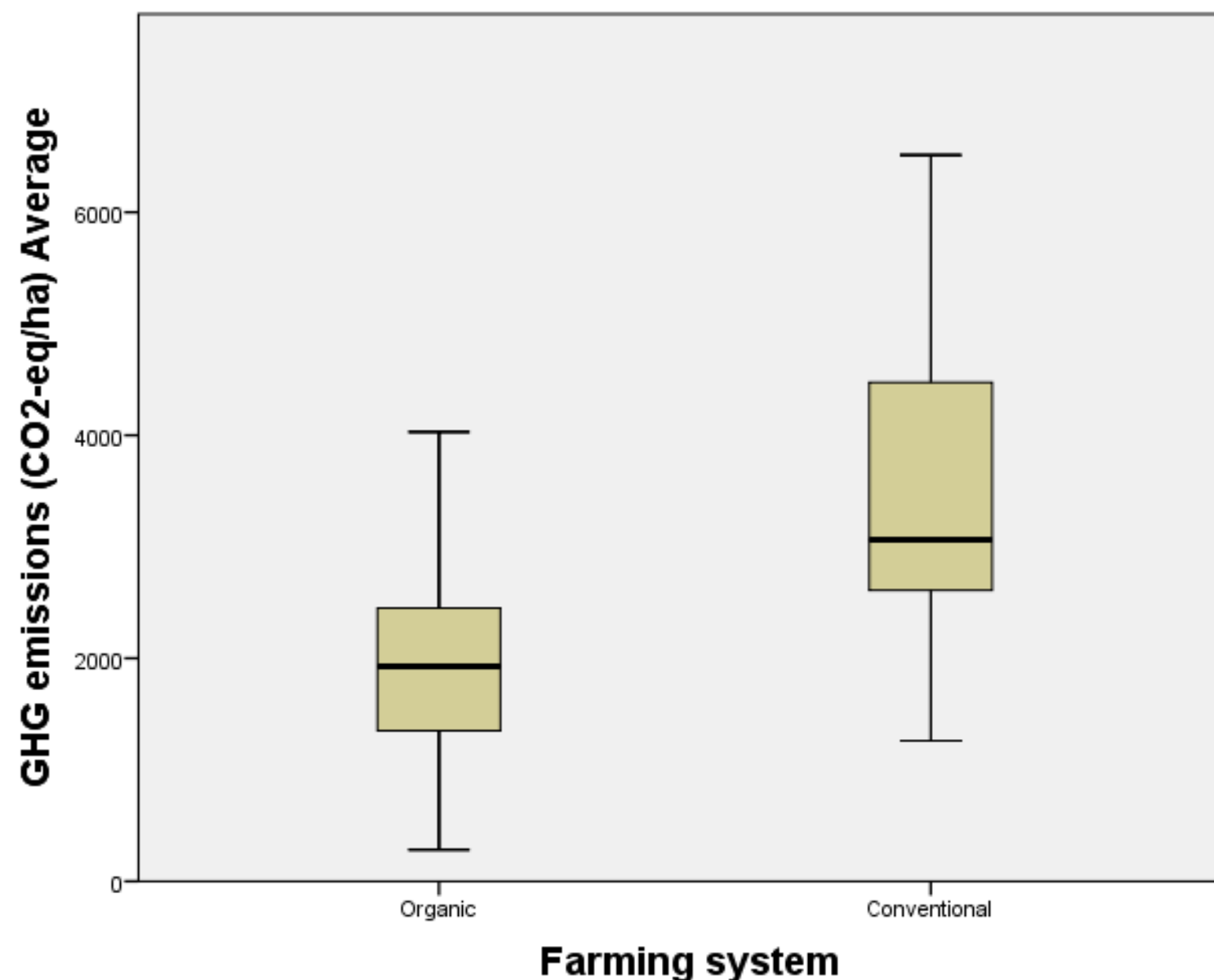
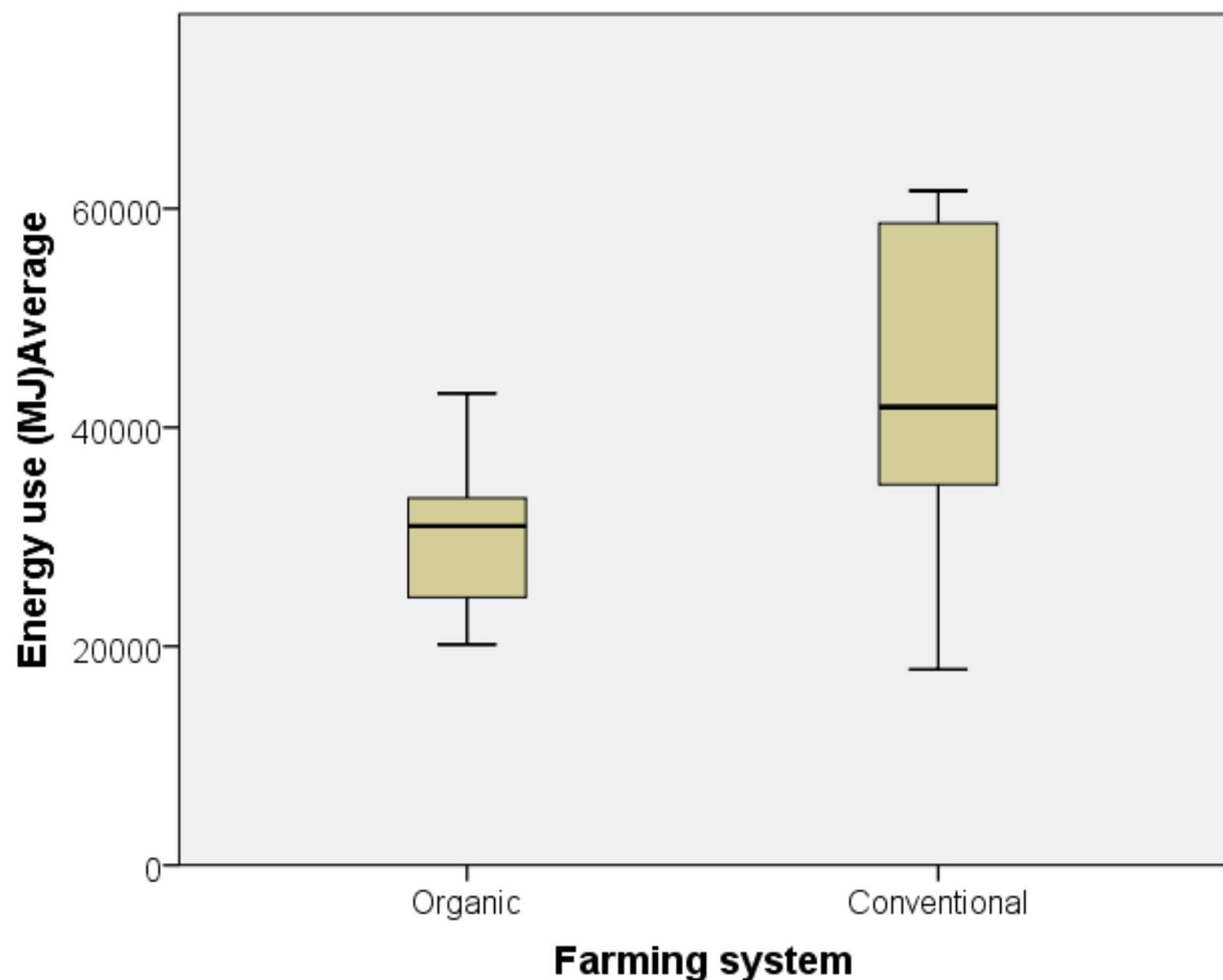
- Fossil fuels accounted for 52% of the total energy use, fertilisers 40%, labour (4%), pesticides (3%)
- Average energy use: 1,188 GJ/ha
- Average energy intensity: 5.9 MJ/ha/kg of grapes

# Results – GHG emissions



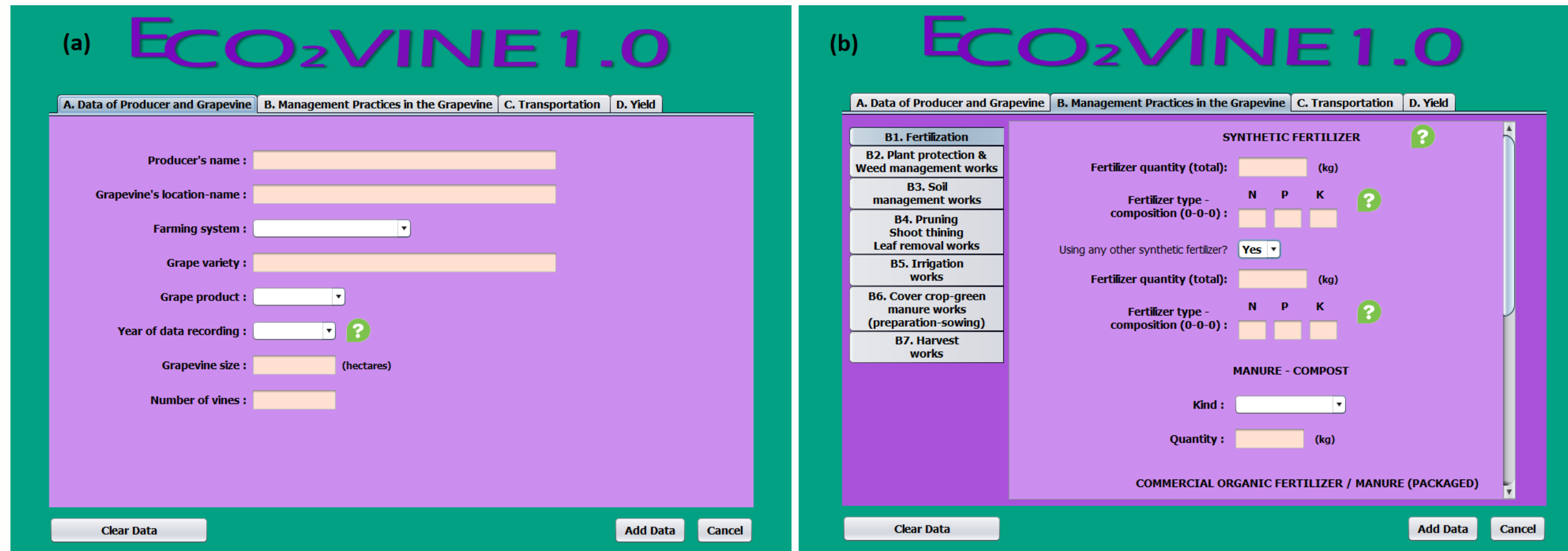
- Fertilisers 38%, fossil fuels 37%, burning of the pruning residues 25%
- Average carbon footprint: 0.39±0.07 CO<sub>2</sub>-eq/kg of grapes
- Literature reports carbon footprint ranges from 0.2 - 2 CO<sub>2</sub>-eq/kg of grapes (Ferrara et al. 2018).

# Organic vs conventional vineyards



- Conventional vineyards had an average of 86% more total GHG emissions and 39% more energy consumption
- Higher GHG emissions of conventional vineyards mainly due to burning of pruning residues.

# Development of ECO2Vine 1.0 decision support tool



**(a) ECO<sub>2</sub>VINE 1.0**

A. Data of Producer and Grapevine | B. Management Practices in the Grapevine | C. Transportation | D. Yield

Producer's name :

Grapevine's location-name :

Farming system :

Grape variety :

Grape product :

Year of data recording :  ?

Grapevine size :  (hectares)

Number of vines :

Clear Data | Add Data | Cancel

**(b) ECO<sub>2</sub>VINE 1.0**

A. Data of Producer and Grapevine | B. Management Practices in the Grapevine | C. Transportation | D. Yield

B1. Fertilization  
B2. Plant protection & Weed management works  
B3. Soil management works  
B4. Pruning Shoot thinning Leaf removal works  
B5. Irrigation works  
B6. Cover crop-green manure works (preparation-sowing)  
B7. Harvest works

**SYNTHETIC FERTILIZER** ?

Fertilizer quantity (total):  (kg)

Fertilizer type - composition (0-0-0) : N P K ?

Using any other synthetic fertilizer? Yes

Fertilizer quantity (total):  (kg)

Fertilizer type - composition (0-0-0) : N P K ?

**MANURE - COMPOST**

Kind :

Quantity :  (kg)

COMMERCIAL ORGANIC FERTILIZER / MANURE (PACKAGED)

Clear Data | Add Data | Cancel

- Java® language for low installation complexity.
- DST's output (HTML) that can be viewed using any web browser.



# ECO2Vine 1.0 decision support tool

Results of Energy use and Greenhouse Gases Emissions of the Grapevine

PRODUCER & GRAPEVINE PROFILE DATA	
Producer:	Gavalas Nikos
Grapevine code:	Fragospito
Management system:	Organic
Variety:	Vidiano-Syrah-Vilana-Mandilari-Kotsifali
Year of management:	2020
Product:	Wine
Grapevine size (hectares):	30.0
Vines number:	90000

YIELD DATA	
Grape quantity:	250000.0 Kg

FERTILIZATION DATA	
Type of fertilization	Quantity (Kg)
Synthetic (N-P-K)	0.0
Manure	150000.0
Commercial Organic fertilizer	0.0
Cover crops (Seeds)	10000.0

ENERGY CONSUMPTION DATA	
Total fuel consumption	
Diesel:	3520.0 liters
Gasolize:	1237.0 liters
Total energy consumption:	309754.44 Mj
Per hectare:	10325.147 Mj/ha
Per tonne of grapes:	1239.0177 Mj/tn of grapes



- Energy use and GHG emissions/tonne of grapes produced
- Production hotspots



# Conclusions

- Fossil fuels consumed by machinery, and the use of synthetic fertilisers, were the main practices related to high energy consumption and GHG emissions.
- Burning of the pruning residues accounts for 25% of GHG emissions
- Discontinuing/substituting this practice can significantly reduce the carbon footprint of a vineyard.
- ECO2VINE DST enables farmers to have an overview and experiment with alternative practices and input amounts to improve energy efficiency and carbon footprint
- Directly supports action towards SDG 11, SDG 12, SDG 13, SDG 15.



# Thank you for your attention



Sotirios Pilafidis  
[spilafidis@eie.gr](mailto:spilafidis@eie.gr)  
@mycognostix

Funded by ECOVINEGOALS (Interreg-Adrion)



Ecological Vineyards Governance Activities for Landscape's Strategies